Geohazard Exploration Report (Final)
CUY-480-16.56 Landslide
Brooklyn Heights, Cuyahoga County, Ohio
S&ME Project No. 24170140E

PREPARED FOR:

ODOT District 12
5500 Transportation Boulevard
Garfield Heights, OH 44125

PREPARED BY:

S&ME, Inc.
6190 Enterprise Court
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December 17, 2025

December 17, 2025

ODOT District 12
5500 Transportation Boulevard
Garfield Heights, OH 44125

Attention: Mr. Erika Kenzig, P.E.

Reference: **District 12/3 Subsurface Investigation for Pavement and Bridges**
PID No. 120619 Agreement No. 40941

Geohazard Exploration Report – Final (Task Order No. D12-04)
CUY-480-16.56 Landslide (PID 124096)
Brooklyn Heights, Cuyahoga County, Ohio
S&ME Project No. 24170140E

Ms. Kenzig:

In accordance with our proposal dated May 22, 2025, which was authorized on June 11, 2025, by ODOT District 12 (D12) Task Order D12-04, Encumbrance No. 744687, S&ME, Inc. (S&ME) has completed a Geohazard Exploration for a landside on the north side of the IR 480 westbound embankment located approximately 0.3 miles west of Lancaster Drive in Brooklyn Heights, Cuyahoga County, Ohio (see Vicinity Map, Plate 1 of the Appendix).

In accordance with Section 701 of the ODOT *Specifications for Geotechnical Explorations* (*SGE*), S&ME is herewith submitting a "final" version of our November 10, 2025, "draft" report and addressing review comments provided by the ODOT Office of Geotechnical Engineering (OGE) on December 8, 2025, and provided to S&ME on December 9, 2025. Final ODOT Geotechnical Profile – Landslide sheets have been prepared and will be submitted under separate cover.

We appreciate being given the opportunity to be of service. Please do not hesitate to contact our office if you have any questions concerning our report.

Sincerely,

S&ME, Inc.

STATE OF OHIO
BRIAN KEITH SEARS
74693
REGISTERED
PROFESSIONAL ENGINEER

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Senior Engineer | Project Manager

Richard S, Weigand, P.E.
Principal Engineer | Senior Reviewer

Attachments: Appendices I through III
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1.0 Executive Summary

An overview of this project and the findings of this geotechnical exploration are presented below. This summary should not be used in place of the more detailed recommendations presented in the remainder of this report.

Category *(Section Reference)*	**Project Overview/Geotechnical Findings**
Project Introduction *(Section 2.0)*	Investigate a landslide located on the north side of westbound IR 480 approximately 0.3 miles west of Lancaster Road and provide recommendations to repair the failed portion of the embankment. The landslide is within an approximately 50-foot-high fill embankment and is approximately 275 feet wide.
Exploration *(Section 4.0)*	Three (3) borings and five (5) Wildcat Dynamic Cone Penetrometer (DCP) soundings were performed at the site to investigate the landslide.
Subsurface Conditions *(Section 5.0)*	*Surface Materials*: Borings encountered 11 to 14 inches of asphalt, over 4 to 15 inches of granular base. *Fill*: Primarily very stiff to hard cohesive soil (A-4a, A-6a, A-6b) with few stiff pockets and discontinuous layers of medium dense to dense sand and/or gravel (A-1-a, A-2-4). Few slightly organic pockets. *Natural Soil*: Primarily very stiff to hard cohesive soil (A-6a) with few stiff pockets and slightly organic pockets. *Bedrock*: Highly to severely weathered SHALE bedrock encountered between El. 653.8 and El. 652.8). *Groundwater*: Variable amounts of groundwater were noted between El. 655.0 and El. 655.4 in Borings B-002-0 and B-003-0, respectively. *Slope DCPs*: Primarily very loose to loose/soft to stiff soils to depths of 2.0 to 12.7 feet underlain by medium dense to dense/stiff to hard soils.
Stability Analyses *(Section 6.1)*	Based on our site reconnaissance observations, laboratory testing results, and slope stability modeling, we are of the opinion that the slope failures currently observed are shallow in nature, extending to depths between 3 and 5 feet below the existing ground surface of the embankment.
Slope Repair Recommendations *(Section 6.2)*	S&ME recommends repairing the slope by removing the failed surface material using an "excavate and replace" benching approach as described in Section 800 of the ODOT *Geotechnical Design Manual*. Benches are anticipated to range from 5 to 10 feet high with variable widths ranging from roughly 4 to 13 feet.
Ground & Surface Water Considerations *(Section 6.3)*	Significant groundwater issues are not anticipated in connection with the proposed benched repair. Surface water should be controlled to mitigate future slope erosion.

2.0 Introduction

This Geohazard Exploration is to investigate and provide slope remediation recommendations for a landslide on the north side of the fill embankment of westbound IR 480 and the exit ramp to Granger Road and SR 176. The site is approximately 0.3 miles west of the Lancaster Drive overpass in Brooklyn Heights, Cuyahoga County, Ohio. During the project scoping meeting held on May 9, 2025, which was attended by representatives from ODOT District 12 (D12), Chagrin Valley Engineering (CVE), Euthenics and S&ME, it was determined that Euthenics would perform the site survey while CVE was tasked with preparing the construction plans.

Based on a site reconnaissance visit performed by S&ME on May 6, 2025, and discussions during the May 9th scope meeting, S&ME understands the landslide is approximately 275 feet long and centered approximately 50 feet east of a large culvert (No. CUY-480-16.54) carrying West Creek beneath the IR 480 embankment. Multiple levels of slope failure scarps are visible near the bottom, middle and top of the slope. Outside of the main failure area, tension cracks were observed to extend to the approximate lateral limits of the slide. The head scarp of the landslide is located at the top of the embankment and at the outside edge of the existing pavement. The downward movement of the landslide has partially undermined some guardrail posts at the head scarp; however, no tension cracks or other evidence of failure has been observed within the existing IR 480/Granger Road ramp pavement.

This Geotechnical Exploration has been performed in general accordance with the July 2025 update of the ODOT *Specifications for Geotechnical Investigations* (*SGE*).

3.0 Geology and Observations of the Project

3.1 Site Geology

The site lies along the boundary of the Galion Glaciated Low Plateau and Erie Lake Plain Physiographic Regions with overburden soils ranging from Pleistocene-age lacustrine deposits to Wisconsinan-age glacial till over Devonian-age Ohio Shale. Quaternary and surficial geology mapping indicates the natural soil below the fill embankment consists of a thin (approximately 10 feet) layer of alluvial deposits over bedrock. Bedrock topography mapping suggests bedrock may be encountered between approximate El. 655 and El. 665; however, bedrock was encountered in the borings performed at the site between El. 652.8 and El. 653.8. Bedrock outcrops are visible in the east bank of West Creek approximately 80 feet north of the embankment.

The ground surface elevation of IR 480 pavement within the limits of the landslide ranges from approximate El. 705 to El. 700, and the toe of the IR 480 embankment in this area ranges from approximate El. 652 to El. 665.

The "Ohio Karst Areas" map published by ODNR shows that the project site lies in an area not known to contain karst features. The "Abandoned Underground Mine Maps" published by ODNR indicates there are no abandoned surface or underground mines situated in the immediate project vicinity. A review of ODNR's "Landslides in Ohio" shows the site is located within an area that is subject to severe slope failure.

3.2 Site Reconnaissance

S&ME visited the site on May 6, 2025, to perform an initial reconnaissance of the site and then returned to the site on July 15, 2025, to mark boring locations prior to the field explorations being performed. The following observations were noted during these visits.

- Evidence of multi-level slope failure is apparent at the top, middle and just above the toe of the north side of the embankment with the primary area of failure encompassing approximately 125 feet (roughly Sta. 897+00 to Sta. 898+25). Outside this primary area of failure, tension cracks were observed to approximately Sta. 896+50 on the west side and approximately Sta. 898+60 on the east side.
- Failure scarps observed at the top and mid-slope show a drop of a few inches to as much as 3.5 feet.
- At the top of the slope, approximately 15 linear feet of guardrail posts have lost some of their support.
- No signs of distress are currently visible in the shoulder pavement as the failure scarp at the top of the slope does not extend into the existing shoulder pavement.
- An area of significant erosion/washout was observed near Sta. 897+25 approximately halfway down the embankment slope. Additional areas of minor erosion were observed in multiple locations.
- No toe bulge or other disturbance to the north of the toe of the embankment slope were observed.
- The slope was generally covered by grassy vegetation with an occasional bush or tree.
- The existing slopes within the project limits ranged from approximately 1.8H:1V to 5H:1V inclination.
- A large (20-foot-wide by 15-foot-tall) arch culvert (No. CUY-480-16.54) conveys West Creek beneath the IR 480 embankment, with a concrete headwall and wingwalls at the culvert outlet.
- An existing 24-inch storm sewer outlet into the stream channel through the east wingwall of the culvert outlet. The pipe appeared to run to the east.
- A drainage channel/ditch was observed beginning approximately 500 feet east of West Creek. Most of the ditch (from approximately Sta. 897+50 to Sta. 902+00) is earth-lined and slowly descends the slope draining westward. The final approximately 50 feet of the ditch before reaching West Creek is lined with rip-rap.
- Bedrock outcrops were observed in the east bank of West Creek approximately 80 feet north of the end of the culvert wingwalls.

3.3 Historic Information

ODOT D12 provided S&ME with three (3) sheets from a set of historic construction plans (dated 1968 to 1970) for the IR 480 construction project identified as CUY-480-15.81. These sheets included a plan view sheet and two cross sections (Sta. 898+00 and Sta 899+00). The plans show the proposed embankment being approximately 45 to 49 feet high with 2H:1V side slopes. In addition to the plan sheets provided by ODOT D12, S&ME searched the ODOT TIMS site and obtained geotechnical profile sheets containing historic borings performed in 1968 for the original construction of IR 480 (CUY-480-15.81 project). These borings were performed at the bottom of the valley near West Creek and indicated the presence of less than 10 feet of thin layers of sandy silt (A-4a), silt (A-4b), and silt and clay (A-6a) soil over shale bedrock which was encountered near El. 655. A note is included on the geotechnical profile sheets that reads "Creek flowing on shale". The borings were not performed in accordance with current ODOT requirements and were not able to be reused as part of our investigation.

S&ME also located historic borings performed in 2002 in connection with a pavement reconstruction project (also identified as CUY-480-15.81). Three borings were performed within or near the limits of the current slide area to depths ranging from 7 to 25 feet deep and were terminated within the existing embankment fill. These borings encountered predominantly cohesive soils (A-4a, A-4b, A-6a) with discontinuous layers of gravel/sand (A-2-4). The termination depths and sampling intervals of these borings do not meet current ODOT requirements and were therefore not able to be reused as part of this current geohazard investigation.

4.0 Exploration

4.1 Field Investigation

On July 17, 2025, S&ME performed five (5) Wildcat DCPs numbered D-001-1-25 and D-002-1-25 through D-002-4-25) within the limits of the slope failure. Between August 5 and 8, 2025, S&ME and our subcontract driller Ohio TestBor performed three soil borings (B-001-0-25 through B-003-0-25) in the westbound outside shoulder of IR 480. For brevity, all explorations will be referred to hereafter without the two-digit year value at the end of the exploration IDs. The approximate locations of these explorations are shown on the Plan of Explorations submitted as Plate 2 of Appendix I.

The borings were advanced by a truck-mounted drill rig using a 3¼-inch hollow-stem auger. Disturbed, but representative, soil samples were attempted by lowering a 2-inch O.D. split-barrel sampler to the bottom of the boring and then driving the sampler into the soil with blows from a 140-pound hammer freely falling 30 inches (AASHTO T206 – Standard Penetration Test, SPT). Recovered SPT samples were examined immediately, and representative portions were preserved in airtight glass jars. In accordance with ODOT specifications, the hammer system on the drilling rig was calibrated (ASTM D4633) on December 30, 2024, to determine the drill rod energy ratio (98.0%). In accordance with the ODOT *SGE*, the energy ratio has been limited to 90%. In addition to SPT sampling, relatively undisturbed (Shelby Tube) samples were obtained between depths of 6 to 15.5 feet below the existing ground surface in each boring. After the completion of each boring, a water measurement was obtained, and the borings were sealed with a Portland cement and bentonite grout mixture. A plastic hole-plug was placed in each bore hole just below the existing pavement, and the existing pavement was repaired with cold-patch asphalt.

The Wildcat DCP explorations consist of allowing a 35-pound hammer to freely fall approximately 15 inches down a guide rod to strike an anvil. Below the anvil, steel rods marked at ten-centimeter increments are attached to a sacrificial conical point at the base of the rods. The number of blows required to drive the rods ten centimeters is recorded in ten-centimeter increments. The number of blows is entered into a manufacturer provided spreadsheet to estimate relative density/stiffness of the soils encountered.

Soil samples were delivered to S&ME's laboratory for further examination and testing. Approximate coordinates at the boring and DCP locations were obtained by S&ME with a handheld GPS (sub-meter horizontal accuracy).

These approximate coordinates were sent to CVE who provided the station, offset and ground surface elevation at each exploration.

In the field, experienced personnel from S&ME observed the drilling procedures and performed the following specific duties: preserved all recovered samples; prepared a log of each boring; made seepage and groundwater observations in the borings; obtained hand-penetrometer measurements in soil samples exhibiting cohesion; and, provided liaison between the field work and the Project Manager so that the program of exploration could be modified, if necessary, because of unanticipated conditions.

4.2 Laboratory Testing

In the laboratory, all soil samples were visually identified and tested for natural moisture content. Classification testing (liquid/plastic limit determinations and grain-size analyses) was also performed on selected representative specimens. Shelby tube samples were extruded and logged, with classification testing performed on a portion of the recovered sample. In addition, one consolidated undrained (CU) triaxial shear strength test series and two (2) unconsolidated undrained (UU) triaxial shear tests were performed on select, representative sections of the undisturbed samples. The results of the laboratory index tests are recorded numerically on the boring logs. Results of the triaxial shear strength testing are presented on Plates 20 through 23 in Appendix I.

Based upon the results of the laboratory testing program, the field logs were modified, if necessary, and copies of the laboratory corrected boring logs are submitted as Plates 5 through 10 of Appendix I. Shown on these logs are: descriptions of the soil stratigraphy encountered; depths from which samples were preserved; sampling efforts (blow-counts) required to obtain the specimens in the borings; calculated N_{60} values; laboratory testing results; seepage and groundwater observations made at the time of drilling; and, values of hand-penetrometer measurements made in soil samples exhibiting cohesion. For your reference, hand-penetrometer values are roughly equivalent to the unconfined compressive strength of the cohesive fraction of the soil sample. Logs of the DCP Soundings are submitted as Plates 11 through 19 of Appendix I.

Soils have been classified in general accordance with Section 603 of the ODOT SGE, and described in general accordance with Section 602. An explanation of the symbols and terms used on the boring logs, definitions of the special adjectives used to denote the minor soil components, and information pertaining to sampling and identification are presented on Plate 3 of Appendix I. Bedrock has been classified and described in general accordance with Section 605 of the ODOT *SGE*. An explanation of the symbols and terms used on the boring logs related to bedrock are presented on Plates 4A and 4B of Appendix I. Group Indices determined from the results of the laboratory testing program are also provided on the boring logs.

5.0 Findings

Please refer to the boring logs (Plates 5 through 10 in Appendix I) for a summary of the pavement, soil and groundwater/seepage conditions encountered at each boring location. Inferences should not be made to the subsurface conditions in the areas away from the boring without performance of additional borings or other field verification.

5.1 Soil Borings

Borings B-001-0 through B-003-0, performed in the westbound outside shoulder pavement of IR-480, encountered 11 to 14 inches of asphalt over 4 to 15 inches of granular base. A 1.2-foot-thick layer of medium dense GRAVEL WITH SAND AND SILT (A-2-4) encountered below the granular base in Boring B-002-0 was described as possible granular base.

Below these pavement materials, these borings encountered existing embankment fill to depths ranging from approximately 42.7 to 48 feet below the pavement surface. These fill materials were predominantly composed of very-stiff to hard brown and/or gray SANDY SILT (A-4a), SILT AND CLAY (A-6a) and SILTY CLAY (A-6b). Occasional and discontinuous zones of stiff soils were encountered in B-001-0 and B-002-0 while a 0.9-foot-thick layer of dense gray GRAVEL (A-1-a) was encountered at a depth of 32.1 feet in Boring B-002-0. Non-soil materials such as glass, asphalt, wood and ceramic fragments were encountered in the fill at varying depths in Borings B-002-0 and B-003-0. Cobbles were encountered at 33.5 feet and again from 38.3 to 39.5 feet in Boring B-001-0. Below the depths of 45.0 and 41.0 feet, the existing fill encountered in Borings B-002-0 and B-003-0 was described as slightly organic with loss-on-ignition (LOI) values ranging from 1.0% to 2.8% and contained wood fragments.

The natural soil beneath the embankment fill consisted predominantly of very-stiff to hard brown and/or gray SILT AND CLAY (A-6a) with stiff pockets in Boring B-003-0. The uppermost portion of the natural soil in Boring B-001-0 was described as being slightly organic (LOI = 1.6%) and contained wood fragments.

SHALE bedrock was encountered in these borings between El. 652.8 and El. 653.8). Based on recovered SPT samples, the shale bedrock was described as gray, highly to severely weathered, and very weak.

During drilling, water was encountered at El. 655.0 and El. 655.4 in Borings B-002-0 and B-003-0, respectively. No water was observed during drilling in Boring B-001-0. All groundwater levels and seepage measurements should be considered as temporary, short-term observations and should not be assumed to be representative of the long-term static groundwater level. Groundwater levels may also fluctuate due to seasonal variations in precipitation, construction activities, etc.

5.2 Wildcat DCP Soundings

DCPs D-001-1, D-002-1, D-002-2, and D-002-4 were performed on the side of the IR 480 embankment and encountered soil with a relative density/consistency which was predominantly very loose to loose/soft to stiff, above the depths of 7.3 to 12.7 feet below the existing ground surface. Below these depths, these mid slope DCPs encountered predominantly medium dense to dense/stiff to hard soil, with few thin loose/stiff zones.

DCP D-002-3 was performed at the toe of the slope and encountered approximately 2 feet of loose/medium stiff to stiff soil underlain by medium dense to dense/stiff to hard soils to the termination of the DCP at a depth of approximately 7.5 (El. 653.5), presumably on bedrock.

6.0 Analyses and Recommendations

Approximately 275 linear feet of slope failure, including tension cracks, has been observed on the north slope of the westbound IR 480 roadway embankment located roughly 0.3 miles west of Lancaster Road. Based on our site observations, laboratory testing results, and slope stability modeling, it is S&ME's opinion that the existing slope failure is relatively shallow in nature, extending to depths ranging from 3 to 5 feet below the surface of the embankment side slope.

6.1 Slope Stability Analysis

S&ME evaluated the stability of the failed existing embankment at Sta. 896+25, Sta. 897+50, and Sta. 899+00. Using cross sections at these 3 locations provided by ODOT and CVE and the results of the field exploration and laboratory testing programs, S&ME back-analyzed the cross section models to develop a failure model which roughly reproduced the observed slope failure. For the purposes of our analyses, slope failure was considered to have occurred when the factor of safety calculated was approximately 1.0. We note that back-analyses performed at Sta. 896+25 resulted in a factor of safety near 1.2 due to the slightly flatter existing slope at that location.

Analyses were performed using the two-dimensional limit-state computer program SLIDE2 (v9.040). The Spencer method was used for the limit equilibrium calculations. The strength parameters used to represent the soil layers were determined by performing an analysis of the soils by soil type and index property characteristics and comparison to strength values from literature correlations. Shear strength values initially used in the model were representative of fully softened strength values from literature correlations (i.e., Stark and Choi, 2005; Stark and Hussain, 2010; etc.), our experience and comparison to lab test results.

Following the back-analyses at each of these cross sections, S&ME performed stability analyses at the same stations assuming that the failed surface material was completely removed using an "excavate and replace" benching approach as described in Section 800 of the ODOT *Geotechnical Design Manual (GDM)*. The SLIDE output for these repair analyses is also provided in Appendix II.

6.2 Repair Recommendations

6.2.1 "Excavate and Replace Benching

Based on our back-analyses and repair analyses, we recommend an embankment repair approach as follows:

- In the paved IR 480 shoulder, begin benching repairs at the existing baseline of the existing IR 480 westbound exit ramp to Granger Road, defined on the plans as "BL CONST. W.B.O.L.".
- The embankment repairs should extend from Sta. 896+25 to Sta. 899+00 with a transition zone on both ends of the full depth benching repair area beginning at the surface of the existing embankment slope and then cutting into the embankment to attain the full bench heights as discussed below. We recommend this transition zone be a minimum of 25 feet long at each end of the repair limits (896+00 on the west and Sta. 899+25 on the east).
- Construct an upper bench 10 feet high and intermediate benches approximately 5 feet high, depending on the best configuration to maintain a constant number of benches throughout the entire repair area. A

constant bench elevation is not required, but the bench should be flatter than 8H:1V, but still sloped sufficiently to drain from the back of each bench to the front. Additionally, the benches should also be sloped to drain longitudinally. Conceptual "excavate and replace" benching sequences at each cross section analyzed are presented on Plates 5, 10 and 15 of Appendix II.

- The bottom bench may be variable in height but should not exceed 10 feet.
- Final repaired slopes should be no steeper than 2.5H:1V, except where constricted by the existing headwall for the arch culvert conveying West Creek beneath the embankment. Along the east wingwall of the culvert headwall, a granular material is anticipated to be required at the toe of the slope to allow the regraded slope to intersect with the backside of the culvert wingwall. The granular material (Rock Channel Protection, RCP, Type C) should be installed to a depth 2 feet below the top of the culvert wingwall with a filter fabric placed beneath the RCP, including up the 1H:1V backslope of the bench to the top of the RCP. The RCP should be extended down slope along the wingwall until it connects with the existing rip-rap lined ditch. See Figure 6-1 below for an illustration of this slope modification along the culvert wingwall at Sta. 897+25.

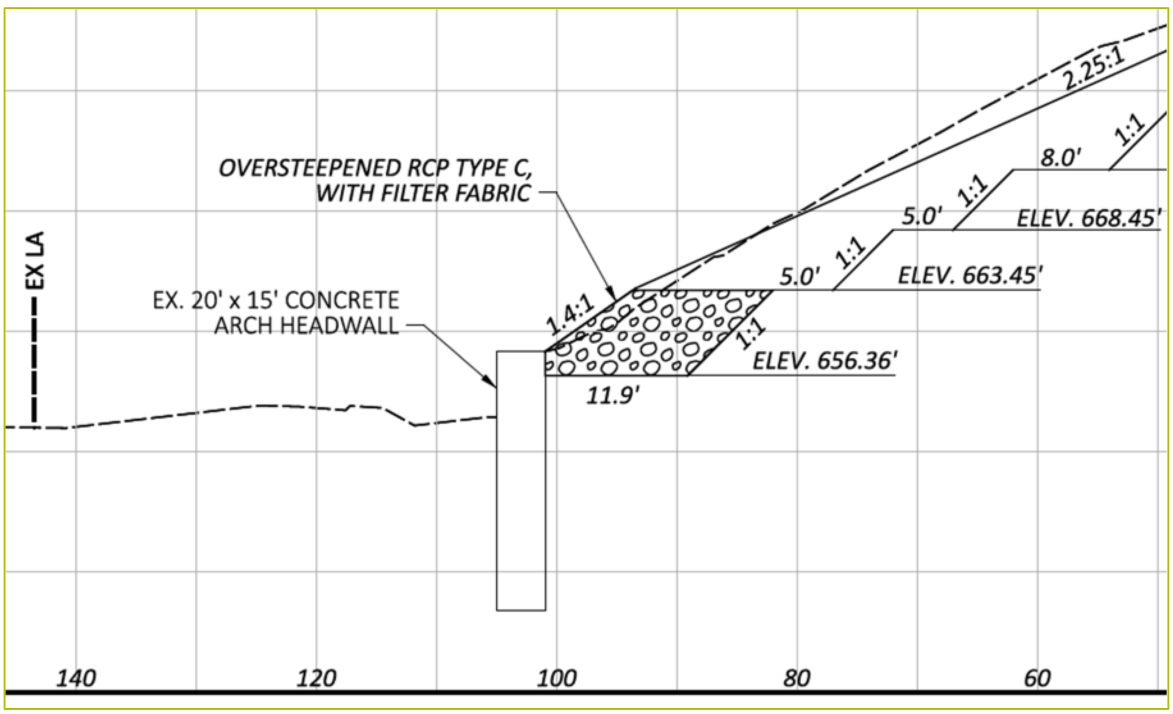


Figure 6-1 Illustration of RCP Toe of Slope Modification at Sta. 897+25

- All benches should have a backslope no steeper than 1H:1V and provide a minimum horizontal distance of 8 feet from the top of each 1H:1V backslope to the planned face of the reconstructed slope. (see Figure 800-1 of the ODOT *GDM*)
- To remove suspected failed material, all benches shall provide a minimum distance of approximately 5 feet (measured normal to the existing slope) between the top of the 1:1 backslope of all benches and the existing slope.

- Flattening the slope to meet stability requirements will result in the eastern portion of the ditch running down the slope and to the west being filled with new soil embankment. Based on discussions with CVE and ODOT D12, we understand the drainage ditch will be redirected to the base of the embankment and run within the flat area in the existing ODOT right-of-way toward West Creek. Portions of the drainage channel that are steepened to redirect flow to the base of the embankment should be lined with appropriately sized rip rap, rock channel protection, or a manufactured erosion mitigation material.
- Strip and waste surficial vegetation/rootmat and all organic soil/matter. Based on the borings, we believe that the remainder of the existing embankment fill excavated to create the benches would be suitable for re-use as borrow.

6.2.2 *Additional Repair Recommendations*

- Existing underdrains beneath the IR 480 paved shoulder should be checked to ensure they are still functioning (i.e., not blocked or plugged), and replaced where necessary to provide positive drainage
- If insufficient horizontal distance is available near the top of the reconstructed slopes such that a minimum 8-foot bench width cannot be provided, temporary fills as described in Section 800 of the ODOT *GDM* (see Figure 800-2) shall be constructed to provide an 8-foot width so that proper compaction of the new fill embankment material may be performed. This temporary fill should be removed after compaction has been achieved.
- Care should be exercised to ensure the direction provided in Item 203.04.A of the ODOT *Construction and Materials Specifications* (*CMS*) is followed to avoid ponding water or saturated/softened surfaces.
- Vegetation should be re-established on the surface of the repaired slope as quickly as possible after construction is complete.
- Fill placement, compaction, moisture conditioning and other embankment construction practices should follow the specifications in Item 203 of the ODOT *CMS*, or Item 204 where embankment fill is placed within 12 inches of the base of any new shoulder pavement.

6.3 Ground and Surface Water Considerations

6.3.1 *Remediation During Embankment Benching*

During this exploration, no significant groundwater was encountered in the borings until immediately above bedrock. Accordingly, no significant quantities of water are anticipated during excavation of the benched repair. Some water seepage may emanate from the walls of the benching excavations through sand/gravel seams, saturated crevices in failed areas, or desiccation cracks. It is recommended that such groundwater (if encountered) should not be allowed to accumulate on benched excavations, and that surface water runoff be directed away from the benched excavations both during and after construction (see also Section 6.2.1), as the cohesive soils in the embankment will soften and weaken when exposed to water. We recommend a contingent quantity of granular embankment, underdrain pipe, conduit and outlets to convey trapped water out of the slope and down to the bottom of the slope. Accordingly, we recommend the following note and minimum contingency quantities be included in the plans.

<u>GROUNDWATER REMEDIATION FOR EMBANKMENT BENCHING</u>

THE FOLLOWING QUANTITIES ARE TO BE USED AS DIRECTED BY THE ENGINEER TO REMOVE ANY GROUNDWATER ENCOUNTERED DURING BENCHING OF THE EMABANKMENT SLOPES.

ITEM 203 – GRANULAR EMBANKMENT	60 CY
ITEM 605 – 6" UNCLASSIFIED PIPE UNDERDRAINS	300 FT
ITEM 611 – 6" CONDUIT, TYPE F, FOR UNDERDRAIN OUTLETS	50 FT
ITEM 611 – PRECAST REINFORCED CONCRETE OUTLET	3 EACH

6.3.2 *Surface Water Run-off*

Surface water, especially concentrated flows flowing from the IR 480 shoulder pavement, have the potential to create erosion rills which can become enlarged over time and potentially cause future slope failures/distress. Potential alternatives to protect the slope were discussed during a conference call on December 16, 2025, with representatives from ODOT D12, CVE and S&ME. Alternatives discussed included installing curbing with a catch basin and slope pipe or a flume, installing a "chimney" drain to direct water into the shoulder underdrain pipe or the installation of an erosion control mat in addition to the seeding and mulching. Following discussion of the alternatives, ODOT D12 indicated that erosion control mat (Type B) was their preferred alternative.

7.0 Final Considerations

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

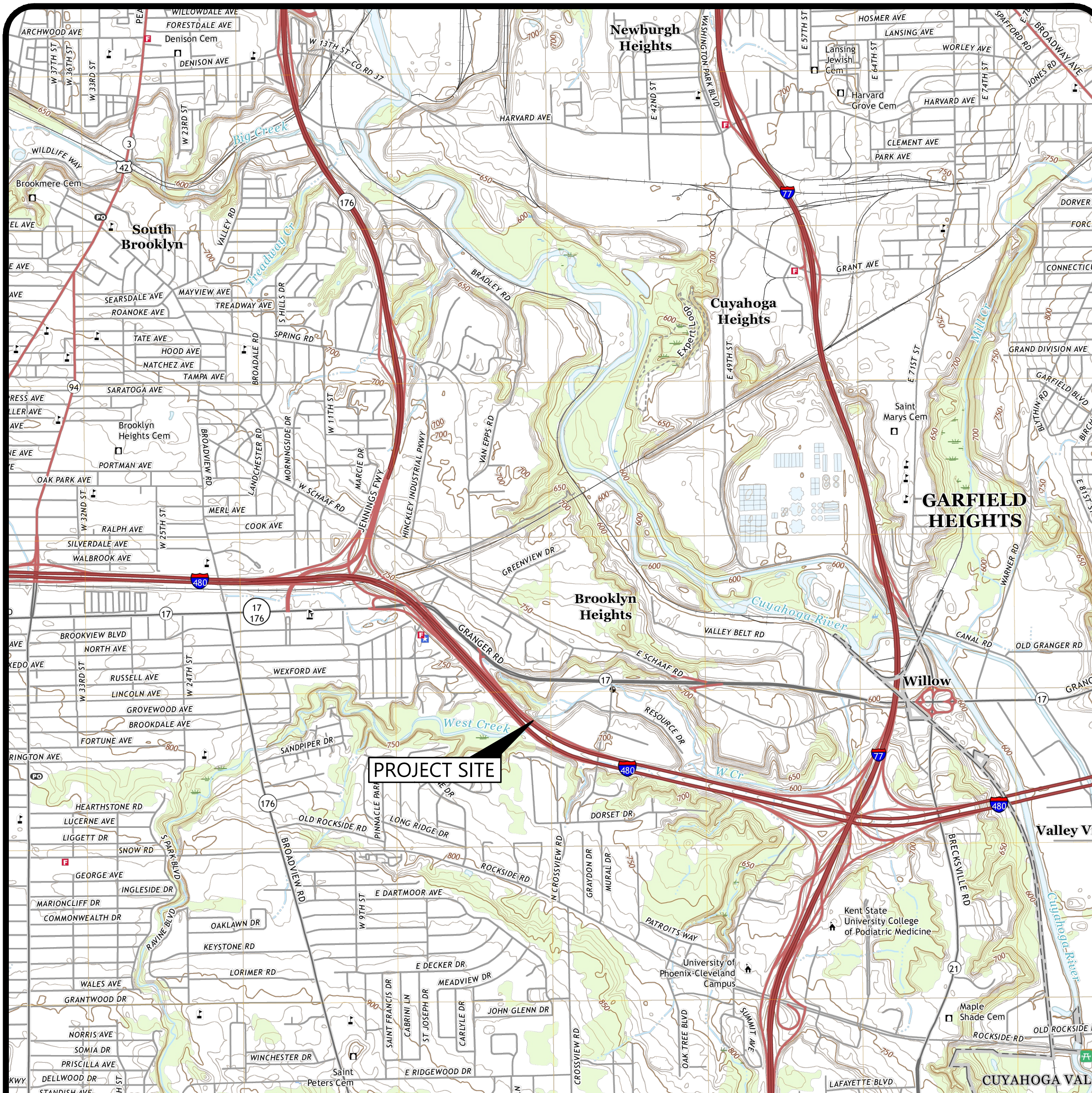
We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

S&ME should be retained to review the final plans and specifications to confirm that earthwork and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME's review of final plans and specifications followed by our observation and monitoring of earthwork construction activities.

Appendices

Appendix I – General Project Information and Lab Testing



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USGS Mapping:
Cleveland South USGS Quad

0 3000 6000
GRAPHIC SCALE (IN FEET)

Vicinity Map

Geohazard Exploration
CUY-480-16.56 Landslide (PID 124096)
Brooklyn Heights, Cuyahoga County, Ohio

SCALE:	FIGURE NO.
GRAPHIC	1
DATE:	
11-10-2025	
PROJECT NUMBER	
24170140E	

Drawing Path: T:\Columbus-1170\Projects\2024\24170140E_ODOT D12_CUY-480-16.56 Slide\GEO\CAD\DWG\Plan of Borings & Vicinity Map.dwg

N

LEGEND

B-001-0-24 BORING NUMBER AND APPROXIMATE LOCATION

D-002-1-25 DCP SOUNDING NUMBER AND APPROXIMATE LOCATION

0 50 100

GRAPHIC SCALE (IN FEET)

S&ME

Plan of Borings

Geohazard Exploration
CUY-480-16.56 Landslide (PID 124096)
Brooklyn Heights, Cuyahoga County, Ohio

SCALE:	FIGURE NO.
GRAPHIC	2
DATE:	
11-10-2025	
PROJECT NUMBER	
24170140E	

Drawing Path: T:\Columbus-1170\Projects\2024\24170140E_ODOT D12_CUY-480-16.56 Slide\GEO\CAD\DWG\Plan of Borings & Vicinity Map.dwg

ODOT SOIL LOG LEGEND

The STANDARD PENETRATION TEST (SPT) as defined by AASHTO T206 (or ASTM D1586) is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D./2-inch O.D. split-barrel sampler is driven three 6-inch increments (see graphic at right) with a 140 lb. hammer freely falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The SPT N Value is determined by adding the number of blows from the 2nd and 3rd 6-inch increments.

2
3
4

SPT BLOWCOUNT CORRECTION FOR HAMMER EFFICIENCY (N_{60}) is determined by the following equation: N_{60} = N * [Drill Rod Energy Ratio (%) / 60], and where the drill rod energy ratio is determined in accordance with ASTM D4633. If the drill rod energy ratio exceeds 90%, it is limited to 90% to determine the N_{60} value and is shown on the log as 90*.

SHELBY TUBE (ST) samples are obtained by hydraulically pushing a thin-walled tube (typically 3-inches in diameter) to obtain a relatively undisturbed sample for testing of fine-grained soils to determine engineering properties such as strength, compressibility, permeability, and density. Shelby tubes are sampled in general accordance with ASTM D1587 (AASHTO T207).

DESCRIPTIVE ORDER OF SOIL STRATA: Consistency/Density, color, ODOT soil classification description, minor soil constituents with percentage modifiers, organic content, miscellaneous constituents or descriptions, relative moisture condition.

ODOT SOIL CLASSIFICATION DESCRIPTION AND SYMBOL

GRAVEL (A-1-a)

GRAVEL WITH SAND (A-1-B)

FINE SAND (A-3)

COARSE AND FINE SAND (A-3a)

GRAVEL WITH SAND AND SILT (A-2-4 OR A-2-5)

GRAVEL WITH SAND, SILT AND CLAY (A-2-6 OR A-2-7)

SANDY SILT (A-4a)

SILT (A-4b)

ELASTIC SILT AND CLAY (A-5)

SILT AND CLAY (A-6a)

SILTY CLAY (A-6b)

ELASTIC CLAY (A-7-5)

CLAY (A-7-6)

ORGANIC SILT (A-8a)

ORGANIC CLAY (A-8b)

PEAT

UNCONTROLLED FILL

BOULDERY ZONE

SOD/ROOTMAT/ TOPSOIL

PAVEMENT OR BASE

CONCRETE

SOIL LOG SYMBOLS

SS - Split-Spoon Sample

ST - Shelby Tube Sample

TR - Top of Rock

REC - Sample Recovery, %

HP - Hand Penetrometer Value, tsf

LOI - Loss on Ignition Test, %

Qu - Unconfined Compressive Strength

γd - Dry Unit Weight, pcf

γm - Moist Unit Weight, pcf

GR - Gravel Content, %

CS - Coarse Sand Content, %

FS - Fine Sand Content, %

SI - Silt Content, %

CL - Clay Content, %

LL - Liquid Limit

PL - Plastic Limit

PI - Plasticity Index

WC - Natural Water Content, %

NOTE: Particle size contents are expressed % by weight.

PARTICLE SIZE

Particle	Size	US Sieve Size
Boulder	>300 mm (12 in.)	12 in.
Cobble	75 - 300 mm (3 - 12 in.)	3 - 12 in.
Coarse gravel	19 - 75 mm (3/4 - 3 in.)	3/4 - 3 in.
Fine gravel	2 - 19 mm (0.08 - 3/4 in.)	#10 - 3/4 in.
Coarse sand	0.42 - 2.0 mm	#40 - #10
Fine sand	0.074 - 0.42 mm	#200 - #40
Silt	0.005 - 0.074 mm	NA
Clay	< 0.005 mm	NA

FINE-GRAINED SOIL
(Relative Consistency)

	N_{60}	HP
Very soft	< 2 bpf	< 0.25 tsf
Soft	2 - 4 bpf	> 0.25 - 0.5 tsf
Medium stiff	5 - 8 bpf	> 0.5 - 1.0 tsf
Stiff	9 - 15 bpf	> 1.0 - 2.0 tsf
Very stiff	16 - 30 bpf	> 2.0 - 4.0 tsf
Hard	> 30 bpf	> 4.0 tsf

COARSE-GRAINED SOIL
(Relative Density)

	N_{60}
Very loose	< 5 bpf
Loose	5 - 10 bpf
Medium dense	11 - 30 bpf
Dense	31 - 50 bpf
Very dense	> 50 bpf

MINOR CONSTITUENTS
(% By Weight)

	Percentage
Trace	0% - 10%
Little	>10% - 20%
Some	>20% - 35%
"And"	≥ 35%

ORGANIC CONTENT OF SOIL
(Determined by ASTM D2974 or AASHTO T267)

Classification	Percentage
Slightly organic	2% - 4%
Moderately organic	>4% - 10%
Highly organic	> 10%

RELATIVE MOISTURE CONDITION

Dry	Cohesive - Powdery, WC well below PL Granular - No moisture present
Damp	Cohesive - Leaves very little moisture when pressed, WC < PL Granular - Internal moisture, little to no surface moisture
Moist	Cohesive - Leaves moisture when pressed, PL < WC < LL - 3 Granular - Free water on surface, shiny appearance
Wet	Cohesive - Mushy, WC near or above LL Granular - Voids filled with free water

At Time of Drilling	Free water (seepage or groundwater) observation made anytime during the drilling process. Depending on time of reading and drilling methodologies, this value may be influenced by the drilling process.
At end of Drilling	Free water measurement soon after the drilling processes are complete, and the borehole is at final depth. Drilling fluids, if introduced during drilling, may influence this measurement.
24 hrs After Drilling	Free water measurements made in a borehole hours to days after drilling is complete including the time elapsed (i.e., "24 hrs" as shown at left). Depending on subsurface conditions, elapsed time, drilling process, etc. this observation may reflect a stabilized level.

REFERENCES:

Ohio Department of Transportation (ODOT), Specifications for Geotechnical Explorations (SGE)

ODOT ROCK CORE LOG LEGEND

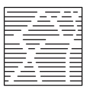
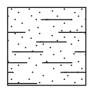
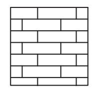
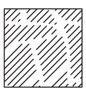
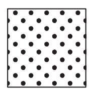
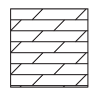
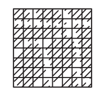
DESCRIPTIVE ORDER FOR ROCK STRATA

Bedrock type, color, weathering, strength, texture, bedding, other descriptors, type and condition of discontinuities, unit RQD, unit recovery.

When alternating layers occur between two distinct rock types, describe the material as "Interbedded" with the major rock type first, with estimated percentage, and the secondary rock type second, with estimated percentage. Provide the unit RQD and unit recovery, then describe each rock type in detail.

For spread footings founded on or into bedrock, describe discontinuities using the modified Rock Mass Rating (RMR) system (degree of fracturing, aperture width and surface roughness). For drilled shafts extending into bedrock, describe discontinuities using the Geologic Strength Index (GSI) system (discontinuity structure and surface condition). For rock cut slopes, describe discontinuities using both the modified RMR and GSI systems.

COMMON OHIO BEDROCK TYPES AND SYMBOLS

	SHALE		SILTSTONE		LIMESTONE		COAL
	CLAYSTONE/ MUDSTONE		SANDSTONE		DOLOMITE		UNDERCLAY/ FIRECLAY

WEATHERING

Unweathered	No evidence of chemical or mechanical alternation of the rock mass. Mineral crystals have a bright appearance with no discoloration. Fractures show little or no staining on surfaces.
Slightly Weathered	Slight discoloration of the rock surface with minor alterations along discontinuities. Less than 10% of the rock volume presents alteration.
Moderately Weathered	Portions of the rock mass are discolored with a dull appearance. Surfaces may have a pitted appearance with weathering "halos". Isolated zones of varying rock strengths.
Highly Weathered	Entire rock mass appears discolored and dull. Some pockets of slightly to moderately weathered rock and some areas of severely weathered materials may be present.
Severely Weathered	Majority of the rock mass reduced to a soil-like state. Zones of more resistant rock may be present, but the material can generally be molded and crumbled by hand pressures.

STRENGTH

		APPROX. UNCONFINED COMPRESSIVE STRENGTH (PSI)
Extremely Strong	Cannot be scratched by a knife or sharp pick. Chipping off hand specimens requires hard repeated blows of a geologist's hammer.	> 30,000
Very Strong	Cannot be scratched by a knife or sharp pick. Breaking off hand specimens requires hard repeated blows of a geologist's hammer.	30,000 - 15,000
Strong	Can be scratched with a knife or pick with difficulty. Requires hard hammer blows to detach hand specimen.	15,000 - 7,500
Moderately Strong	Can be scratched with a knife or pick. Gouges ¼" deep can be excavated by a pick. Requires moderate hammer blows to detach specimen.	7,500 - 3,600
Slightly Strong	Can be gouged 0.05 inch deep by firm pressure with a knife or pick point. Can excavate small pieces (1-inch) by hard blows with a pick.	3,600 - 1,500
Weak	Can be gouged readily by a knife or pick or excavated in small fragments by moderate blows of a pick. Small, thin pieces can be broken by hand.	1,500 - 750
Very Weak	Can be carved with a knife and excavated readily with a pick. Pieces 1 inch or more thick can be broken by hand. Can be scratched by fingernail.	750 - 40

TEXTURE

Boulder	> 12 in.
Cobble	12 - 3 in.
Gravel	3 - 0.08 in.
Coarse Sand	0.08 - 0.02 in.
Medium Sand	0.02 - 0.01 in.
Fine Sand	0.01 - 0.005 in.
Very Fine Sand	0.005 - 0.003 in.

BEDDING

Very Thick Bedded	> 36 in.
Thick Bedded	36 in. - 18 in.
Medium Bedded	18 in. - 10 in.
Thin Bedded	10 in. - 2 in.
Very Thin Bedded	2 in. - 0.4 in.
Laminated	0.4 in. - 0.1 in.
Thinly Laminated	< 0.1 in.

ODOT ROCK CORE LOG LEGEND

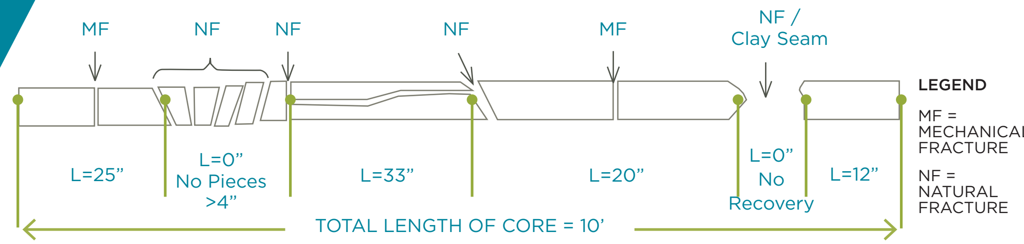
ROCK CORE RECOVERY

Recovery to be determined by core run and by rock unit (layer).

$$\text{REC} = \frac{\text{Length of Rock Core Recovered}}{\text{Length of Core Run}} \times 100$$

(Recovery)

ROCK QUALITY DESIGNATION (RQD)



$$\text{RQD} = \left(\frac{\sum \text{Core with Length (L)} \geq 4”}{\text{Core Run or Interval Total Length}} \right) \times 100$$

(Equation)

$$\text{RQD} = \left(\frac{25” + 33” + 20” + 12”}{120”} \right) \times 100 = 75\%$$

(Example)

DESCRIPTORS

Arenaceous - Sandy
Argillaceous - Clayey
Brecciated - Contains angular gravel
Calcareous - Contains calcium carbonate
Carbonaceous - Contains carbon
Cherty - Contains chert
Conglomeritic - Contains rounded gravel
Crystalline - Contains crystalline structure
Dolomitic - Contains Ca/Mg carbonate
Ferriferous - Contains iron
Fissile - Thin planar partings
Fossiliferous - Contains fossils
Friable - Easily broken down
Micaceous - Contains mica
Pyritic - Contains pyrite
Siliceous - Contains silica
Stylolitic - Contains stylotites
Vuggy - Contains openings

DISCONTINUITIES IN BEDROCK

Fault	Fracture which expresses displacement parallel to the surface that does not result in a polished surface.
Joint	Planar fracture that does not express displacement. Generally occurs at regularly spaced intervals.
Shear	Fracture which expresses displacement parallel to the surface that results in polished surfaces or slickensides.
Bedding	A surface produced along a bedding plane.
Contact	A surface produced along a contact plane. (generally not seen in Ohio)

MODIFIED RMR DISCONTINUITY TERMS

DEGREE OF FRACTURING

Unfractured	>10 ft.
Intact	10 ft. – 3 ft.
Slightly Fractured	3 ft. – 1 ft.
Moderately Fractured	12 in. – 4 in.
Fractured	4 in. – 2 in.
Highly Fractured	< 2 in.

APERTURE WIDTH

Open	> 0.2 in.
Narrow	0.2 in. - 0.05 in.
Tight	< 0.05 in.

SURFACE ROUGHNESS

Very Rough	Near vertical steps and ridges occur on the discontinuity surface.
Slightly Rough	Asperities on the discontinuity surface are distinguishable and can be felt.
Slickensided	Surface has a smooth, glassy finish with visual evidence of striation.

GSI DISCONTINUITY TERMS

ROCK MASS STRUCTURE

Intact or Massive	Intact rock with few widely spaced discontinuities
Blocky	Well interlocked undisturbed rock mass, formed by 3 intersecting discontinuity sets
Very Blocky	Interlocked, partially disturbed mass formed by 4 or more joint sets
Blocky/ Disturbed/Seamy	Angular blocks formed by many intersecting discontinuity sets, bedding planes
Disintegrated	Poorly interlocked, heavily broken rock mass
Laminated/ Sheared	Lack of blockiness due to close spacing of weak shear planes

SURFACE CONDITION

Very Good	Very rough, fresh unweathered surfaces
Good	Rough, slightly weathered, iron stained surfaces
Fair	Smooth, moderately weathered and altered surfaces
Poor	Slickensided, high weathered surface with compact coatings
Very Poor	Slickensided, highly weathered surface with soft clay coatings

REFERENCES: OHIO DEPARTMENT OF TRANSPORTATION (ODOT), SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS (SGE).

S&ME JOB: 24170140E

PROJECT: CUY-480-16.56 LANDSLIDE TYPE: LANDSLIDE PID: 124096 BR ID: N/A START: 8/6/25 END: 8/7/25	DRILLING FIRM / OPERATOR: OTB / C. SVITAK SAMPLING FIRM / LOGGER: S&ME / M.S. ANSARI DRILLING METHOD: 3-1/4" HSA SAMPLING METHOD: SPT	DRILL RIG: OTB MOBILE B-57 HAMMER: SAFETY HAMMER CALIBRATION DATE: 12/30/24 ENERGY RATIO (%): 90*	STATION / OFFSET: 896+31, 2' RT ALIGNMENT: BL CONST. W.B.O.L. ELEVATION: 704.8 (MSL) EOB: 52.5 ft. COORD: 41.413015 N, 81.671548 W

EXPLORATION ID **B-001-0-25**

PAGE 1 OF 2

MATERIAL DESCRIPTION AND NOTES	ELEV. 704.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
ASPHALT - 14 INCHES	703.6	1																
GRANULAR BASE - 8-1/2 INCHES	702.9	2	6			SS-1A	-	-	-	-	-	-	-	-	-	8	A-1-b (V)	
FILL: Very stiff to hard dark gray and brown **SILT AND CLAY**, little fine to coarse sand, trace to little fine gravel, few stiff pockets, damp to moist.		3	7 4	17	100	SS-1B	3.0-3.2	-	-	-	-	-	-	-	-	18	A-6a (V)	
		4	3 4 3	11	100	SS-2	4.0-4.2	-	-	-	-	-	-	-	-	16	A-6a (V)	
		5	2 2 4	9	100	SS-3	3.7-4.0	-	-	-	-	-	-	-	-	18	A-6a (V)	
		6 7			83	ST-4	1.5-2.2	10	6	9	36	39	29	16	13	15	A-6a (9)	
	695.3	8 9	2 4 3	11	100	SS-5	2.7-3.0	-	-	-	-	-	-	-	-	20	A-6a (V)	
FILL: Very stiff to hard brown and gray **SILTY CLAY**, trace fine to coarse sand, trace fine gravel, few stiff pockets, damp.		10	3 4 4	12	89	SS-6	3.7-4.5	-	-	-	-	-	-	-	-	14	A-6b (V)	
		11 12	3 5 5	15	100	SS-7	4.2-4.5	3	3	7	38	49	30	14	16	14	A-6b (10)	
	690.8	13	2 3 4	11	72	SS-8	1.5-2.0	-	-	-	-	-	-	-	-	16	A-6b (V)	
FILL: Very stiff to hard brown and gray **SILT AND CLAY**, little to some fine to coarse sand, trace to little fine gravel, few stiff pockets, damp.		14 15	3 5 6	17	89	SS-9	3.7-4.5	-	-	-	-	-	-	-	-	12	A-6a (V)	
		16	6 5 5	15	100	SS-10	3.7-4.2	-	-	-	-	-	-	-	-	10	A-6a (V)	
		17 18	3 4 7	17	100	SS-11	4.5	-	-	-	-	-	-	-	-	17	A-6a (V)	
		19	5 3 4	11	78	SS-12	2.5-2.7	18	11	12	27	32	29	18	11	14	A-6a (5)	
		20 21	3 4 5	14	100	SS-13	3.7-4.5	-	-	-	-	-	-	-	-	15	A-6a (V)	
		22	5 4 6	15	100	SS-14	3.0-4.5	-	-	-	-	-	-	-	-	13	A-6a (V)	
		23 24	4 4 5	14	100	SS-15	1.5-2.5	-	-	-	-	-	-	-	-	12	A-6a (V)	
		25	3 4 5	14	100	SS-16	2.0-2.7	-	-	-	-	-	-	-	-	15	A-6a (V)	
		26 27	5 4 6	15	100	SS-17	2.0-2.7	9	7	6	36	42	29	17	12	16	A-6a (9)	
		28	3 4 5	14	100	SS-18	2.5-3.0	-	-	-	-	-	-	-	-	15	A-6a (V)	
		29	4 3	12	100	SS-19	1.7-	-	-	-	-	-	-	-	-	13	A-6a (V)	

S&ME ODOT LOG (8.5X11) - SGE 01/2019 - OH DOT.GDT - 12/15/25 14:17 - R:\SERVICE LINES\CS-2557\COLUMBUS\GINTWPROJECTS\24170140E CUY-480.GPJ

PLATE 5

PID: 124096	BR ID: N/A	PROJECT: CUY-480-16.56 LANDSLIDE	STATION / OFFSET: 896+31, 2' RT	START: 8/6/25	END: 8/7/25	PG 2 OF 2	B-001-0-25

MATERIAL DESCRIPTION AND NOTES	ELEV. 674.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
								GRADATION (%)					ATTERBERG					
-SEE PREVIOUS SHEET FOR DESCRIPTION-	674.3		5				2.0											
FILL: Very stiff to hard gray and brown **SANDY SILT**, some to "and" clay, little fine to coarse gravel, damp.		31	3 7 8	23	100	SS-20	4.5	17	9	11	27	36	27	17	10	12	A-4a (6)	
		33	4 7 15	33	100	SS-21	4.0-4.5	-	-	-	-	-	-	-	-	13	A-4a (V)	
- Cobbles encountered at 33.5'.		34	30 9 5	21	44	SS-22	3.0-3.2	-	-	-	-	-	-	-	-	15	A-4a (V)	
	668.3	36	4 6 8	21	100	SS-23	3.7-4.2	-	-	-	-	-	-	-	-	11	A-4a (V)	
FILL: Very stiff to hard gray **SILT AND CLAY**, some fine to coarse gravel, little fine to coarse sand, damp.		37	5 6 23	44	100	SS-24	2.7-3.0	29	14	6	19	32	30	18	12	10	A-6a (4)	
- Cobbles encountered from 38.3' to 39.5'.		38	50/3"	-	0	--	-	-	-	-	-	-	-	-	-	-		
			50/1"	-	0	--	-	-	-	-	-	-	-	-	-	-		
	664.3	40	49 18 10	42	67	SS-25	4.5	-	-	-	-	-	-	-	-	13	A-6a (V)	
FILL: Very stiff to hard gray and brown **SANDY SILT**, some clay, some fine gravel, damp.		41	4 6 8	21	78	SS-26	2.5-2.7	-	-	-	-	-	-	-	-	13	A-4a (V)	
		43	6 7 8	23	100	SS-27	4.5	-	-	-	-	-	-	-	-	12	A-4a (V)	
	659.8	44	4 10 6	24	44	SS-28	3.0-4.5	26	13	9	24	28	27	17	10	11	A-4a (3)	
FILL: Very stiff to hard gray and brown **SILT AND CLAY**, some fine to coarse sand, little fine gravel, damp.		46	6 11 9	30	67	SS-29	2.5-2.7	-	-	-	-	-	-	-	-	15	A-6a (V)	
	656.8	47	8 9 10	29	100	SS-30	4.0-4.5	-	-	-	-	-	-	-	-	16	A-6a (V)	
Very stiff gray and dark gray **SILT AND CLAY**, little fine to coarse sand, trace fine gravel, few wood fragments and slightly organic above 49.5', damp. - SS-31; LOI = 1.6%.		49	4 5 7	18	100	SS-31	2.0-2.2	3	4	7	44	42	31	18	13	18	A-6a (9)	
		50	4 9 15	36	100	SS-32	2.7-3.7	-	-	-	-	-	-	-	-	17	A-6a (V)	
	652.8	TR 52	6 9 15	36	100	SS-33A	3.0-3.2	-	-	-	-	-	-	-	-	15	A-6a (V)	
SHALE, gray, severely weathered, very weak.	652.3	EOB				SS-33B	-	-	-	-	-	-	-	-	-	11	Rock (V)	

NOTES:
- No water encountered during drilling.
- After removing augers, borehole caved at 41.0' and was dry.

NOTES: SEE ABOVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BENTONITE AND CEMENT GROUT; PLASTIC HOLE PLUG DEVICE; SOIL CUTTINGS

PROJECT: CUY-480-16.56 LANDSLIDE	DRILLING FIRM / OPERATOR: OTB / C. SVITAK	DRILL RIG: OTB MOBILE B-57	STATION / OFFSET: 897+56, 1' RT	EXPLORATION ID **B-002-0-25**
TYPE: LANDSLIDE	SAMPLING FIRM / LOGGER: S&ME / M.S. ANSARI	HAMMER: SAFETY HAMMER	ALIGNMENT: BL CONST. W.B.O.L.	
PID: 124096 BR ID: N/A	DRILLING METHOD: 3-1/4" HSA	CALIBRATION DATE: 12/30/24	ELEVATION: 703.0 (MSL) EOB: 50.8 ft.	PAGE 1 OF 2
START: 8/5/25 END: 8/6/25	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	COORD: 41.412813 N, 81.671179 W	

MATERIAL DESCRIPTION AND NOTES	ELEV. 703.0	SPT/RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
ASPHALT - 11 INCHES	702.1																
GRANULAR BASE - 4 INCHES	701.7	5 7 6	20	100	SS-1A	-	-	-	-	-	-	-	-	-	6	A-1-b (V)	
FILL: Medium dense brown **GRAVEL WITH SAND AND SILT**, trace clay, possible granular base, moist.	700.5				SS-1B	-	-	-	-	-	-	-	-	-	11	A-2-4 (V)	
FILL: Very stiff to hard brown and gray **SILT AND CLAY**, trace to little fine to coarse sand, trace fine gravel, few stiff pockets, damp.		3 4 5	14	100	SS-2	4.5	-	-	-	-	-	-	-	-	13	A-6a (V)	
		2 4 4	12	61	SS-3	3.5-4.5	3	5	8	36	48	28	17	11	14	A-6a (8)	
		3 4 6	15	89	SS-4	4.5	-	-	-	-	-	-	-	-	12	A-6a (V)	
- SS-5; contains coarse gravel.		3 3 3	9	44	SS-5	2.2-2.5	-	-	-	-	-	-	-	-	12	A-6a (V)	
		2 3 3	9	78	SS-6	3.7-4.0	-	-	-	-	-	-	-	-	15	A-6a (V)	
		2 3 4	11	78	SS-7	2.2-2.5	-	-	-	-	-	-	-	-	16	A-6a (V)	
	689.5			58	ST-8	1.5-2.5	2	4	4	46	44	31	16	15	18	A-6a (10)	
FILL: Very stiff to hard brown and gray **SANDY SILT**, some to "and" clay, little to some fine to coarse gravel, few shale fragments, few stiff pockets, damp to moist.		3 5 6	17	100	SS-9	2.5-2.7	-	-	-	-	-	-	-	-	11	A-4a (V)	
		3 4 6	15	100	SS-10	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)	
		5 7 6	20	89	SS-11	3.5-4.2	-	-	-	-	-	-	-	-	14	A-4a (V)	
		3 5 4	14	89	SS-12	3.5-4.0	-	-	-	-	-	-	-	-	15	A-4a (V)	
		1 3 4	11	100	SS-13	2.7-3.0	-	-	-	-	-	-	-	-	17	A-4a (V)	
		3 4 5	14	67	SS-14	2.7-3.7	-	-	-	-	-	-	-	-	15	A-4a (V)	
		3 4 4	12	100	SS-15	3.7-4.0	16	6	8	29	41	27	17	10	12	A-4a (7)	
		4 3 6	14	78	SS-16	3.5-4.0	-	-	-	-	-	-	-	-	10	A-4a (V)	
		4 4 5	14	100	SS-17	2.2-2.5	-	-	-	-	-	-	-	-	15	A-4a (V)	
		2 3 4	11	100	SS-18	2.2-2.7	-	-	-	-	-	-	-	-	13	A-4a (V)	
		3 6 8	21	72	SS-19	1.7-2.2	26	9	7	28	30	25	16	9	11	A-4a (5)	

PID: 124096	BR ID: N/A	PROJECT: CUY-480-16.56 LANDSLIDE	STATION / OFFSET: 897+56, 1' RT	START: 8/5/25	END: 8/6/25	PG 2 OF 2	B-002-0-25

MATERIAL DESCRIPTION AND NOTES	ELEV. 673.0	DEPTHS	SPT/ RQD	N60	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
FILL: Very stiff to hard brown and gray **SANDY SILT**, some to "and" clay, little to some fine to coarse gravel, few shale fragments, few stiff pockets, damp to moist. *(continued)*	670.9	31 – 32	2 5 7	18	100	SS-20	3.7-4.0	-	-	-	-	-	-	-	-	14	A-4a (V)	
			4 12 11	35	100	SS-21A	2.2-2.5	-	-	-	-	-	-	-	-	19	A-4a (V)	
FILL: Dense gray **GRAVEL**, little fine to coarse sand, trace silt, trace clay, dry.	670.0	33				SS-21B	-	-	-	-	-	-	-	-	-	4	A-1-a (V)	
FILL: Very stiff to hard brown and gray **SILT AND CLAY**, trace to little fine to coarse sand, trace to little fine gravel, damp.		34	4 6 8	21	100	SS-22	2.7-3.0	3	4	6	36	51	27	16	11	14	A-6a (8)	
		35 – 36	3 5 6	17	100	SS-23	3.5-4.5	-	-	-	-	-	-	-	-	14	A-6a (V)	
		37	4 8 9	26	100	SS-24	3.7-4.5	-	-	-	-	-	-	-	-	16	A-6a (V)	
		38 – 39	5 8 10	27	78	SS-25	4.5+	-	-	-	-	-	-	-	-	11	A-6a (V)	
		40	9 16 12	42	100	SS-26	4.5+	-	-	-	-	-	-	-	-	5	A-6a (V)	
		41 – 42	3 8 9	26	100	SS-27	4.5+	14	7	6	31	42	31	18	13	14	A-6a (9)	
		43	2 4 5	14	22	SS-28	2.2-2.5	-	-	-	-	-	-	-	-	7	A-6a (V)	
	658.0	44 – 45	3 7 9	24	78	SS-29	2.5-2.7	-	-	-	-	-	-	-	-	12	A-6a (V)	
FILL: Hard gray **SILT AND CLAY**, some fine to coarse gravel, little fine to coarse sand, few glass fragments, few wood fragments, slightly organic, damp to moist. - SS-30; LOI = 1.0%.		46	5 14 12	39	100	SS-30	4.5	24	7	7	28	34	29	18	11	13	A-6a (6)	
	655.0	W 655.0 — 47 – 48	5 17 10	41	100	SS-31	4.5	-	-	-	-	-	-	-	-	29	A-6a (V)	
Hard (est.) dark gray **SILT AND CLAY**, little fine to coarse sand, trace fine gravel, damp.	653.8	TR — 49	8 8 12	30	100	SS-32A	-	-	-	-	-	-	-	-	-	18	A-6a (V)	
SHALE, gray highly to severely weathered, very weak.						SS-32B	-	-	-	-	-	-	-	-	-	16	Rock (V)	
	652.2	50 — EOB	23 30 50/3"	-	80	SS-33	-	-	-	-	-	-	-	-	-	18	Rock (V)	

NOTES:
- Water encountered at 48.0' during drilling.
- After removing augers, borehole caved at 40.0' and was dry.

NOTES: SEE ABOVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BENTONITE AND CEMENT GROUT; PLASTIC HOLE PLUG DEVICE; SOIL CUTTINGS

PROJECT: CUY-480-16.56 LANDSLIDE
TYPE: LANDSLIDE
PID: 124096 BR ID: N/A
START: 8/7/25 END: 8/8/25

DRILLING FIRM / OPERATOR: OTB / C. SVITAK
SAMPLING FIRM / LOGGER: S&ME / M.S. ANSARI
DRILLING METHOD: 3-1/4" HSA
SAMPLING METHOD: SPT

DRILL RIG: OTB MOBILE B-57
HAMMER: SAFETY HAMMER
CALIBRATION DATE: 12/30/24
ENERGY RATIO (%): 90*

STATION / OFFSET: 899+02, 1' RT
ALIGNMENT: BL CONST. W.B.O.L.
ELEVATION: 700.9 (MSL) EOB: 48.8 ft.
COORD: 41.412590 N, 81.670735 W

EXPLORATION ID **B-003-0-25**
PAGE 1 OF 2

MATERIAL DESCRIPTION AND NOTES	ELEV. 700.9	DEPTHS	SPT/RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
ASPHALT - 14 INCHES	699.7	1																
GRANULAR BASE - 15 INCHES	698.4	2	7 9 3	18	100	SS-1A	-	-	-	-	-	-	-	-	-	8	A-1-b (V)	
FILL: Very stiff to hard brown and gray **SILT AND CLAY**, little fine to coarse sand, trace to little fine to coarse gravel, few shale fragments, damp.		3				SS-1B	3.7-4.0	-	-	-	-	-	-	-	-	14	A-6a (V)	
		4	3 4 5	14	100	SS-2	4.5	4	6	11	36	43	27	16	11	13	A-6a (8)	
		5	3 4 5	14	100	SS-3	3.7-4.2	-	-	-	-	-	-	-	-	14	A-6a (V)	
		6, 7	2 7 3	15	100	SS-4	3.2-3.5	-	-	-	-	-	-	-	-	13	A-6a (V)	
		8	3 4 4	12	100	SS-5	3.5-3.7	8	6	9	28	49	29	17	12	14	A-6a (9)	
		9, 10	3 4 5	14	100	SS-6	3.7-4.5	-	-	-	-	-	-	-	-	9	A-6a (V)	
		11	3 4 6	15	100	SS-7	4.5	-	-	-	-	-	-	-	-	13	A-6a (V)	
		12, 13	3 5 6	17	100	SS-8	4.0-4.5	-	-	-	-	-	-	-	-	14	A-6a (V)	
		14, 15			42	ST-9	4.5	20	7	7	34	32	31	16	15	11	A-6a (8)	
	683.9	16	2 2 3	8	100	SS-10	2.2-3.0	-	-	-	-	-	-	-	-	18	A-6a (V)	
FILL: Very stiff to hard brown and gray **SANDY SILT**, "and" clay, little fine to coarse gravel, damp.		17, 18	2 4 4	12	44	SS-11	3.0-3.2	-	-	-	-	-	-	-	-	11	A-4a (V)	
		19	5 8 5	20	100	SS-12	3.2-3.7	-	-	-	-	-	-	-	-	14	A-4a (V)	
		20, 21	3 4 5	14	100	SS-13	3.5-4.5	-	-	-	-	-	-	-	-	14	A-4a (V)	
		22	4 4 5	14	100	SS-14	3.5-3.7	12	7	13	30	38	25	15	10	12	A-4a (7)	
- SS-15; few asphalt fragments.		23, 24	3 4 5	14	100	SS-15	3.7-4.0	-	-	-	-	-	-	-	-	16	A-4a (V)	
	674.9	25	4 5 8	20	100	SS-16	3.7-4.5	-	-	-	-	-	-	-	-	12	A-4a (V)	
FILL: Very stiff to hard brown and gray **SILT AND CLAY**, trace to little fine to coarse sand, trace to some fine to coarse gravel, damp.		26, 27	5 6 5	17	100	SS-17	2.0-2.2	-	-	-	-	-	-	-	-	14	A-6a (V)	
		28	2 7 7	21	100	SS-18	3.2-3.5	-	-	-	-	-	-	-	-	15	A-6a (V)	
		29	3 5 [illegible]	17	100	SS-19	2.5-	6	3	4	28	59	32	18	14	16	A-6a (10)	

PID: 124096	BR ID: N/A	PROJECT: CUY-480-16.56 LANDSLIDE	STATION / OFFSET: 899+02, 1' RT	START: 8/7/25	END: 8/8/25	PG 2 OF 2	B-003-0-25

MATERIAL DESCRIPTION AND NOTES	ELEV. 670.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
FILL: Very stiff to hard brown and gray **SILT AND CLAY**, trace to little fine to coarse sand, trace to some fine to coarse gravel, damp. *(continued)*			6				3.5											
		31	4 4 5	14	100	SS-20	3.2-3.7	-	-	-	-	-	-	-	-	16	A-6a (V)	
		32–33	6 6 9	23	100	SS-21	4.5	-	-	-	-	-	-	-	-	12	A-6a (V)	
- SS-22; LOI = 0.9%, dark gray and few wood fragments.		34	5 6 6	18	100	SS-22	3.0-3.5	4	5	7	36	48	28	17	11	15	A-6a (8)	
		35–36	4 10 10	30	100	SS-23	4.5	23	9	8	24	36	29	18	11	11	A-6a (5)	
- SS-24; few ceramic fragments.		37	4 7 7	21	100	SS-24	2.5-2.7	-	-	-	-	-	-	-	-	17	A-6a (V)	
		38–39	2 2 4	9	100	SS-25	1.7-2.2	-	-	-	-	-	-	-	-	22	A-6a (V)	
		40	6 5 6	17	100	SS-26	2.0-2.2	-	-	-	-	-	-	-	-	18	A-6a (V)	
- SS-27; LOI = 2.8%, slightly organic, dark gray and few wood fragments.	658.2	41–42	4 5 6	17	100	SS-27	3.2-3.5	1	2	13	33	51	34	22	12	22	A-6a (9)	
Very stiff brown mottled with gray **SILT AND CLAY**, some fine to coarse gravel, some fine to coarse sand, few stiff pockets, few shale fragments, few roots, moist.		43	3 5 5	15	100	SS-28A	2.2	-	-	-	-	-	-	-	-	20	A-6a (V)	
						SS-28B	3.5-3.7	-	-	-	-	-	-	-	-	21	A-6a (V)	
	W 655.4	44–45	3 5 5	15	100	SS-29	3.0-3.5	-	-	-	-	-	-	-	-	23	A-6a (V)	
	653.7	46	3 5 9	21	100	SS-30	1.7-2.0	27	11	11	18	33	35	20	15	20	A-6a (5)	
SHALE, gray highly to severely weathered, very weak.		TR 47	23 50/4"	-	100	SS-31A	-	-	-	-	-	-	-	-	-	24	A-6a (V)	
						SS-31B	-	-	-	-	-	-	-	-	-	13	Rock (V)	
	652.1	48 EOB	50/4"	-	100	SS-32	-	-	-	-	-	-	-	-	-	11	Rock (V)	

NOTES:
- Seepage encountered at 45.5' during drilling.
- After removing augers, borehole caved at 38.0' and was dry.

NOTES: SEE ABOVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BENTONITE AND CEMENT GROUT; PLASTIC HOLE PLUG DEVICE; SOIL CUTTINGS

WILDCAT DYNAMIC CONE LOG

PROJECT NUMBER:	24170140E
DATE STARTED:	07-17-2025
DATE COMPLETED:	07-17-2025
HOLE #:	D-001-1-25
CREW:	KAH/SJD
PROJECT:	CUY-480-16.56 Slide
ADDRESS:	Brooklyn Heights, OH
LOCATION:	41.413058 N; 81.671329 W; Sta. 896+70, 46.6' LT
SURFACE ELEVATION:	688
WATER ON COMPLETION:	N/A
HAMMER WEIGHT:	35 lbs.
CONE AREA:	10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
- 1 ft	10	44.4	••••••••••••	12	MEDIUM DENSE	STIFF
-	10	44.4	••••••••••••	12	MEDIUM DENSE	STIFF
-	9	40.0	•••••••••••	11	MEDIUM DENSE	STIFF
- 2 ft	11	48.8	••••••••••••••	13	MEDIUM DENSE	STIFF
-	15	66.6	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
-	31	137.6	••	25+	DENSE	HARD
- 3 ft	14	62.2	••••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
- 1 m	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
-	7	27.0	•••••••	7	LOOSE	MEDIUM STIFF
- 4 ft	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
-	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
-	4	15.4	••••	4	VERY LOOSE	SOFT
- 5 ft	4	15.4	••••	4	VERY LOOSE	SOFT
-	3	11.6	•••	3	VERY LOOSE	SOFT
-	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
- 6 ft	9	34.7	••••••••••	9	LOOSE	STIFF
-	9	34.7	••••••••••	9	LOOSE	STIFF
- 2 m	12	46.3	•••••••••••••	13	MEDIUM DENSE	STIFF
- 7 ft	16	54.7	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	12	41.0	•••••••••••	11	MEDIUM DENSE	STIFF
-	10	34.2	•••••••••	9	LOOSE	STIFF
- 8 ft	11	37.6	••••••••••	10	LOOSE	STIFF
-	12	41.0	•••••••••••	11	MEDIUM DENSE	STIFF
-	10	34.2	•••••••••	9	LOOSE	STIFF
- 9 ft	6	20.5	•••••	5	LOOSE	MEDIUM STIFF
-	9	30.8	••••••••	8	LOOSE	MEDIUM STIFF
-	11	37.6	••••••••••	10	LOOSE	STIFF
- 3 m 10 ft	11	37.6	••••••••••	10	LOOSE	STIFF
-	11	33.7	•••••••••	9	LOOSE	STIFF
-	11	33.7	•••••••••	9	LOOSE	STIFF
-	10	30.6	••••••••	8	LOOSE	MEDIUM STIFF
- 11 ft	9	27.5	•••••••	7	LOOSE	MEDIUM STIFF
-	11	33.7	•••••••••	9	LOOSE	STIFF
-	13	39.8	•••••••••••	11	MEDIUM DENSE	STIFF
- 12 ft	15	45.9	•••••••••••••	13	MEDIUM DENSE	STIFF
-	14	42.8	••••••••••••	12	MEDIUM DENSE	STIFF
-	14	42.8	••••••••••••	12	MEDIUM DENSE	STIFF
- 4 m 13 ft	15	45.9	•••••••••••••	13	MEDIUM DENSE	STIFF

HOLE #: D-001-1-25

WILDCAT DYNAMIC CONE LOG

PROJECT: CUY-480-16.56 Slide

PROJECT NUMBER: 24170140E

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	11	30.5	••••••••	8	LOOSE	MEDIUM STIFF
-	14	38.8	•••••••••••	11	MEDIUM DENSE	STIFF
- 14 ft	16	44.3	••••••••••••	12	MEDIUM DENSE	STIFF
-	17	47.1	•••••••••••••	13	MEDIUM DENSE	STIFF
-	27	74.8	•••••••••••••••••••••	21	MEDIUM DENSE	VERY STIFF
- 15 ft	40	110.8	••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	47	130.2	•••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	41	113.6	••••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 16 ft						
- 5 m						
-						
- 17 ft						
-						
-						
- 18 ft						
-						
-						
- 19 ft						
-						
- 6 m						
- 20 ft						
-						
-						
- 21 ft						
-						
-						
- 22 ft						
-						
-						
- 7 m 23 ft						
-						
-						
- 24 ft						
-						
-						
- 25 ft						
-						
-						
- 26 ft						
- 8 m						
-						
- 27 ft						
-						
-						
- 28 ft						
-						
-						
- 29 ft						
-						
- 9 m						

WILDCAT DYNAMIC CONE LOG

PROJECT NUMBER: 24170140E
DATE STARTED: 07-17-2025
DATE COMPLETED: 07-17-2025

HOLE #: D-002-1-25
CREW: KAH/SJD
PROJECT: CUY-480-16.56 Slide
ADDRESS: Brooklyn Heights, OH
LOCATION: 41.412886 N; 81.671096 W; Sta. 897+59, 33.7' LT

SURFACE ELEVATION: 691
WATER ON COMPLETION: N/A
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	COHESIVE
-	3	13.3	•••	3	VERY LOOSE	SOFT
-	3	13.3	•••	3	VERY LOOSE	SOFT
- 1 ft	2	8.9	••	2	VERY LOOSE	SOFT
-	2	8.9	••	2	VERY LOOSE	SOFT
-	1	4.4	•	1	VERY LOOSE	VERY SOFT
- 2 ft	2	8.9	••	2	VERY LOOSE	SOFT
-	2	8.9	••	2	VERY LOOSE	SOFT
-	1	4.4	•	1	VERY LOOSE	VERY SOFT
- 3 ft	2	8.9	••	2	VERY LOOSE	SOFT
- 1 m	1	4.4	•	1	VERY LOOSE	VERY SOFT
-	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
- 4 ft	8	30.9	••••••••	8	LOOSE	MEDIUM STIFF
-	9	34.7	•••••••••	9	LOOSE	STIFF
-	10	38.6	•••••••••••	11	MEDIUM DENSE	STIFF
- 5 ft	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
- 6 ft	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	13	50.2	••••••••••••••	14	MEDIUM DENSE	STIFF
- 2 m	9	34.7	•••••••••	9	LOOSE	STIFF
- 7 ft	10	34.2	•••••••••	9	LOOSE	STIFF
-	9	30.8	••••••••	8	LOOSE	MEDIUM STIFF
-	13	44.5	••••••••••••	12	MEDIUM DENSE	STIFF
- 8 ft	12	41.0	•••••••••••	11	MEDIUM DENSE	STIFF
-	17	58.1	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	15	51.3	••••••••••••••	14	MEDIUM DENSE	STIFF
- 9 ft	10	34.2	•••••••••	9	LOOSE	STIFF
-	12	41.0	•••••••••••	11	MEDIUM DENSE	STIFF
-	13	44.5	••••••••••••	12	MEDIUM DENSE	STIFF
- 3 m 10 ft	13	44.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	15	45.9	•••••••••••••	13	MEDIUM DENSE	STIFF
-	20	61.2	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	17	52.0	••••••••••••••	14	MEDIUM DENSE	STIFF
- 11 ft	16	49.0	•••••••••••••	13	MEDIUM DENSE	STIFF
-	17	52.0	••••••••••••••	14	MEDIUM DENSE	STIFF
-	16	49.0	•••••••••••••	13	MEDIUM DENSE	STIFF
- 12 ft	16	49.0	•••••••••••••	13	MEDIUM DENSE	STIFF
-	18	55.1	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	17	52.0	••••••••••••••	14	MEDIUM DENSE	STIFF
- 4 m 13 ft	18	55.1	•••••••••••••••	15	MEDIUM DENSE	STIFF

PROJECT: CUY-480-16.56 Slide PROJECT NUMBER: 24170140E

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	COHESIVE
-	20	55.4	••••••••••••••••	15	MEDIUM DENSE	STIFF
-	19	52.6	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 14 ft	23	63.7	••••••••••••••••••	18	MEDIUM DENSE	VERY STIFF
-	21	58.2	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	23	63.7	••••••••••••••••••	18	MEDIUM DENSE	VERY STIFF
- 15 ft	32	88.6	•••••••••••••••••••••••••	25	MEDIUM DENSE	VERY STIFF
-	31	85.9	••••••••••••••••••••••••	24	MEDIUM DENSE	VERY STIFF
-						
- 16 ft						
- 5 m						
-						
- 17 ft						
-						
-						
- 18 ft						
-						
-						
- 19 ft						
-						
- 6 m						
- 20 ft						
-						
-						
- 21 ft						
-						
-						
- 22 ft						
-						
-						
- 7 m 23 ft						
-						
-						
- 24 ft						
-						
-						
- 25 ft						
-						
-						
- 26 ft						
- 8 m						
-						
- 27 ft						
-						
-						
- 28 ft						
-						
-						
- 29 ft						
-						
- 9 m						

WILDCAT DYNAMIC CONE LOG

PROJECT NUMBER: 24170140E
DATE STARTED: 07-17-2025
DATE COMPLETED: 07-17-2025

HOLE #: D-002-2-25
CREW: KAH/SJD
PROJECT: CUY-480-16.56 Slide
ADDRESS: Brooklyn Heights, OH
LOCATION: 41.412968 N; 81.670998 W; Sta. 897+64, 73.7' LT

SURFACE ELEVATION: 673
WATER ON COMPLETION: N/A
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	COHESIVE
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
- 1 ft	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	3	13.3	•••	3	VERY LOOSE	SOFT
- 2 ft	3	13.3	•••	3	VERY LOOSE	SOFT
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
- 3 ft	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
- 1 m	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	4	15.4	••••	4	VERY LOOSE	SOFT
- 4 ft	3	11.6	•••	3	VERY LOOSE	SOFT
-	3	11.6	•••	3	VERY LOOSE	SOFT
-	4	15.4	••••	4	VERY LOOSE	SOFT
- 5 ft	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
-	3	11.6	•••	3	VERY LOOSE	SOFT
-	4	15.4	••••	4	VERY LOOSE	SOFT
- 6 ft	4	15.4	••••	4	VERY LOOSE	SOFT
-	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
- 2 m	9	34.7	••••••••••	9	LOOSE	STIFF
- 7 ft	5	17.1	••••	4	VERY LOOSE	SOFT
-	9	30.8	••••••••	8	LOOSE	MEDIUM STIFF
-	9	30.8	••••••••	8	LOOSE	MEDIUM STIFF
- 8 ft	11	37.6	••••••••••	10	LOOSE	STIFF
-	17	58.1	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	11	37.6	••••••••••	10	LOOSE	STIFF
- 9 ft	7	23.9	••••••	6	LOOSE	MEDIUM STIFF
-	6	20.5	•••••	5	LOOSE	MEDIUM STIFF
-	8	27.4	•••••••	7	LOOSE	MEDIUM STIFF
- 3 m 10 ft	16	54.7	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	13	39.8	•••••••••••	11	MEDIUM DENSE	STIFF
-	10	30.6	••••••••	8	LOOSE	MEDIUM STIFF
-	11	33.7	•••••••••	9	LOOSE	STIFF
- 11 ft	11	33.7	•••••••••	9	LOOSE	STIFF
-	15	45.9	•••••••••••••	13	MEDIUM DENSE	STIFF
-	17	52.0	•••••••••••••••	14	MEDIUM DENSE	STIFF
- 12 ft	14	42.8	••••••••••••	12	MEDIUM DENSE	STIFF
-	18	55.1	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	17	52.0	•••••••••••••••	14	MEDIUM DENSE	STIFF
- 4 m 13 ft	18	55.1	•••••••••••••••	15	MEDIUM DENSE	STIFF

WILDCAT DYNAMIC CONE LOG

PROJECT: CUY-480-16.56 Slide PROJECT NUMBER: 24170140E

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	20	55.4	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	20	55.4	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 14 ft	23	63.7	•••••••••••••••••	18	MEDIUM DENSE	VERY STIFF
-	25	69.3	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
-	33	91.4	•••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
- 15 ft	41	113.6	•••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	44	121.9	••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	41	113.6	•••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 16 ft						
- 5 m						
-						
- 17 ft						
-						
-						
- 18 ft						
-						
-						
- 19 ft						
-						
- 6 m						
- 20 ft						
-						
-						
- 21 ft						
-						
-						
- 22 ft						
-						
-						
- 7 m 23 ft						
-						
-						
- 24 ft						
-						
-						
- 25 ft						
-						
-						
- 26 ft						
- 8 m						
-						
- 27 ft						
-						
-						
- 28 ft						
-						
-						
- 29 ft						
-						
- 9 m						

WILDCAT DYNAMIC CONE LOG

PROJECT NUMBER: 24170140E
DATE STARTED: 07-17-2025
DATE COMPLETED: 07-17-2025

HOLE #: D-002-3-25
CREW: KAH/SJD
PROJECT: CUY-480-16.56 Slide
ADDRESS: Brooklyn Heights, OH
LOCATION: 41.413022 N; 81.670932 W; Sta. 897+67, 100.2' LT

SURFACE ELEVATION: 661
WATER ON COMPLETION: N/A
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
-	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
- 1 ft	8	35.5	••••••••••	10	LOOSE	STIFF
-	8	35.5	••••••••••	10	LOOSE	STIFF
-	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
- 2 ft	15	66.6	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
-	30	133.2	••••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	19	84.4	••••••••••••••••••••••••	24	MEDIUM DENSE	VERY STIFF
- 3 ft	14	62.2	••••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
- 1 m	17	75.5	•••••••••••••••••••••	21	MEDIUM DENSE	VERY STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
- 4 ft	16	61.8	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	15	57.9	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	13	50.2	••••••••••••••	14	MEDIUM DENSE	STIFF
- 5 ft	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
- 6 ft	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
- 2 m	15	57.9	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
- 7 ft	33	112.9	••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	20	68.4	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
-						
- 8 ft						
-						
-						
- 9 ft						
-						
-						
- 3 m 10 ft						
-						
-						
-						
- 11 ft						
-						
-						
- 12 ft						
-						
-						
- 4 m 13 ft						

WILDCAT DYNAMIC CONE LOG

PROJECT NUMBER:	24170140E
DATE STARTED:	07-17-2025
DATE COMPLETED:	07-17-2025
HOLE #:	D-002-4-25
CREW:	KAH
SURFACE ELEVATION:	682
PROJECT:	CUY-480-16.56 Slide
WATER ON COMPLETION:	N/A
ADDRESS:	Brooklyn Heights, OH
HAMMER WEIGHT:	35 lbs.
LOCATION:	41.412812 N; 81.670825 W; Sta. 898+36, 54.2' LT
CONE AREA:	10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	COHESIVE
-	5	22.2	••••••	6	LOOSE	MEDIUM STIFF
-	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
- 1 ft	9	40.0	•••••••••••	11	MEDIUM DENSE	STIFF
-	9	40.0	•••••••••••	11	MEDIUM DENSE	STIFF
-	9	40.0	•••••••••••	11	MEDIUM DENSE	STIFF
- 2 ft	10	44.4	••••••••••••	12	MEDIUM DENSE	STIFF
-	8	35.5	••••••••••	10	LOOSE	STIFF
-	6	26.6	•••••••	7	LOOSE	MEDIUM STIFF
- 3 ft	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
- 1 m	5	22.2	••••••	6	LOOSE	MEDIUM STIFF
-	3	11.6	•••	3	VERY LOOSE	SOFT
- 4 ft	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
-	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
-	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
- 5 ft	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
-	8	30.9	••••••••	8	LOOSE	MEDIUM STIFF
-	10	38.6	•••••••••••	11	MEDIUM DENSE	STIFF
- 6 ft	13	50.2	••••••••••••••	14	MEDIUM DENSE	STIFF
-	17	65.6	•••••••••••••••••••	18	MEDIUM DENSE	VERY STIFF
- 2 m	15	57.9	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
- 7 ft	11	37.6	••••••••••	10	LOOSE	STIFF
-	7	23.9	••••••	6	LOOSE	MEDIUM STIFF
-	8	27.4	•••••••	7	LOOSE	MEDIUM STIFF
- 8 ft	11	37.6	••••••••••	10	LOOSE	STIFF
-	10	34.2	•••••••••	9	LOOSE	STIFF
-	11	37.6	••••••••••	10	LOOSE	STIFF
- 9 ft	18	61.6	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	49	167.6	•••	25+	DENSE	HARD
-	45	153.9	•••	25+	DENSE	HARD
- 3 m 10 ft	14	47.9	•••••••••••••	13	MEDIUM DENSE	STIFF
-	10	30.6	••••••••	8	LOOSE	MEDIUM STIFF
-	9	27.5	•••••••	7	LOOSE	MEDIUM STIFF
-	8	24.5	•••••••	6	LOOSE	MEDIUM STIFF
- 11 ft	11	33.7	•••••••••	9	LOOSE	STIFF
-	11	33.7	•••••••••	9	LOOSE	STIFF
-	6	18.4	•••••	5	LOOSE	MEDIUM STIFF
- 12 ft	8	24.5	•••••••	6	LOOSE	MEDIUM STIFF
-	10	30.6	••••••••	8	LOOSE	MEDIUM STIFF
-	12	36.7	••••••••••	10	LOOSE	STIFF
- 4 m 13 ft	15	45.9	•••••••••••••	13	MEDIUM DENSE	STIFF

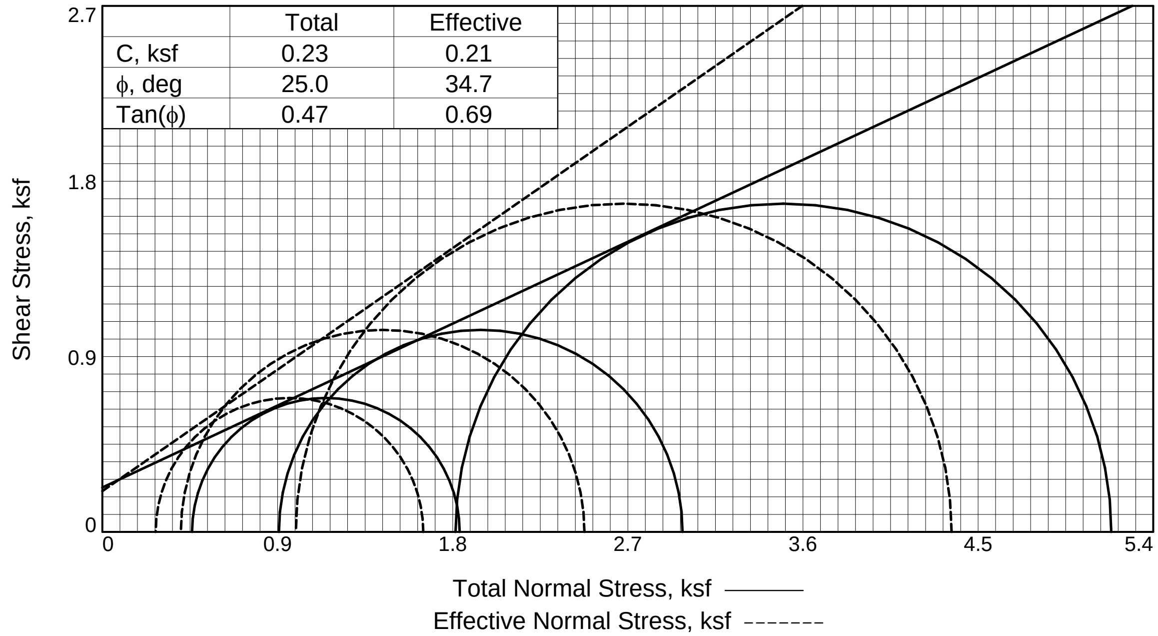
WILDCAT DYNAMIC CONE LOG

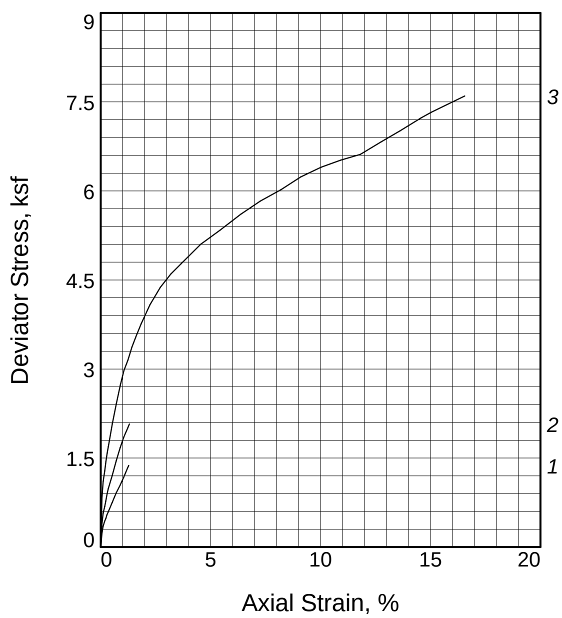
PROJECT: CUY-480-16.56 Slide   PROJECT NUMBER: 24170140E

	BLOWS	RESISTANCE	GRAPH OF CONE RESISTANCE		TESTED CONSISTENCY	
DEPTH	PER 10 cm	Kg/cm²	0 50 100 150	N'	NON-COHESIVE	COHESIVE
-	14	38.8	•••••••••••	11	MEDIUM DENSE	STIFF
-	21	58.2	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
- 14 ft	22	60.9	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	20	55.4	••••••••••••••••	15	MEDIUM DENSE	STIFF
-	20	55.4	••••••••••••••••	15	MEDIUM DENSE	STIFF
- 15 ft	13	36.0	••••••••••	10	LOOSE	STIFF
-	14	38.8	•••••••••••	11	MEDIUM DENSE	STIFF
-	15	41.6	••••••••••••	11	MEDIUM DENSE	STIFF
- 16 ft						
- 5 m						
-						
- 17 ft						
-						
-						
- 18 ft						
-						
-						
- 19 ft						
-						
- 6 m						
- 20 ft						
-						
-						
- 21 ft						
-						
-						
- 22 ft						
-						
-						
- 7 m 23 ft						
-						
-						
- 24 ft						
-						
-						
- 25 ft						
-						
-						
- 26 ft						
- 8 m						
-						
- 27 ft						
-						
-						
- 28 ft						
-						
-						
- 29 ft						
-						
- 9 m						

C & phi are not test results but an interpertaion of test results. The designer is responsible for interperting test data as provided by S&ME.

	Total	Effective
C, ksf	0.23	0.21
ϕ, deg	25.0	34.7
Tan(ϕ)	0.47	0.69





	Sample No.	1	2	3
Initial	Water Content, %	16.3	16.3	16.3
	Dry Density, pcf	117.9	117.9	117.9
	Saturation, %	97.9	97.9	97.9
	Void Ratio	0.4588	0.4588	0.4588
	Diameter, in.	2.836	2.836	2.836
	Height, in.	5.558	5.558	5.558
At Test	Water Content, %	16.6	16.2	15.7
	Dry Density, pcf	118.0	118.8	120.0
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4576	0.4477	0.4332
	Diameter, in.	2.834	2.833	2.827
	Height, in.	5.562	5.526	5.496
	Strain rate, %/min.	0.01	0.01	0.01
	Eff. Cell Pressure, psi	3.20	6.30	12.60
	Fail. Stress, ksf	1.37	2.07	3.37
	Excess Pore Pr., ksf	0.19	0.50	0.82
	Strain, %	1.3	1.3	1.4
	Ult. Stress, ksf	1.37	2.07	7.33
	Excess Pore Pr., ksf	0.19	0.50	-2.55
	Strain, %	1.3	1.3	15.0
	$\bar{\sigma}_1$ Failure, ksf	1.65	2.48	4.36
	$\bar{\sigma}_3$ Failure, ksf	0.27	0.40	0.99

Type of Test:
CU with Pore Pressures

Sample Type: Intact

Description: SILT AND CLAY (A-6a, 8), gray

LL= 29 **PL=** 16 **PI=** 13

Specific Gravity= 2.755

Remarks: Failure criterion is 1.3% strain.

Figure 1 of 2

Client: ODOT District 12

Project: CUY-480-16.56 Slide

Source of Sample: B-001-0-25 **Depth:** 6.0 - 7.7

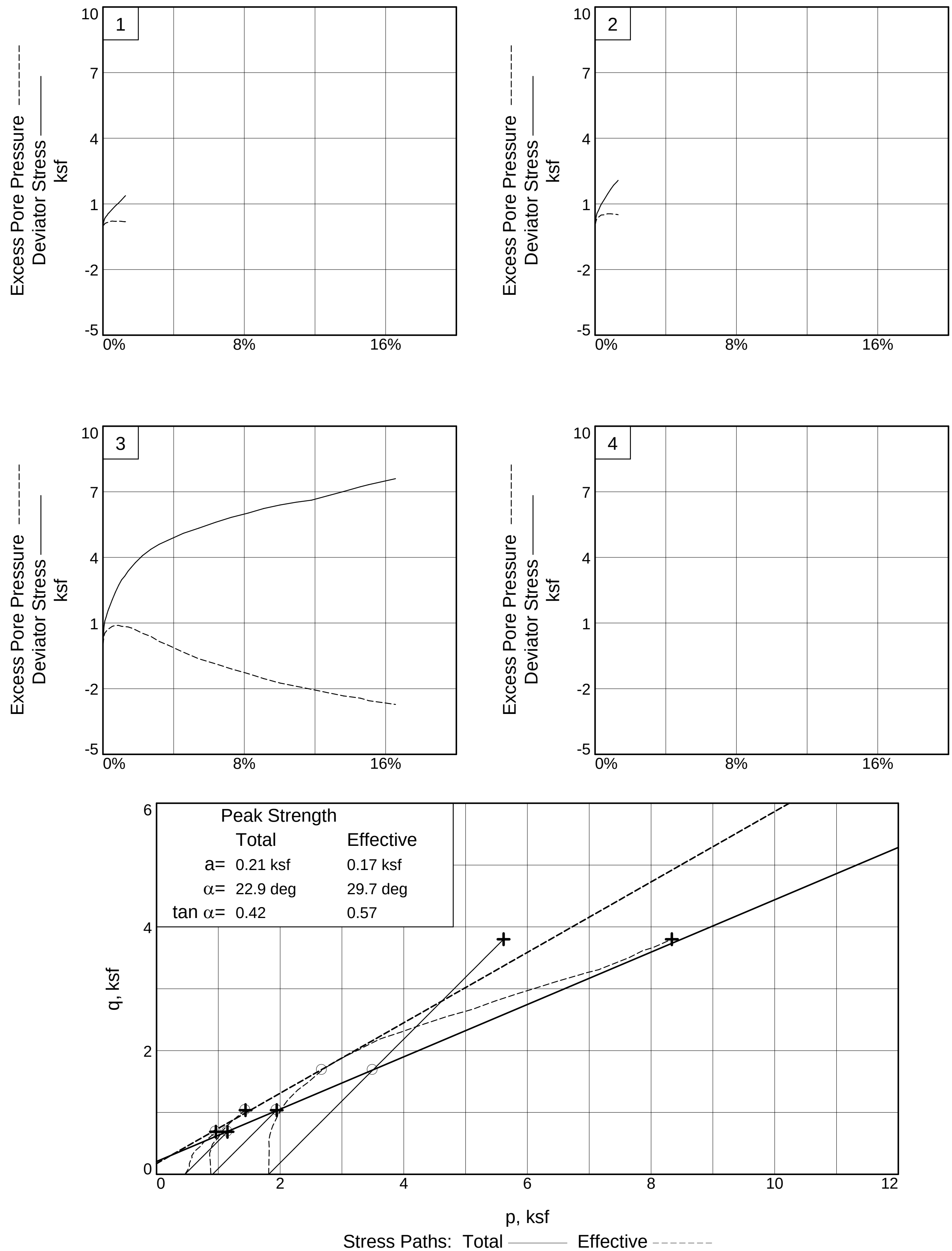
Sample Number: S-4

Proj. No.: 24170140E **Date Sampled:** 08/08/25

TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Lexington, Kentucky

Tested By: J. LaMothe **Checked By:** J. Folsom 10/03/2025

C & phi are not test results but an interpertaion of test results. The designer is responsible for interperting test data as provided by S&ME.



Client: ODOT District 12

Project: CUY-480-16.56 Slide

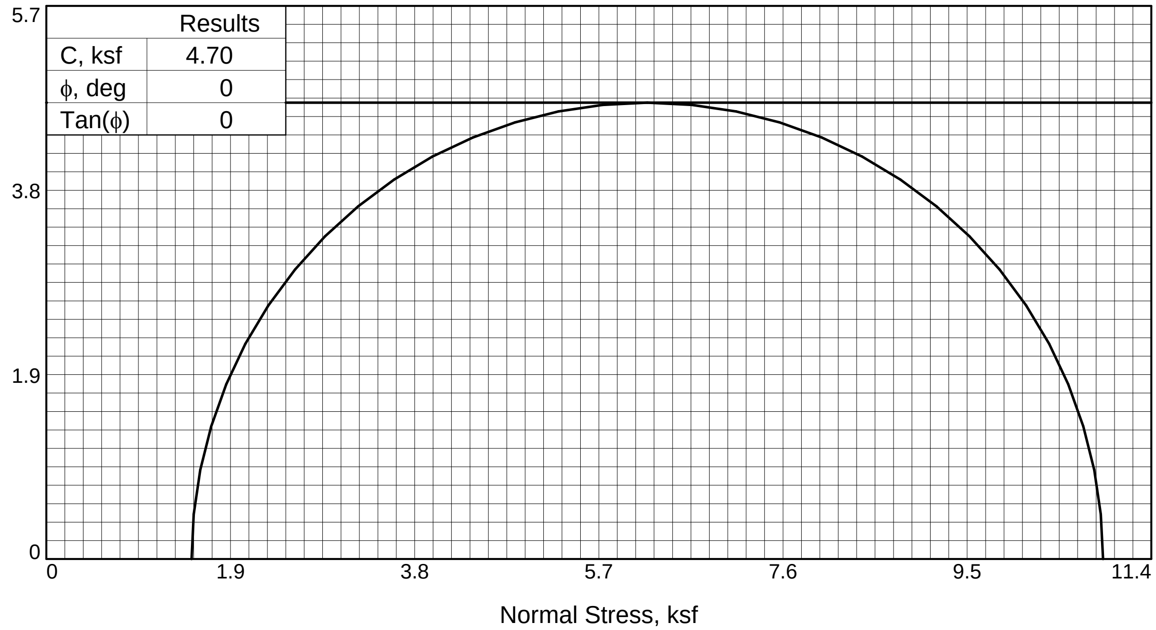
Source of Sample: B-001-0-25 **Depth:** 6.0 - 7.7 **Sample Number:** S-4

Project No.: 24170140E **Figure** 2 of 2

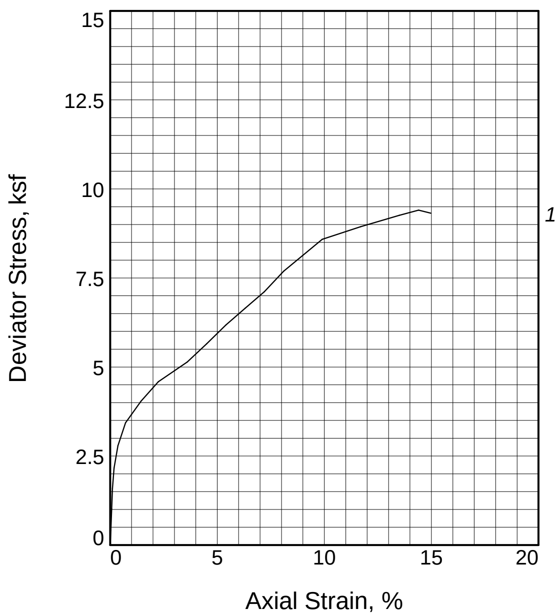
S&ME, Inc.

Tested By: J. LaMothe **Checked By:** J. Folsom 10/03/2025

C & phi are not test results but an interpertaion of test results. The designer is responsiible for interperting test data as provided by S&ME.



	Results
C, ksf	4.70
ϕ, deg	0
Tan(ϕ)	0



	Sample No.	1
Initial	Water Content, %	14.4
	Dry Density, pcf	120.6
	Saturation, %	99.7
	Void Ratio	0.3870
	Diameter, in.	2.867
	Height, in.	5.555
At Test	Water Content, %	14.4
	Dry Density, pcf	120.6
	Saturation, %	99.7
	Void Ratio	0.3870
	Diameter, in.	2.867
	Height, in.	5.555
	Strain rate, %/min.	1.00
	Back Pressure, psi	0.00
	Cell Pressure, psi	10.40
	Fail. Stress, ksf	9.4
	Strain, %	14.4
	Ult. Stress, ksf	9.3
	Strain, %	15.0
	σ_1 Failure, ksf	10.9
	σ_3 Failure, ksf	1.5

Type of Test:
Unconsolidated Undrained

Sample Type: Intact

Description: SILT AND CLAY (A-6a, 12), gray and brown

LL= 31 **PL=** 16 **PI=** 15

Assumed Specific Gravity= 2.68

Remarks: Failure criterion is peak deviator stress

Figure 1 of 2

Client: ODOT District 12

Project: CUY-480-16.56 Slide

Source of Sample: B-002-0-25 **Depth:** 11.5 - 12.7

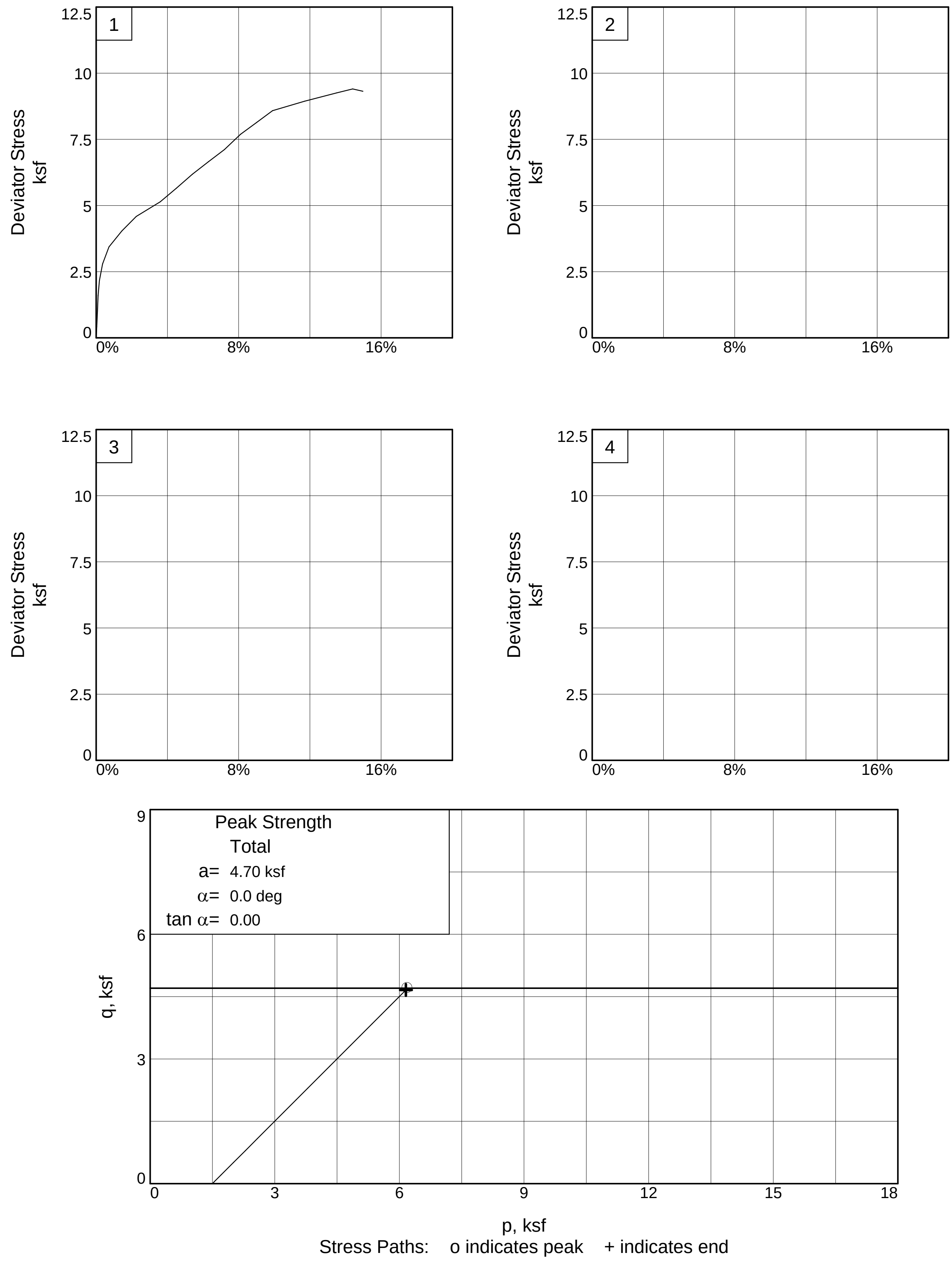
Sample Number: S-8

Proj. No.: 24170140E **Date Sampled:** 08/08/25

TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Lexington, Kentucky

Tested By: M. Bolton **Checked By:** J. Folsom 10/03/2025

C & phi are not test results but an interpertaion of test results. The designer is responsiible for interperting test data as provided by S&ME.



Client: ODOT District 12

Project: CUY-480-16.56 Slide

Source of Sample: B-002-0-25 **Depth:** 11.5 - 12.7 **Sample Number:** S-8

Project No.: 24170140E **Figure** 2 of 2 **S&ME, Inc.**

Tested By: M. Bolton **Checked By:** J. Folsom 10/03/2025

PLATE 23

Important Information About Your
Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project.

Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

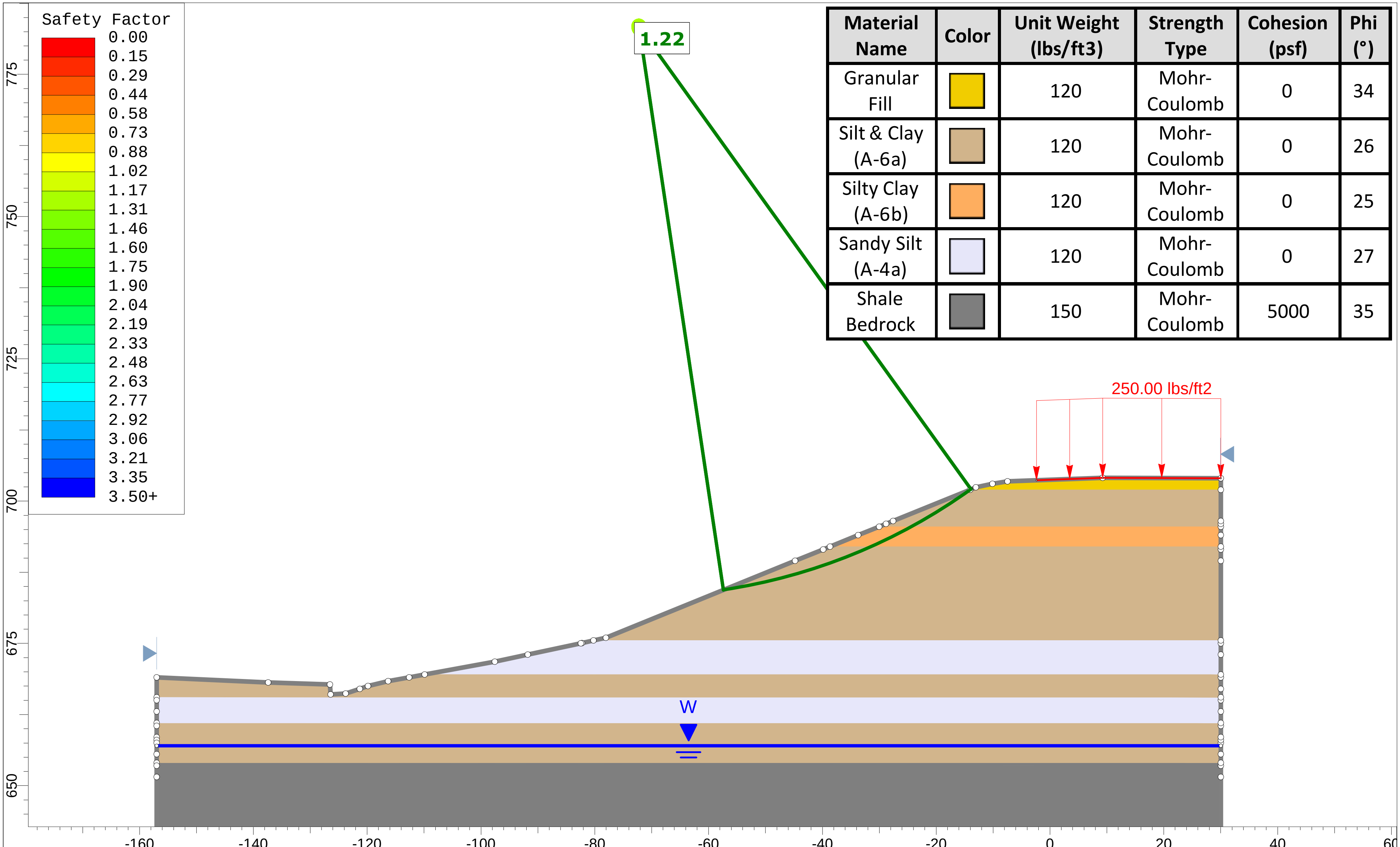
Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

Appendix II – Slope Stability Analysis Results

Global Stability Back-Analysis Results

(Sta. 896+25, Sta. 897+50, Sta. 899+00)



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Silty Clay (A-6b)		120	Mohr-Coulomb	0	25
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Shale Bedrock		150	Mohr-Coulomb	5000	35

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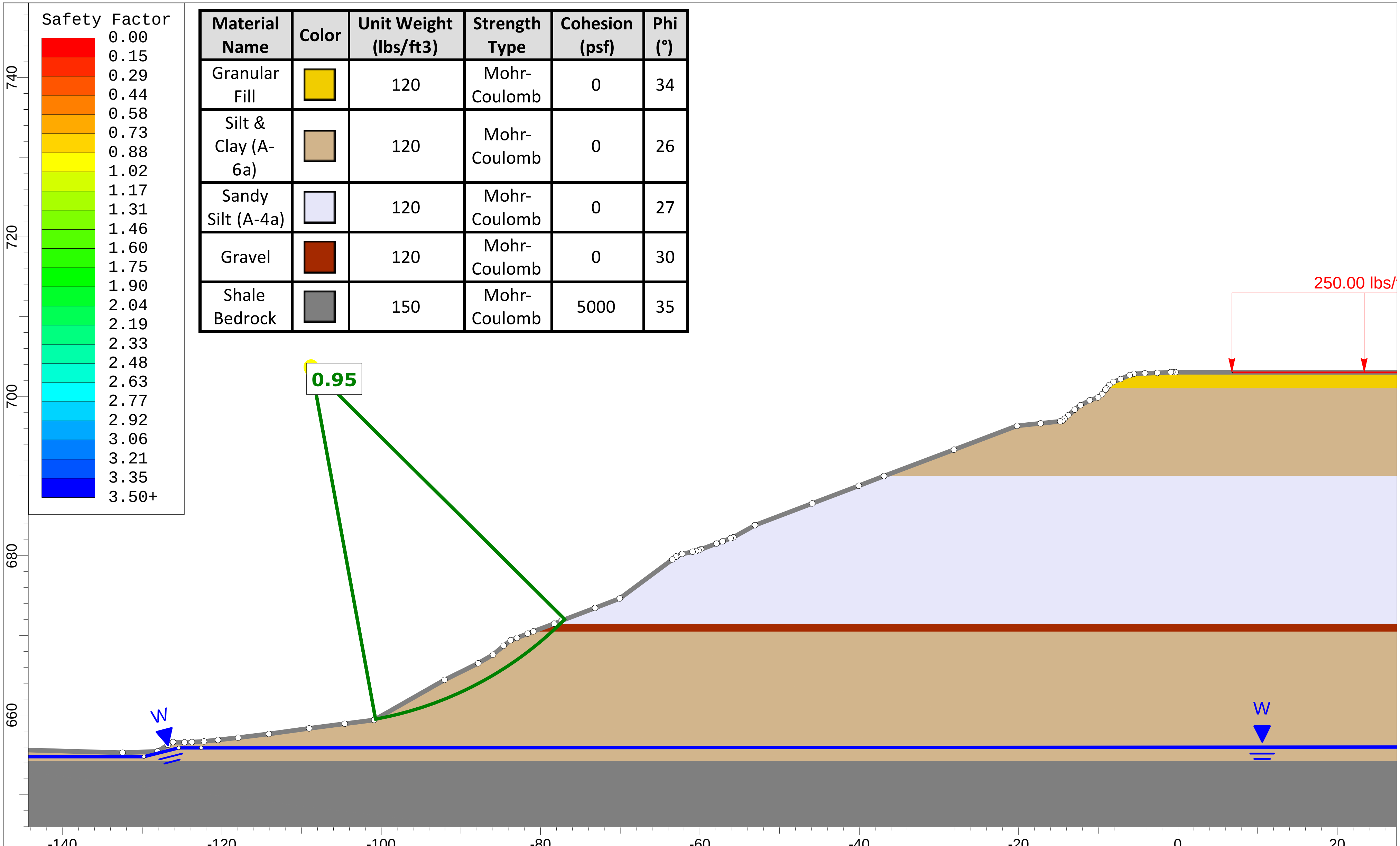
Project Name	CUY-480-16.56 Landslide (PID 124096)				
Scenario	STA 896+25 Back Analysis	*Analysis Method*	Spencer, Auto Search, Circular_min depth 3 ft		
Cross Section	STA 896+25	*File Name*	STA 896+25 Back-Analysis.slmd		
Project Number	24170140E	*Calc. By*	DRS	*Date*	11/6/2025
Scale	1:280				

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 1



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Gravel		120	Mohr-Coulomb	0	30
Shale Bedrock		150	Mohr-Coulomb	5000	35

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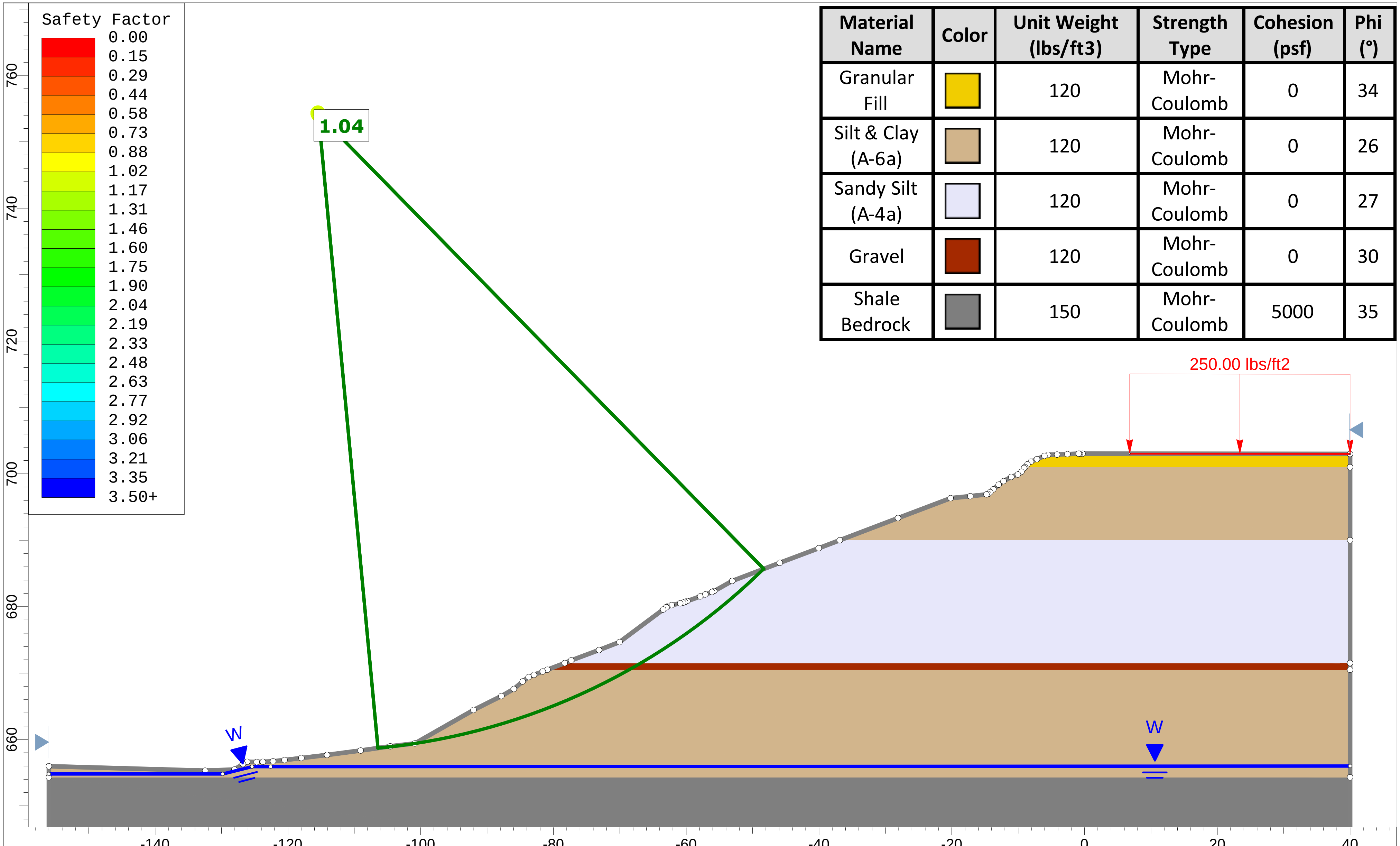
Project Name	CUY-480-16.56 Landslide (PID 124096)						
Scenario	STA 897+50 Back Analysis			*Analysis Method*	Spencer, Auto Search, Circular_min depth 3 ft		
Cross Section	STA 897+50			*File Name*	STA 897+50 Back Analysis.slmd		
Project Number	24170140E	*Calc. By*	DRS	*Date*	11/6/2025	*Scale*	1:200

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 2



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Gravel		120	Mohr-Coulomb	0	30
Shale Bedrock		150	Mohr-Coulomb	5000	35

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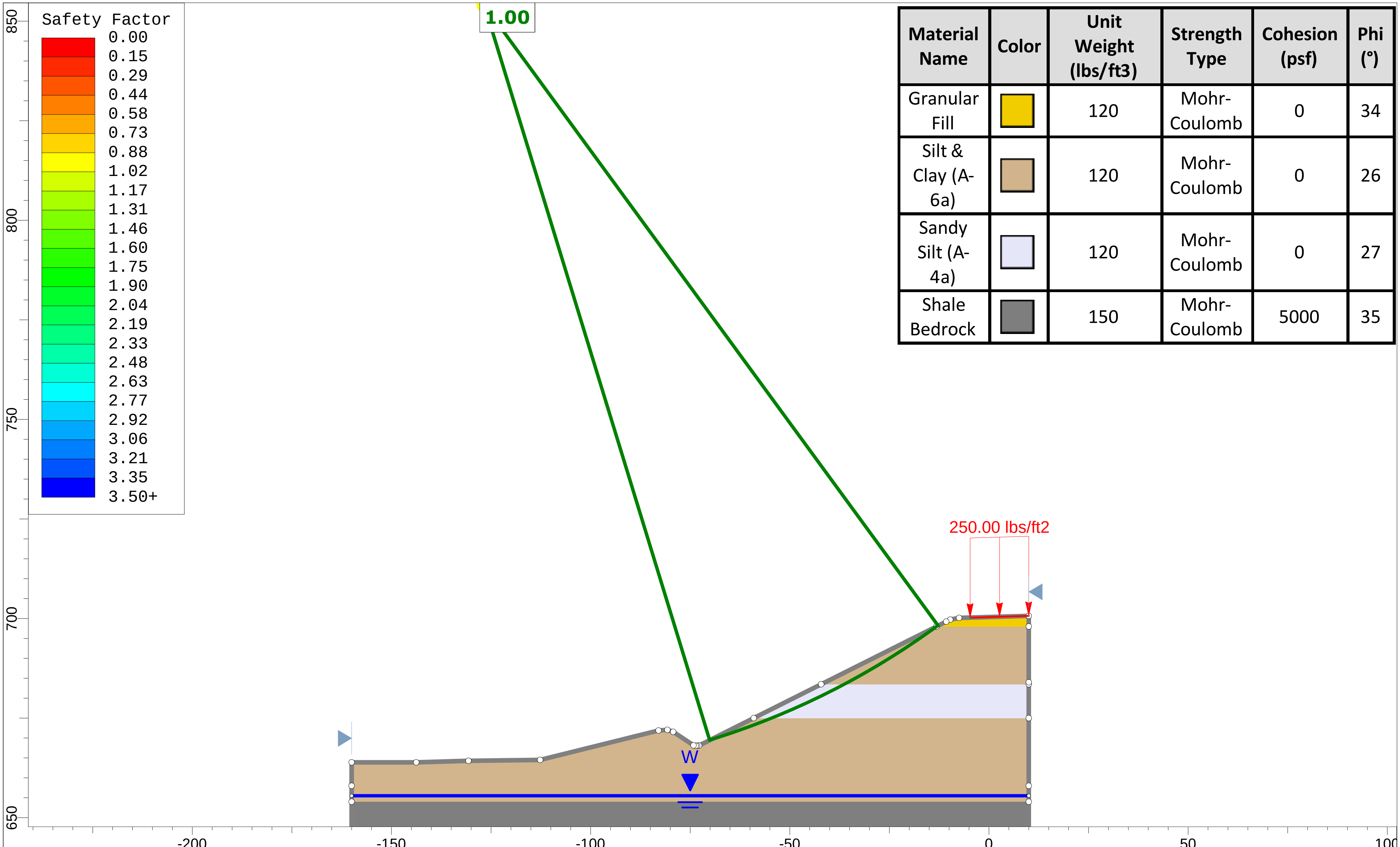
Project Name	CUY-480-16.56 Landslide (PID 124096)				
Scenario	STA 897+50 Back Analysis		*Analysis Method*	Spencer, Auto Search, Circular_min depth 6 ft	
Cross Section	STA 897+50		*File Name*	STA 897+50 Back Analysis.slmd	
Project Number	24170140E	*Calc. By* DRS	*Date* 11/6/2025	*Scale*	1:240

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Shale Bedrock		150	Mohr-Coulomb	5000	35

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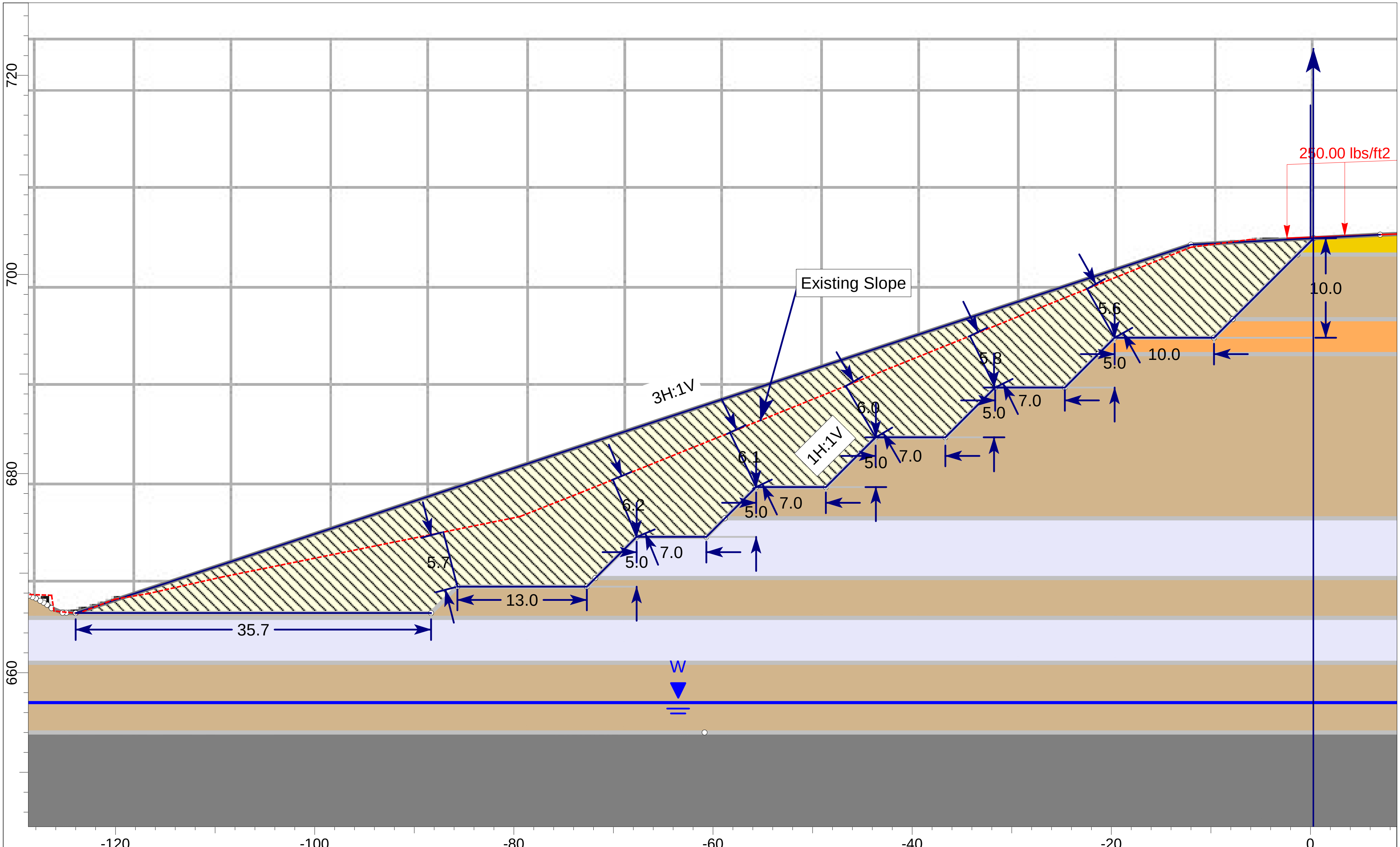
Project Name	CUY-480-16.56 Landslide (PID 124096)				
Scenario	STA 899+00 Back Analysis	*Analysis Method*	Spencer, Auto Search, Circular_min depth 3 ft		
Cross Section	STA 899+00	*File Name*	STA 899+00 Back-Analysis.slmd		
Project Number	24170140E	*Calc. By*	DRS	*Date* 11/6/2025	*Scale* 1:400

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 4

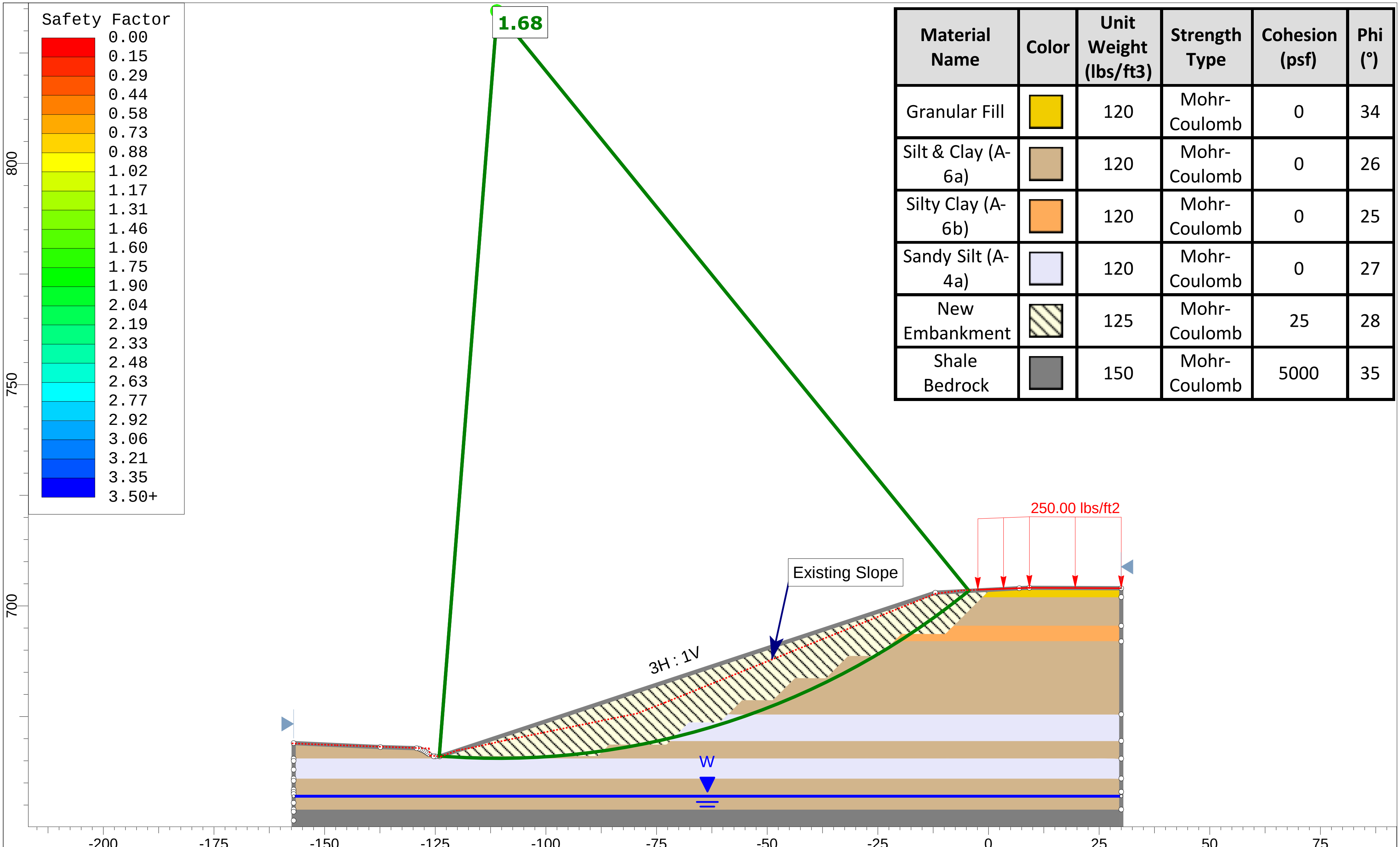
Stability Analyses Sta. 896+25
(Conceptual Repair & Analysis Output)



S&ME, Inc. 6190 Enterprise Ct. Dublin, OH 43016 (614) 793-2226 SLIDE 9.040	*Project Name* CUY-480-16.56 Landslide (PID 124096)					
	Scenario STA 896+25 Repair Analysis		*Analysis Method*			
	Cross Section STA 896+25		*File Name* STA 896+25 Repair Analysis Short Benching.slmd			
	Project Number 24170140E	*Calc. By* DRS	*Date* 11/6/2025	*Scale* 1:160		

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 5



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Silty Clay (A-6b)		120	Mohr-Coulomb	0	25
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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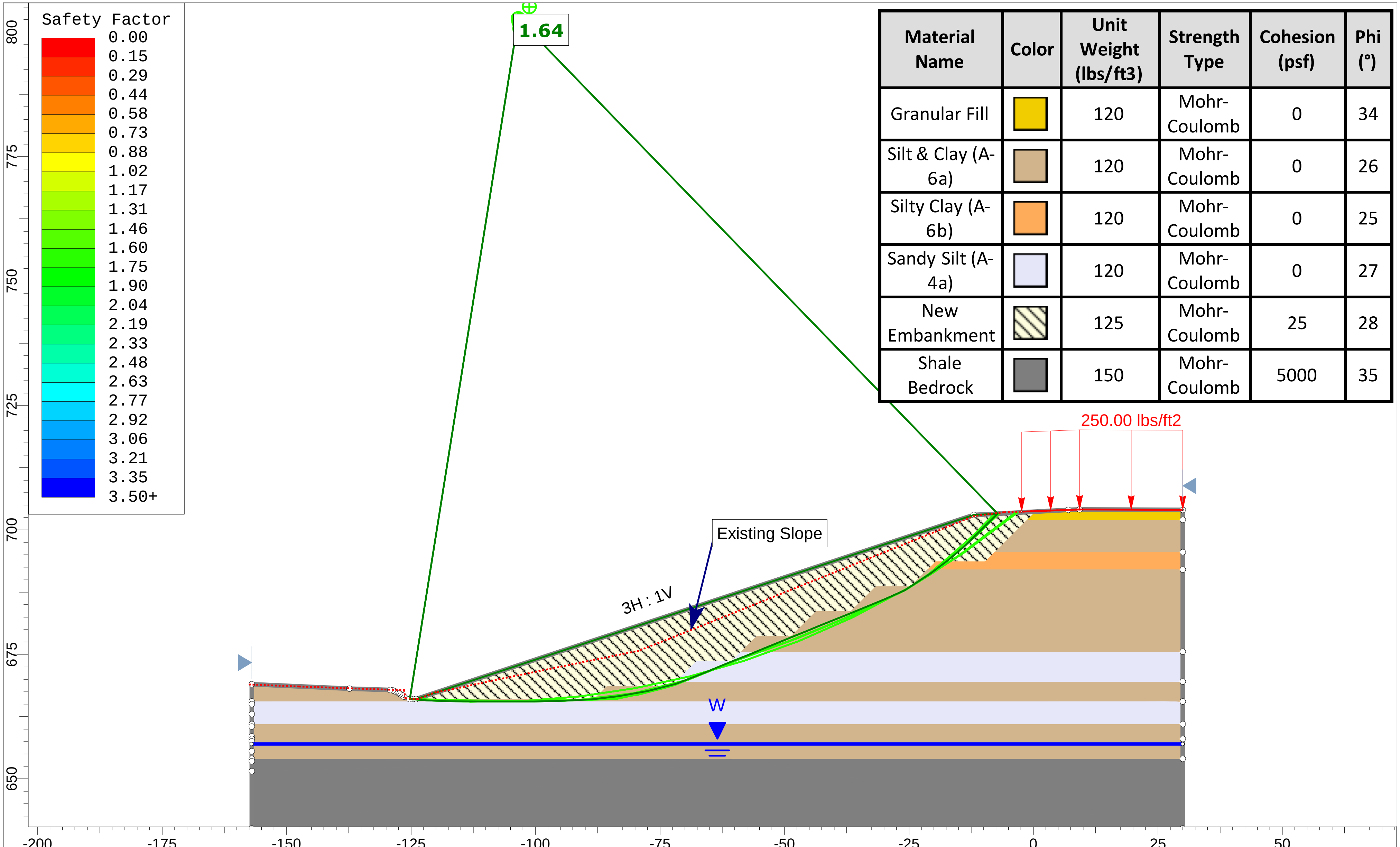
Project Name	CUY-480-16.56 Landslide (PID 124096)		
Scenario	STA 896+25 Repair Analysis	*Analysis Method*	Spencer, Auto Search, Circular
Cross Section	STA 896+25	*File Name*	STA 896+25 Repair Analysis Short Benching.slmd
Project Number	24170140E	*Calc. By*	DRS
Date	11/6/2025	*Scale*	1:360

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

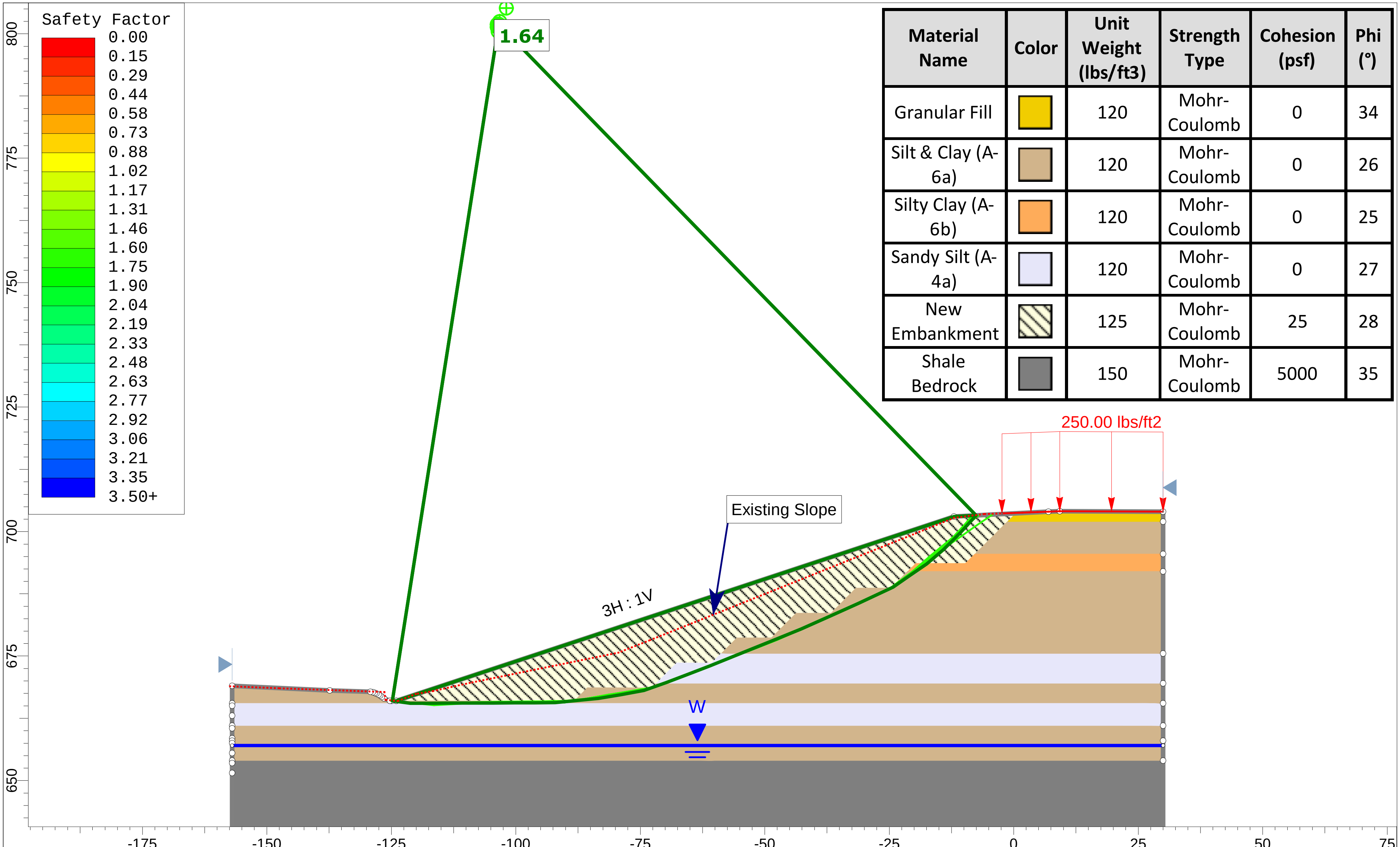
PLATE 6



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Silty Clay (A-6b)		120	Mohr-Coulomb	0	25
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

S&ME, Inc. 6190 Enterprise Ct. Dublin, OH 43016 (614) 793-2226	*Project Name*	CUY-480-16.56 Landslide (PID 124096)			
	Scenario	STA 896+25 Repair Analysis	*Analysis Method*	Spencer, Auto Search, Non-Circula	
	Cross Section	STA 896+25	*File Name*	STA 896+25 Repair Analysis Short Benching.slmd	
	Project Number 24170140E	*Calc. By* DRS	*Date* 11/6/2025	*Scale* 1:320	
SLIDEINTERPRET 9.040	Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.				

PLATE 7



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Silty Clay (A-6b)		120	Mohr-Coulomb	0	25
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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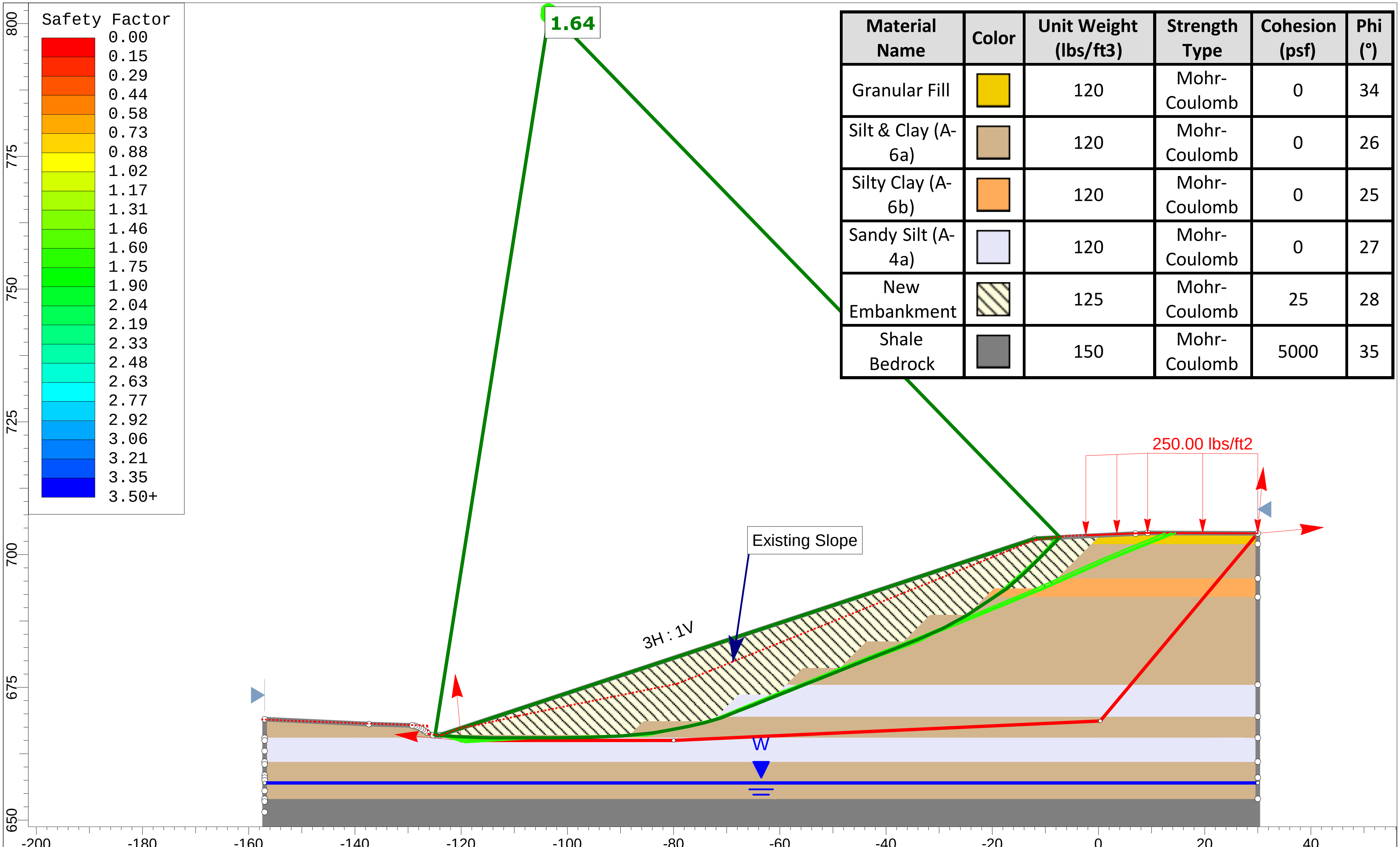
SLIDEINTERPRET 9.040

Project Name	CUY-480-16.56 Landslide (PID 124096)		
Scenario	STA 896+25 Repair Analysis	*Analysis Method*	Spencer, Cuckoo Search, Non-Circular
Cross Section	STA 896+25	*File Name*	STA 896+25 Repair Analysis Short Benching.slmd
Project Number	24170140E	*Calc. By*	DRS
Date	11/6/2025	*Scale*	1:320

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Silty Clay (A-6b)		120	Mohr-Coulomb	0	25
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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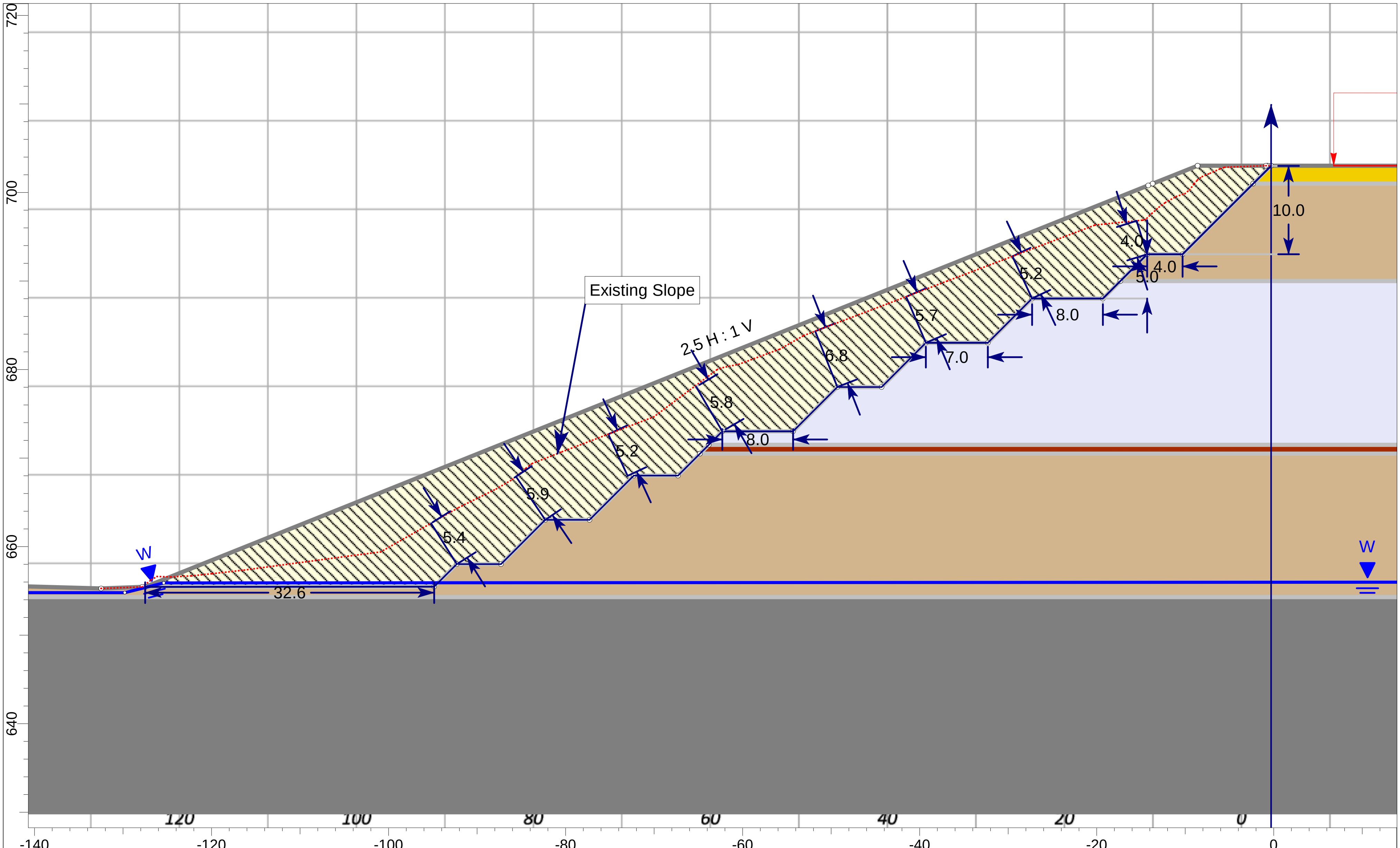
Project Name	CUY-480-16.56 Landslide (PID 124096)		
Scenario	STA 896+25 Repair Analysis	*Analysis Method*	Spencer, Block Search, Non-Circular
Cross Section	STA 896+25	*File Name*	STA 896+25 Repair Analysis Short Benching.slmd
Project Number 24170140E	*Calc. By* DRS	*Date* 11/6/2025	*Scale* 1:300

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 9

Stability Analyses Sta. 897+50
(Conceptual Repair & Analysis Output)



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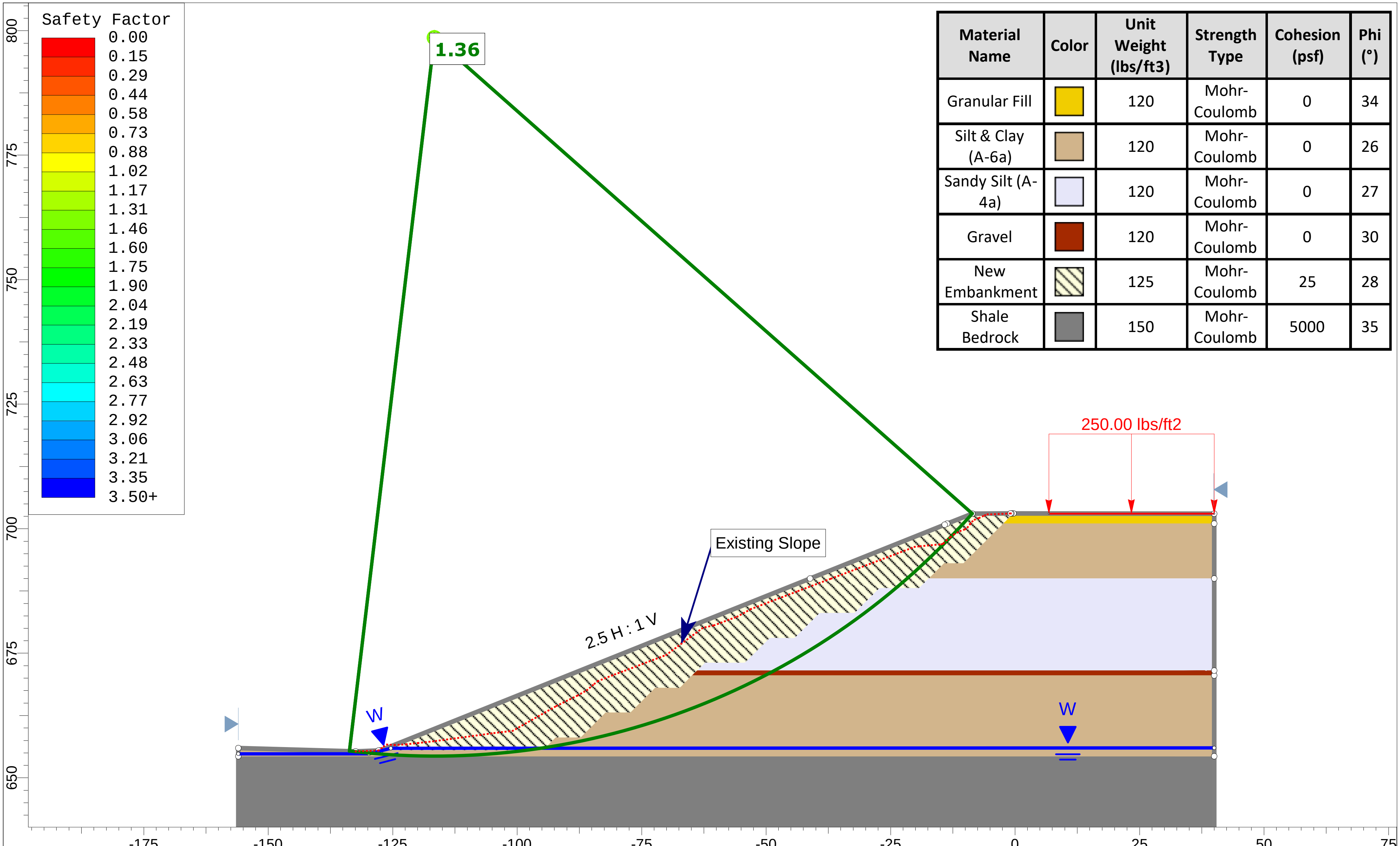
SLIDE 9.040

Project Name	CUY-480-16.56 Landslide (PID 124096)
Scenario	STA 897+50 Repair Analysis
Analysis Method	
Cross Section	STA 897+50
File Name	STA 897+50 Repair Analysis Short Benching.slmd
Project Number	24170140E
Calc. By	DRS
Date	11/6/2025
Scale	1:180

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 10



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Gravel		120	Mohr-Coulomb	0	30
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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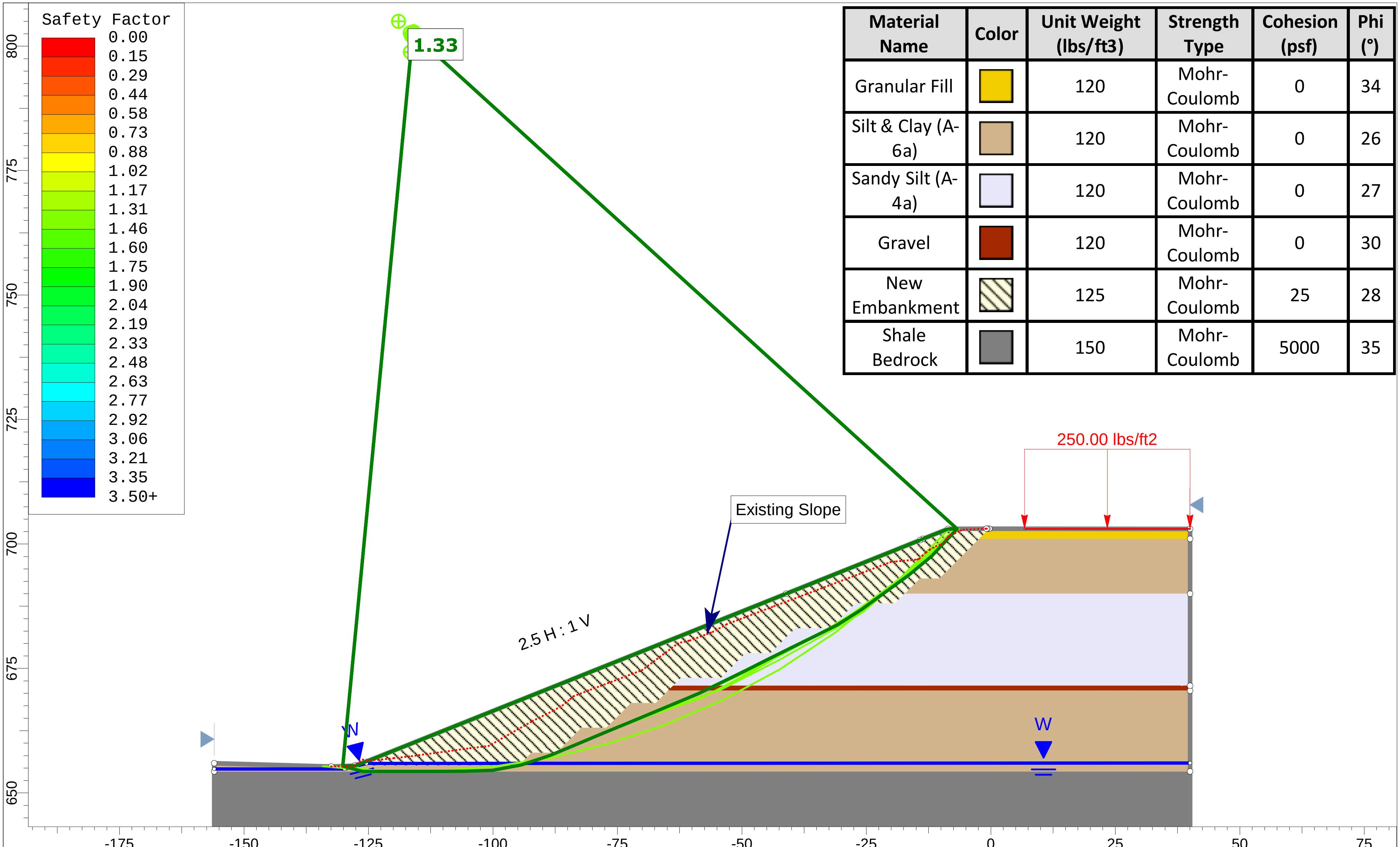
Project Name	CUY-480-16.56 Landslide (PID 124096)				
Scenario	STA 897+50 Repair Analysis	*Analysis Method*	Spencer, Auto Search, Circular		
Cross Section	STA 897+50	*File Name*	STA 897+50 Repair Analysis Short Benching.slmd		
Project Number	24170140E	*Calc. By*	DRS	*Date* 11/6/2025	*Scale* 1:320

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 11



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Gravel		120	Mohr-Coulomb	0	30
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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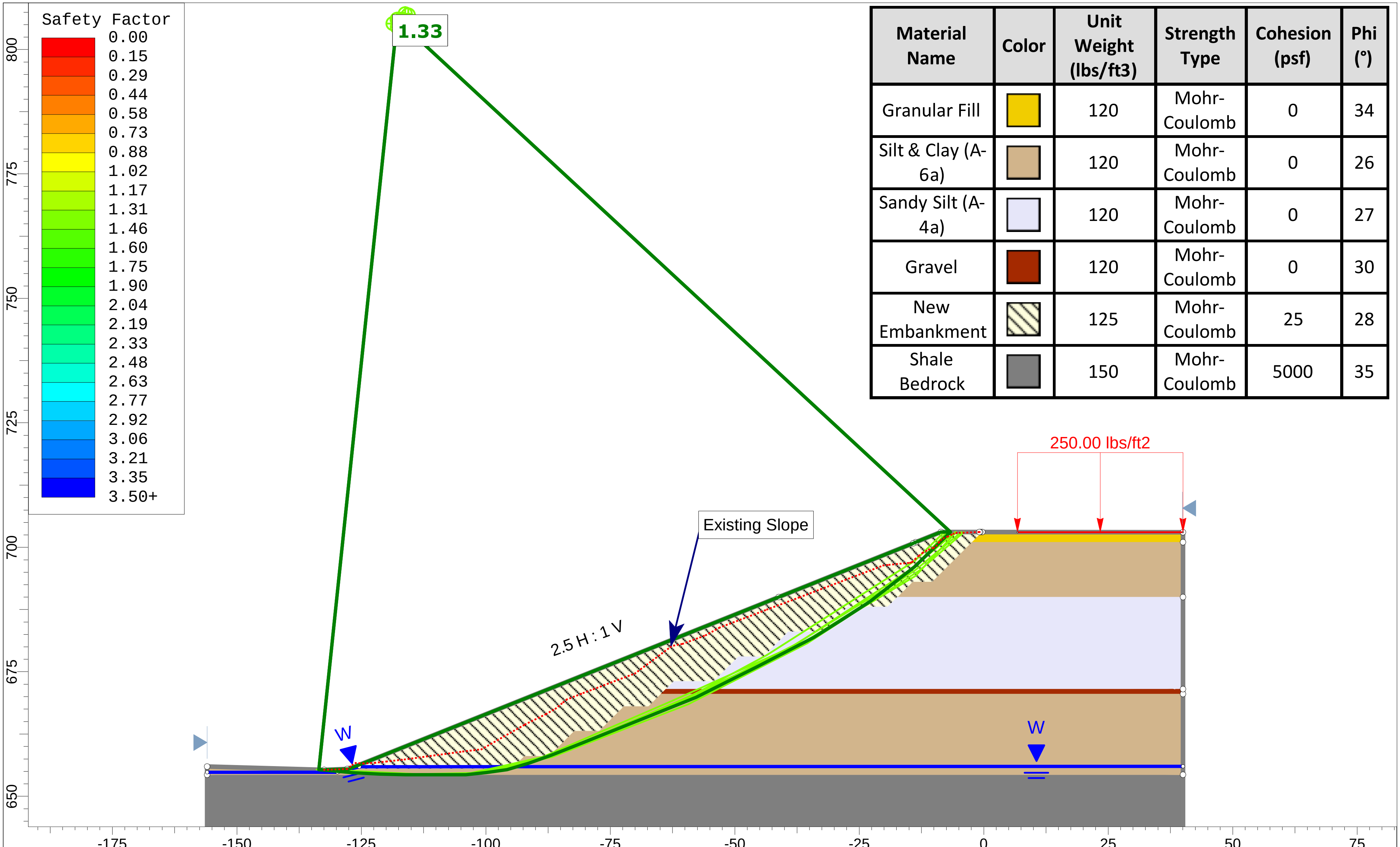
Project Name	CUY-480-16.56 Landslide (PID 124096)		
Scenario	STA 897+50 Repair Analysis	*Analysis Method*	Spencer, Auto Search, Non-Circular
Cross Section	STA 897+50	*File Name*	STA 897+50 Repair Analysis Short Benching.slmd
Project Number	24170140E	*Calc. By*	DRS
Date	11/6/2025	*Scale*	1:320

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 12



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Gravel		120	Mohr-Coulomb	0	30
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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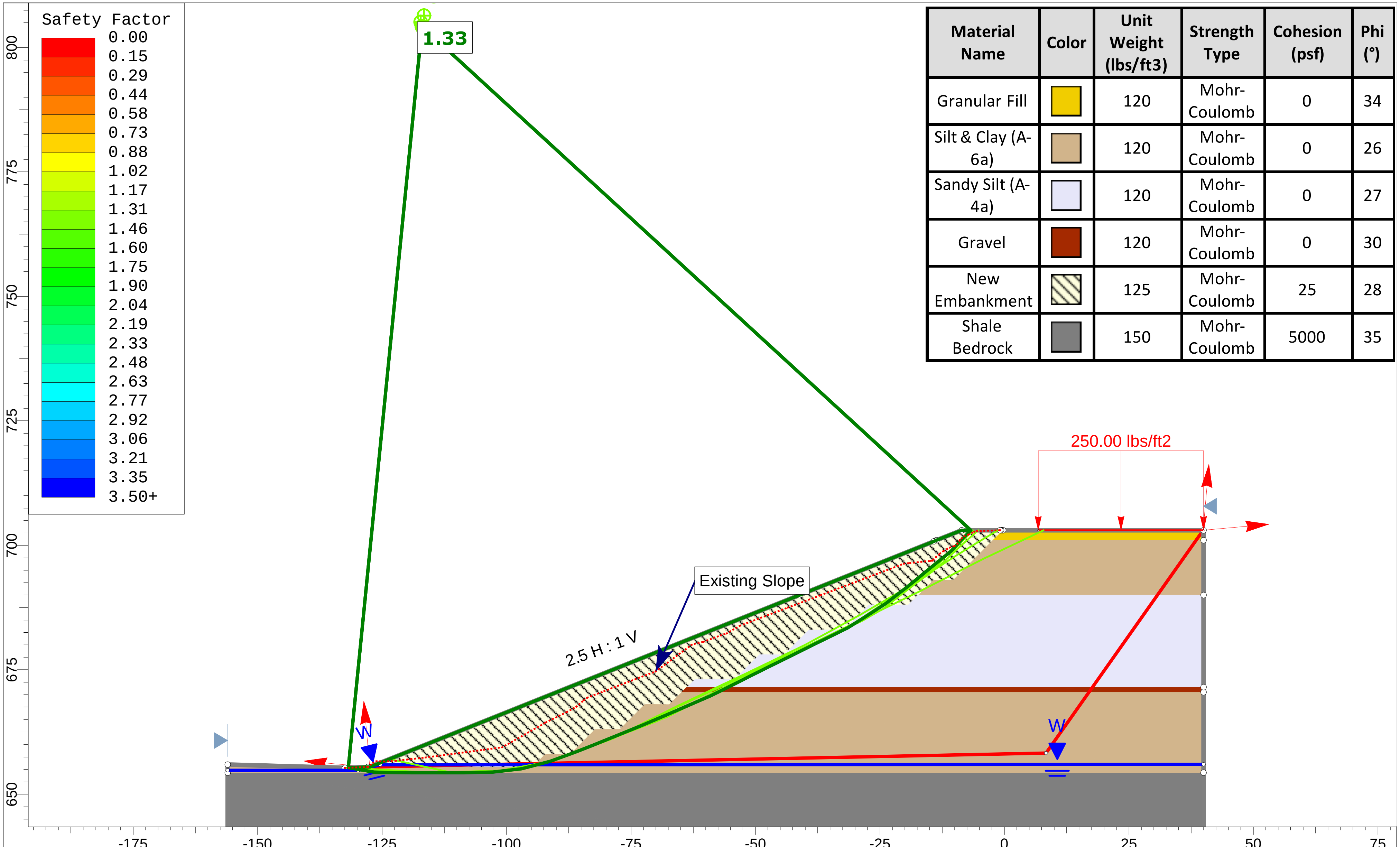
Project Name CUY-480-16.56 Landslide (PID 124096)			
Scenario STA 897+50 Repair Analysis		*Analysis Method* Spencer, Cuckoo, Non-Circular	
Cross Section STA 897+50		*File Name* STA 897+50 Repair Analysis Short Benching.slmd	
Project Number 24170140E	*Calc. By* DRS	*Date* 11/6/2025	*Scale* 1:320

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 13



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
Gravel		120	Mohr-Coulomb	0	30
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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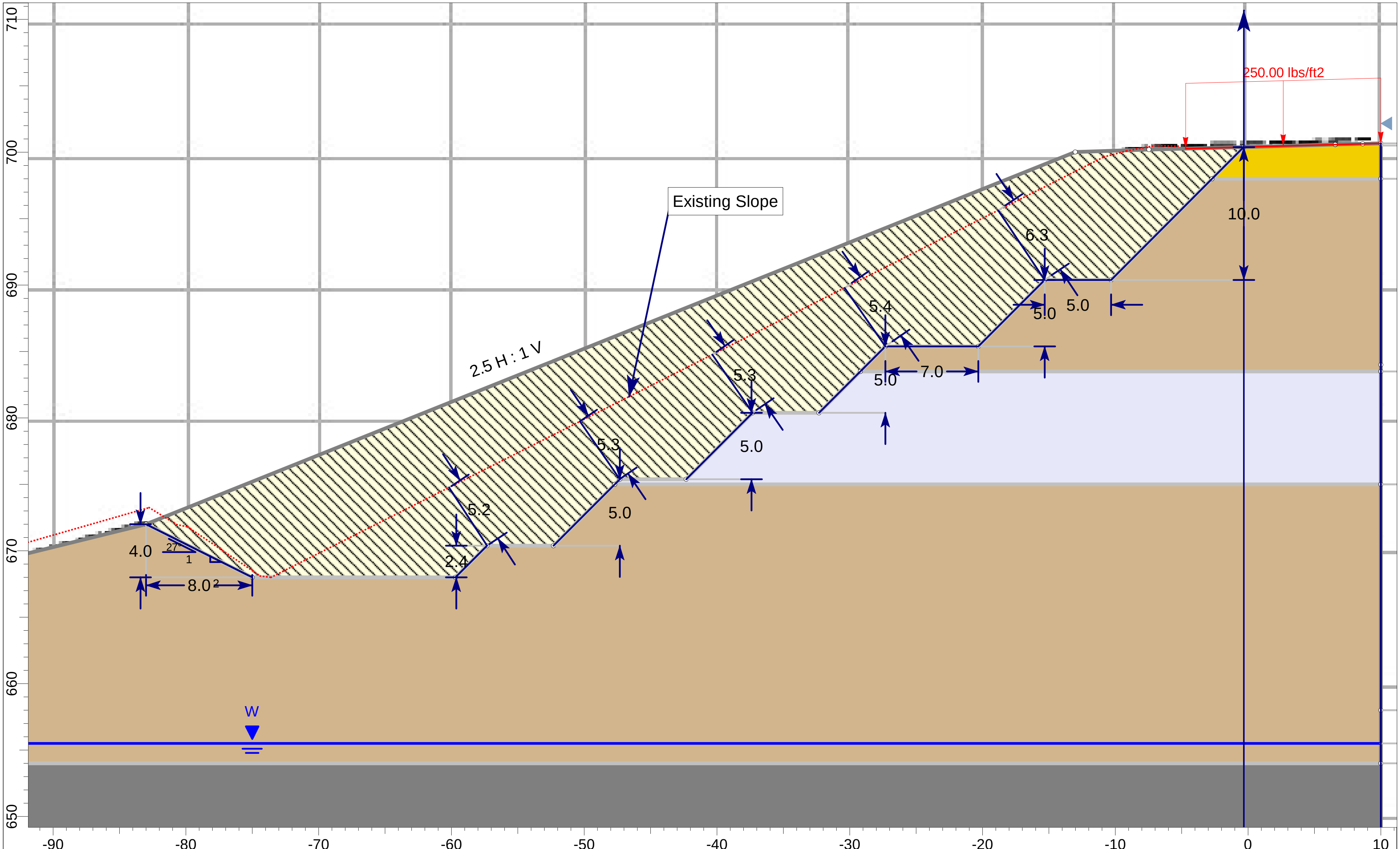
Project Name	CUY-480-16.56 Landslide (PID 124096)
Scenario	STA 897+50 Repair Analysis
Analysis Method	Spencer, Block Search, Non-Circular
Cross Section	STA 897+50
File Name	STA 897+50 Repair Analysis Short Benching.slmd
Project Number	24170140E
Calc. By	DRS
Date	11/6/2025
Scale	1:320

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

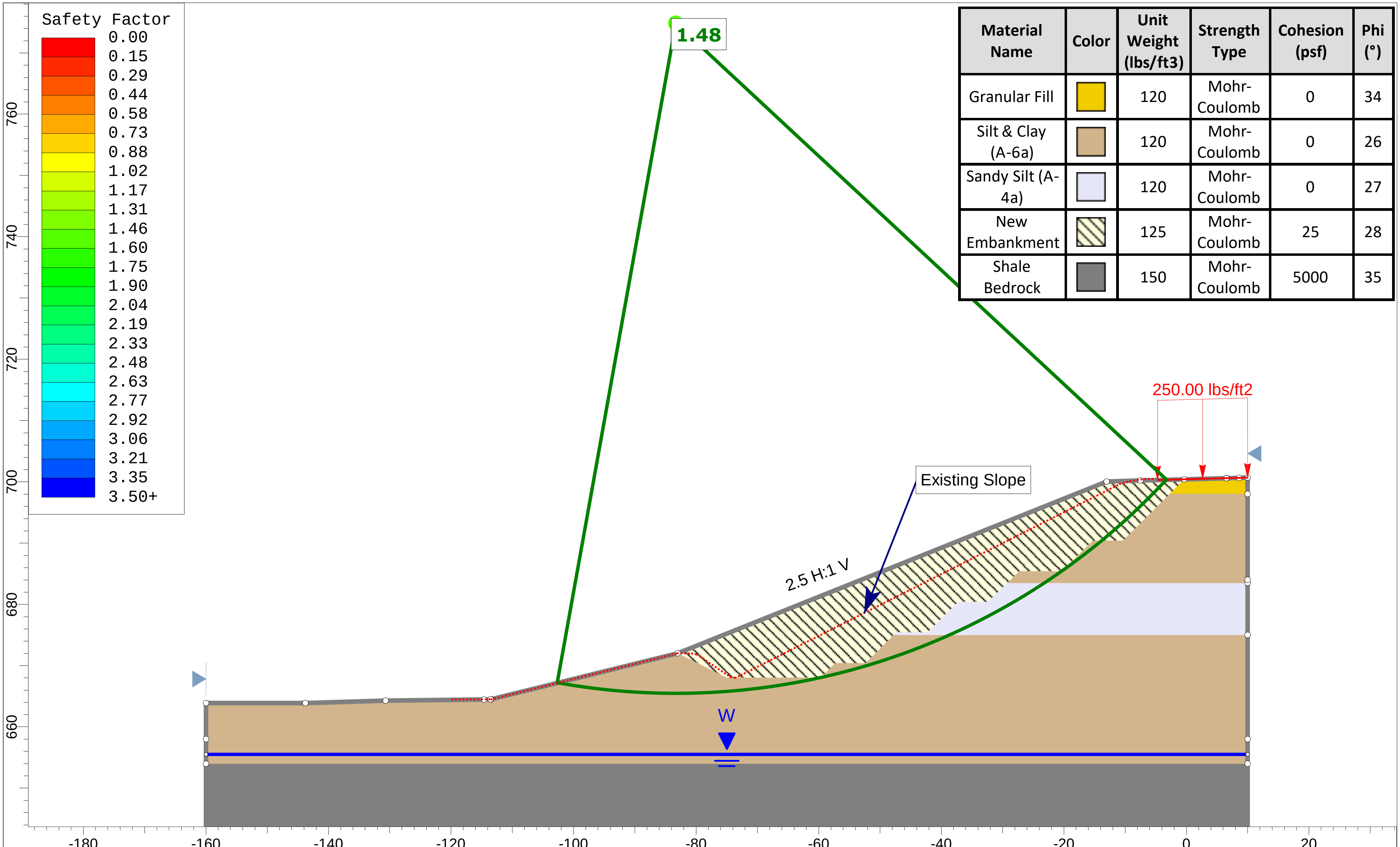
PLATE 14

Stability Analyses Sta. 899+00
(Conceptual Repair & Analysis Output)



S&ME, Inc. 6190 Enterprise Ct. Dublin, OH 43016 (614) 793-2226 SLIDE 9.040	*Project Name*	CUY-480-16.56 Landslide (PID 124096)				
	Scenario	STA 899+00 Repair Analysis	*Analysis Method*			
	Cross Section	STA 899+00	*File Name*	STA 899+00 Repair Analysis-Short Benching.slmd		
	Project Number	24170140E	*Calc. By*	DRS	*Date* 11/6/2025	*Scale* 1:120
	Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.					

PLATE 15



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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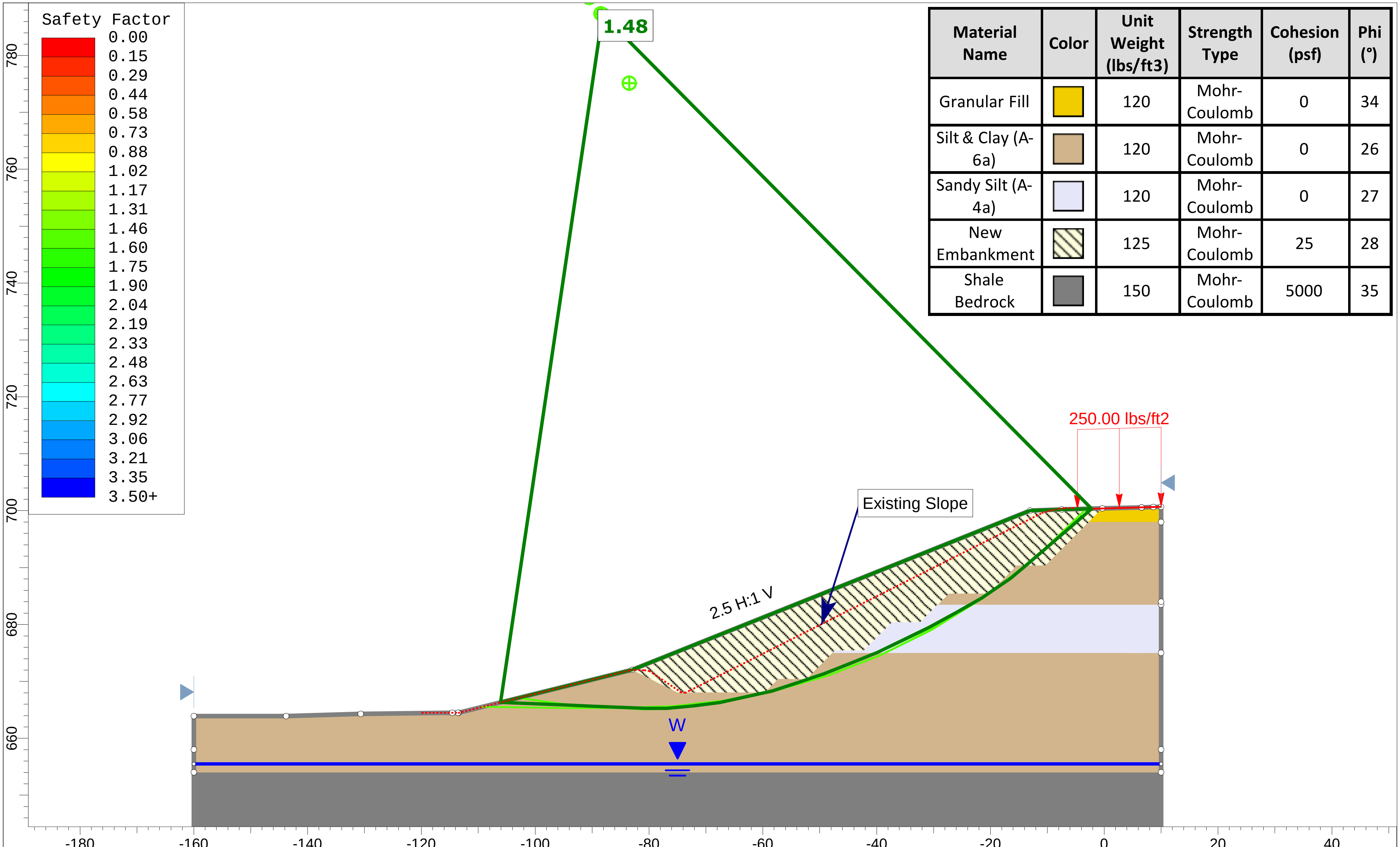
SLIDEINTERPRET 9.040

Project Name	CUY-480-16.56 Landslide (PID 124096)
Scenario	STA 899+00 Repair Analysis
Analysis Method	Spencer, Auto Search, Circular
Cross Section	STA 899+00
File Name	STA 899+00 Repair Analysis-Short Benching.slmd
Project Number	24170140E
Calc. By	DRS
Date	11/6/2025
Scale	1:260

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 16



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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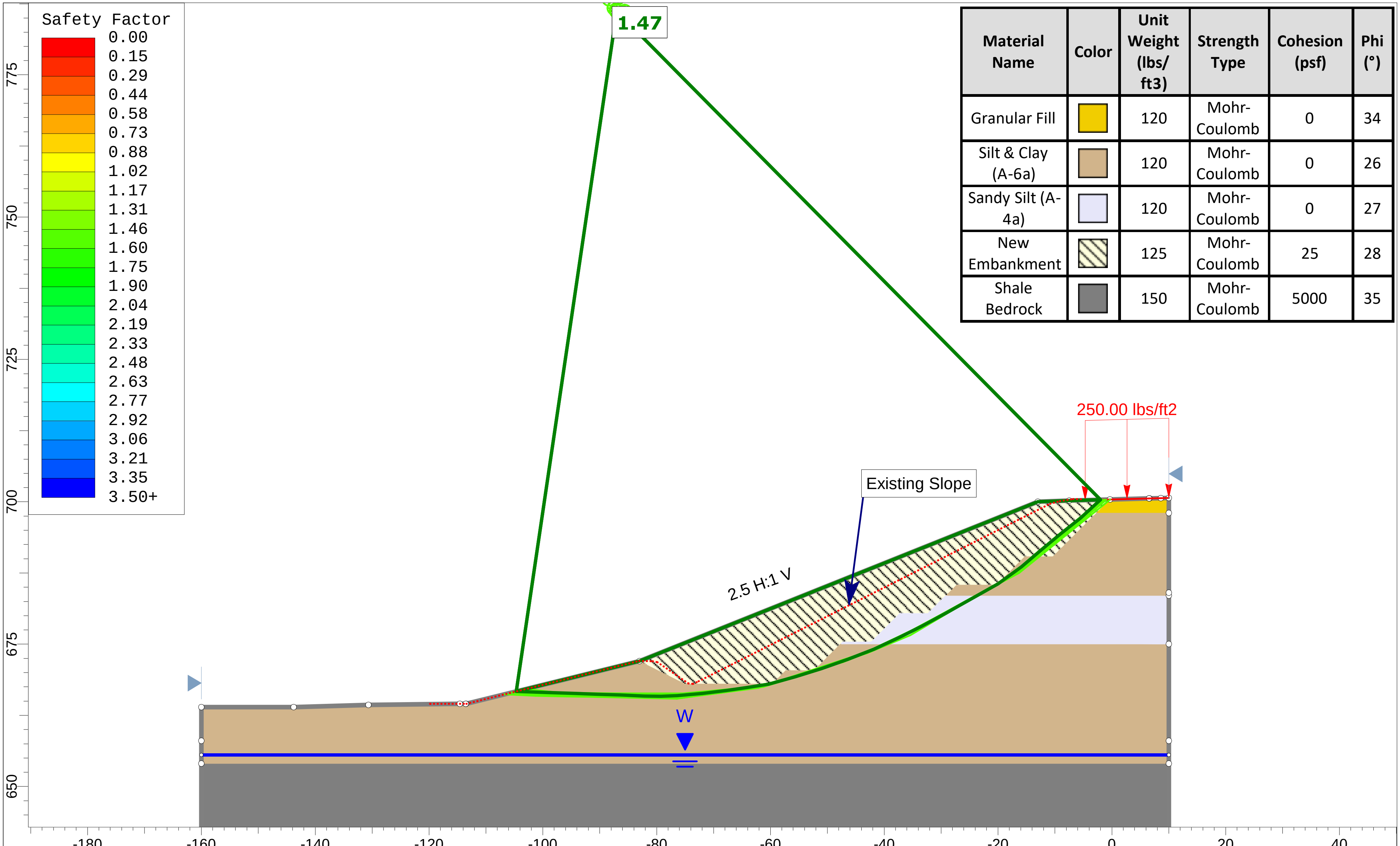
SLIDEINTERPRET 9.040

Project Name	CUY-480-16.56 Landslide (PID 124096)		
Scenario	STA 899+00 Repair Analysis	Analysis Method	Spencer, Auto Search, Non-Circular
Cross Section	STA 899+00	File Name	STA 899+00 Repair Analysis-Short Benching.slmd
Project Number	24170140E	Calc. By	DRS
Date	11/6/2025	Scale	1:280

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.



Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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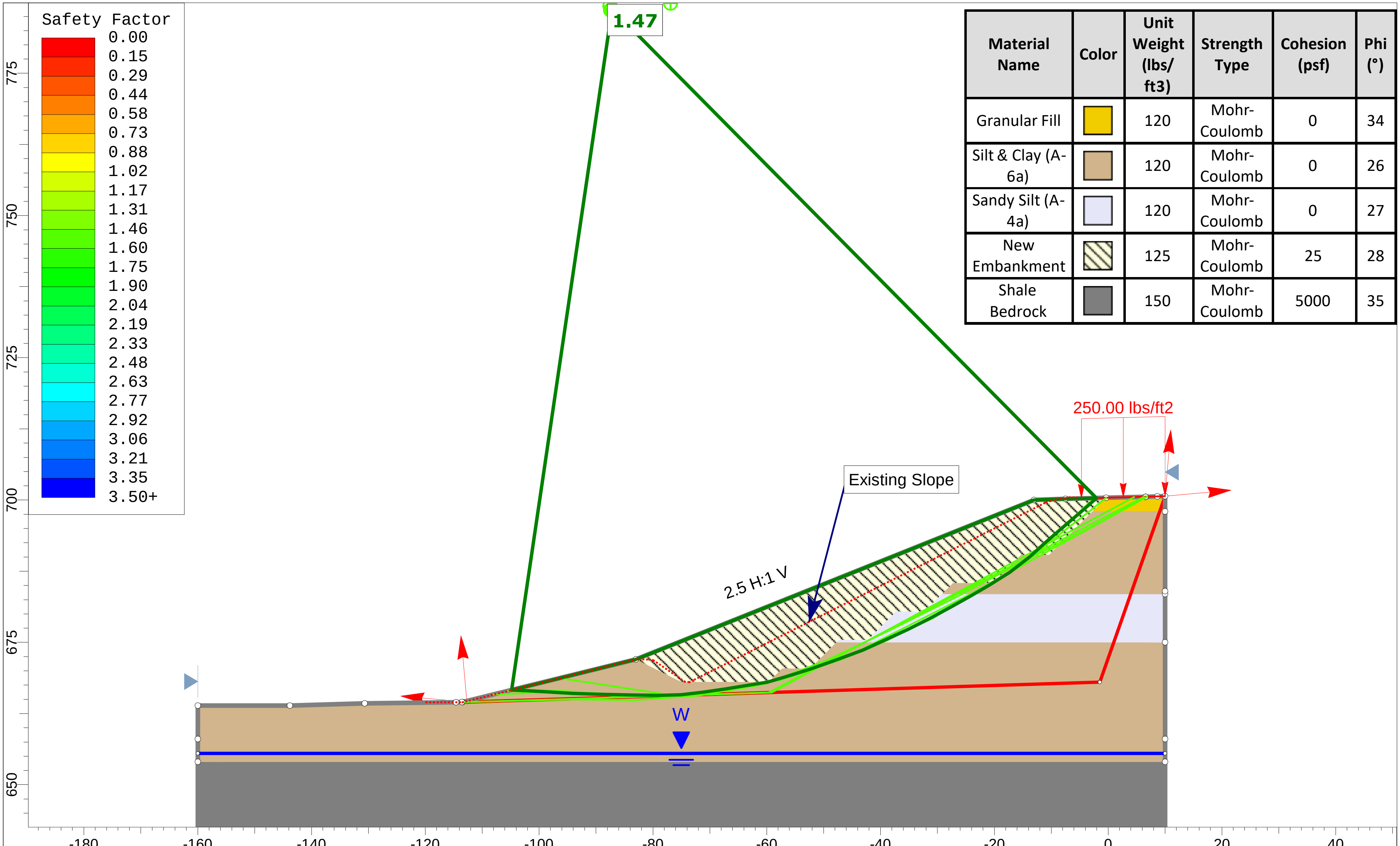
SLIDEINTERPRET 9.040

Project Name	CUY-480-16.56 Landslide (PID 124096)		
Scenario	STA 899+00 Repair Analysis	*Analysis Method*	Spencer, Cuckoo, Non-Circular
Cross Section	STA 899+00	*File Name*	STA 899+00 Repair Analysis-Short Benching.slmd
Project Number 24170140E	*Calc. By* DRS	*Date* 11/6/2025	*Scale* 1:280

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 18



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Granular Fill		120	Mohr-Coulomb	0	34
Silt & Clay (A-6a)		120	Mohr-Coulomb	0	26
Sandy Silt (A-4a)		120	Mohr-Coulomb	0	27
New Embankment		125	Mohr-Coulomb	25	28
Shale Bedrock		150	Mohr-Coulomb	5000	35

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SLIDEINTERPRET 9.040

Project Name	CUY-480-16.56 Landslide (PID 124096)				
Scenario	STA 899+00 Repair Analysis		*Analysis Method*	Spencer, Block Search, Non-Circular	
Cross Section	STA 899+00		*File Name*	STA 899+00 Repair Analysis-Short Benching.slmd	
Project Number	24170140E	*Calc. By* DRS	*Date*	11/6/2025	*Scale* 1:280

Note: The results of this analysis are based on the available subsurface information and engineering judgment. Subsurface conditions between explored locations have been approximated based on observations from our site visit(s) and provided historical information.

PLATE 19

Appendix III – OGE Geotechnical Checklists

I. Geotechnical Design Checklists			
Project:	**CUY-480-16.56 Slide**	**PDP Path:**	
PID:	**124096**	**Review Stage:**	**Final**

Checklist	**Included in This Submission**
II. Reconnaissance and Planning	✓
III. A. Centerline Cuts	
III. B. Embankments	
III. C. Subgrade	
IV. A. Foundations of Structures	
IV. B. Retaining Wall	
V. A. Landslide Remediation	✓
V. B. Rockfall Remediation	
V. C. Wetland or Peat Remediation	
V. D. Underground Mine Remediation	
V. E. Surface Mine Remediation	
V. F. Karst Remediation	
VI. A. Geotechnical Profile	
VI. D. Geotechnical Reports	✓

II. Reconnaissance and Planning Checklist

C-R-S:	CUY-480-16.56 Slide	PID:	124096	Reviewer:	BKS	Date:	12/15/2025

Reconnaissance		(Y/N/X)	Notes:
1	Based on Section 302.1 in the SGE, have the necessary plans been developed in the following areas prior to the commencement of the subsurface exploration reconnaissance:	Y	
	Roadway plans		
	Structures plans	✓	
	Geohazards plans		
2	Have the resources listed in Section 302.2.1 of the SGE been reviewed as part of the office reconnaissance?	Y	
3	Have all the features listed in Section 302.3 of the SGE been observed and evaluated during the field reconnaissance?	Y	
4	If notable features were discovered in the field reconnaissance, were the GPS coordinates of these features recorded?	X	GPS coordinates were not recorded from our site reconnaissance, however, they were captured by the site survey.

Planning - General		(Y/N/X)	Notes:
5	In planning the geotechnical exploration program for the project, have the specific geologic conditions, the proposed work, and historic subsurface exploration work been considered?	Y	
6	Has the ODOT Transportation Information Mapping System (TIMS) been accessed to find all available historic boring information and inventoried geohazards?	Y	Historic borings were available, but could not be reused as part of the exploration.
7	Have the borings been located to develop the maximum subsurface information while using a minimum number of borings, utilizing historic geotechnical explorations to the fullest extent possible?	Y	
8	Have the topography, geologic origin of materials, surface manifestation of soil conditions, and any other special design considerations been utilized in determining the spacing and depth of borings?	Y	
9	Have the borings been located so as to provide adequate overhead clearance for the equipment, clearance of underground utilities, minimize damage to private property, and minimize disruption of traffic, without compromising the quality of the exploration?	Y	

II. Reconnaissance and Planning Checklist

Planning - General		(Y/N/X)	Notes:
10	Have the scaled boring plans, showing all project and historic borings, and a schedule of borings in tabular format, been submitted to the District Geotechnical Engineer?	Y	
	The schedule of borings should present the following information for each boring:		
a.	exploration identification number	Y	
b.	location by station and offset	Y	
c.	estimated amount of rock and soil, including the total for each for the entire program.	Y	
Planning – Exploration Number		(Y/N/X)	Notes:
11	Have the coordinates, stations and offsets of all explorations (borings, soundings, test pits, etc.) been identified?	Y	
12	Has each exploration been assigned a unique identification number, in the following format X-ZZZ-W-YY, as per Section 303.2 of the SGE?	Y	
13	When referring to historic explorations that did not use the identification scheme in 12 above, have the historic explorations been assigned identification numbers according to Section 303.2 of the SGE?	X	

II. Reconnaissance and Planning Checklist

Planning – Boring Types		(Y/N/X)	Notes:
14	Based on Sections 303.3 to 303.7.6 of the SGE, have the location, depth, and sampling requirements for the following boring types been determined for the project?	Y	
	Check all boring types utilized for this project:		
	Existing Subgrades (Type A)		
	Roadway Borings (Type B)		
	Embankment Foundations (Type B1)		
	Cut Sections (Type B2)		
	Sidehill Cut Sections (Type B3)		
	Sidehill Cut-Fill Sections (Type B4)		
	Sidehill Fill Sections on Unstable Slopes (Type B5)		
	Geohazard Borings (Type C)		
	Lakes, Ponds, and Low-Lying Areas (Type C1)		
	Peat Deposits, Compressible Soils, and Low Strength Soils (Type C2)		
	Uncontrolled Fills, Waste Pits, and Reclaimed Surface Mines (Type C3)		
	Underground Mines (C4)		
	Landslides (Type C5)	✓	
	Rock Slope (Type C6)		
	Karst (Type C7)		
	Proposed Underground Utilities (Type D)		
	Structure Borings (Type E)		
	Bridges (Type E1)		
	Culverts (Type E2 a,b,c)		
	Retaining Walls (Type E3 a and b)		
	Noise Barrier (Type E4)		
	CCTV & High Mast Lighting Towers (Type E5)		
	Buildings and Salt Domes (Type E6)		

V.A. Landslide Remediation Checklist

C-R-S: CUY-480-16.56 Slide	**PID:** 124096	**Reviewer:** BKS	**Date:** 12/15/2025

If you do not have a landslide remediation on the project, you do not have to fill out this checklist.

Exploration		(Y/N/X)	Notes:
1	Is the site included in the GHMS/ Collector Landslide Inventory? If yes, provide the rating.	N	
2	Has a site reconnaissance been conducted to define the limits of the landslide?	Y	
	If yes, check the visible signs observed:		
	cracks in pavement		
	bulging toe		
	sloughed slopes	✓	
	scarp	✓	
	stream channel or ditch pinches		
	hydrophytic vegetation		
	rotated or dropped guardrail	✓	
	bent, cracked, or crushed pipe, culvert, or other structures		
	water seepage, flow from embankment, or ice		
	leaning, curved, J-shaped, deformed, or fallen trees or power poles	✓	
	deflection of linear features	✓	
	other (describe other visible signs)		
3	Have a site plan and cross sections been provided to compare ground surface conditions before and after failure?	Y	
4	Has the history of the landslide area been researched, including movement history, maintenance work, pavement drainage, and past corrective measures?	Y	Minimal information was available in excess of original construction plans and contemporary information provided by ODOT.
5	Has a site specific geotechnical exploration been performed to investigate the landslide area?	Y	
6	Has a groundwater monitoring program been performed to identify the phreatic surface through the landslide area?	N	
7	Has a landslide failure plane been determined from field observations or instrumentation?	Y	From field observations with input from DCP soundings performed on the slope.

V.A. Landslide Remediation Checklist

Analysis		(Y/N/X)	Notes:
8	Has the landslide mode of failure been determined?	Y	
	Check those that apply:		
	rotational failure	✓	
	translational		
	block failure		
	sheet		
	surface sloughing	✓	
	slump	✓	
	other (describe other failure modes)		
9	Have the subsurface conditions been identified which are the expected source of the failure mode?	Y	
	Check those that apply:		
	general shear strength failure of foundation soils	✓	
	loading		
	along sloped rock surfaces		
	erosion	✓	
	through thin, weak soil layers		
	permeable materials		
	surface / groundwater	✓	
	structure		
	Anthropogenic disturbances		
	weathering		
	impeded drainage		
	other (describe other sources)		
10	If water (static or flowing) significantly influences the stability of the landslide, has the source of water been identified, quantified, and water quality assessed?	X	Borings did not indicate the presence of groundwater within the slope. Surface water is main concern in terms of water.
11	Have calculations been performed to determine the F.S. for stability? Indicate which program and which analysis method (Spencer, Bishop, etc) was used.	Y	Spencer method used.
12	Have the following F.S. been met or exceeded, as determined by the calculations, for the given stability conditions:	Y	
a.	1.30 for short term (undrained) condition	Y	
b.	1.30 for long term (drained) condition	Y	
c.	1.10 for rapid drawdown, flood condition	X	
d.	1.50 for slope containing or supporting a structural element	X	

V.A. Landslide Remediation Checklist

Analysis		(Y/N/X)	Notes:
13	When differing soil or loading conditions occur throughout the landslide area, have sufficient analyses been completed to evaluate the stability at locations representative of the most critical conditions?	Y	

Design		(Y/N/X)	Notes:
14	Has a landslide remediation method been determined?	Y	
	If yes, check the methods that were evaluated and note the chosen remediation:		
	benching and regrading (See GDM 800)	✓	
	counter berm and regrading		
	flatten slope		
	geosynthetic reinforced slope		
	install surface / subsurface drainage system		
	shear key (See GDM 800)		
	soil nails or tiebacks		
	walls, sheeting, or drilled shafts		
	soil anchoring		
	relocate existing alignments		
	lightweight fills		
	soil removal / treatment		
	chemical treatment		
	Bioengineering		
	other (describe other methods)		
15	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, were calculations performed to evaluate the effectiveness of the chosen solutions?	Y	
16	Has a cost comparison been performed to evaluate a recommended solution compared to others?	X	

V.A. Landslide Remediation Checklist

Plans and Contract Documents		(Y/N/X)	Notes:
17	Have all necessary notes, specifications, and plan details been developed?	X	Being performed by others.
18	Has the vertical and lateral extent of defined landslide conditions been included on the Cross Sections and Plan and Profile sheets?	Y	
19	Has the information obtained from the exploration and analysis been incorporated into the project design?	Y	
20	Have the need, location, plan notes, and monitoring schedule of instrumentation been determined?	X	
21	Have the effects of the stability solution on the construction schedule and maintenance of traffic been accounted for in the plans?	Y	
22	Have the effects of the original failure and proposed remediation on any structures (e.g., bridges, buildings, culverts, utilities) or adjacent properties been evaluated and solutions to any issues incorporated into final design?	Y	

VI.B. Geotechnical Reports

C-R-S:	CUY-480-16.56 Slide	PID: 124096	Reviewer: BKS	Date: 12/15/2025

General		(Y/N/X)	Notes:
1	Has an electronic copy of all geotechnical submissions been provided to the District Geotechnical Engineer (DGE)?	Y	
2	Has the first complete version of a geotechnical report being submitted been labeled as ‘Draft’?	Y	
3	Subsequent to ODOT’s review and approval, has the complete version of the revised geotechnical report being submitted been labeled ‘Final’?	Y	
4	Has the boring data been submitted in a native format that is DIGGS (Data Interchange for Geotechnical and Geoenvironmental) compatable? gINT files meet this demand?	Y	
5	Does the report cover format follow ODOT's Brand and Identity Guidelines Report Standards found at http://www.dot.state.oh.us/brand/Pages/default.aspx ?	Y	
6	Have all geotechnical reports being submitted been titled correctly as prescribed in Section 706.1 of the SGE?	Y	
Report Body		(Y/N/X)	Notes:
7	Do all geotechnical reports being submitted contain the following:	Y	
a.	an Executive Summary as described in Section 706.2 of the SGE?	Y	
b.	an Introduction as described in Section 706.3 of the SGE?	Y	
c.	a section titled "Geology and Observations of the Project," as described in Section 706.4 of the SGE?	Y	
d.	a section titled "Exploration," as described in Section 706.5 of the SGE?	Y	
e.	a section titled "Findings," as described in Section 706.6 of the SGE?	Y	
f.	a section titled "Analyses and Recommendations," as described in Section 706.7 of the SGE?	Y	
Appendices		(Y/N/X)	Notes:
8	Do all geotechnical reports being submitted contain all applicable Appendices as described in Section 706.8 of the SGE?	Y	
9	Do the Appendices present a site Boring Plan showing all boring locations as described in Section 706.8.1 of the SGE?	Y	

VI.B. Geotechnical Reports

Appendices		(Y/N/X)	Notes:
10	Do the Appendices include boring logs and color pictures of rock, if applicable, as described in Section 706.8.2 of the SGE?	Y	
11	Do the Appendices include reports of undisturbed test data as described in Section 706.8.3 of the SGE?	Y	
12	Do the Appendices include calculations in a logical format to support recommendations as described in Section 706.8.4 of the SGE?	Y	