

August 8, 2025
ES-9607.02

Derek and Eileen Cheshire
7615 East Mercer Way
Mercer Island, Washington 98040

**Subject: Response to Land Use Review Comments
Cheshire Property
7615 East Mercer Way
Mercer Island, Washington**

City File No. CA025-005 SUB 2

Dear Derek and Eileen:

As requested, Earth Solutions NW, LLC (ESNW) has prepared this response to review comments for the subject project. This response letter addresses city of a city of Mercer Island review comments in the referenced review letter. This update includes a review of the latest submittal plans.

Plan Updates

Since issuing the previous response to comments letter the design team has revised the project to include pipe pile and helical anchor support for the new home and a catchment wall along the toe of the ascending slope off the west side of the building pad that was designed to resist impacts generated from a typical debris flow event. The following responses include these components in the specific evaluation.

Pipe piles will consist of three-inch diameter schedule-40 steel driven to refusal estimated at about 40 feet below grade. The pipe piles were designed using an allowable axial capacity of 10 kips and no lateral resistance. Lateral resistance will be provided by helical anchors installed to depths of about 40 feet (torque-confirmed to achieve design capacity) and a capacity of 40 kips. The referenced structural plans were designed using the capacity values provided by ESNW. Installation parameters are provided in the referenced structural plans.

The catchment wall designed off the west side of the building pad at the toe of an ascending natural slope was designed to withstand an impact of 1,200 pounds (per linear foot of wall) applied to the freeboard portion of the wall, which was based on a mobilized soil depth of about two feet. It is important to note that slope gradients decrease at the toe of the slope which will attenuate the debris flow that would be generated further up the slope in the steeper section. In addition, updated slope stability results suggest that the slope will maintain a minimum factor of safety of 1.1 after a design-level earthquake; therefore, any debris flow that may originate on the slope would likely be an isolated unique condition. On this basis, the structural design uses ultimate strength values to reflect this highly unlikely occurrence.

MI SUB 2 Review Comment 6

In the response above, the "...isolated areas of instability, such as within the slope to the west..." will require mitigation recommendations to meet the requirements of the statement of risk provided by the geotechnical engineer. The proposed development should not focus solely on the proposed building, but the entire property, i.e. not only the potential impact of the development on the slope, but the impact of the slope on the development.

The Nisqually earthquake produced lower ground motions than those anticipated with the current IBC earthquake loading used for the design of this project. So although the site response after the Nisqually earthquake "shows little to no signs of obvious foundation settlement or displacement", that response is not indicative of how the site will respond under current IBC earthquake design loading.

ESNW Response

Updated slope stability analyses attached evaluated the overall site as well as features adjacent to the building pad. The results of the stability analyses suggest that adequate factor of safety is maintained on the site such that impacts to the structure will not be increased. The new home will be supported by pipe piles and battered helical anchors that will further protect the building from earthquake forces and resulting potential ground deformation. A catchment wall with two feet of freeboard is included in the latest submittal for the base of the slope to the west. This element will provide protection to the residence from debris flow failure, although modeling suggests this occurrence is extremely unlikely.

MI SUB 2 Review Comment 7

From FHWA-NHI-11-032 (see Reference citation at the end of this letter):

"While there is some limited information to indicate that the shear strength of soil increases with increasing strain rate, the peak shear strength of soil subjected to cyclic loading is generally assumed to be equal to or less than the peak static strength. If the soil is dry, the static drained shear strength may be used. If the soil is saturated, even if the soil is relatively free draining, the undrained shear strength should be used for seismic analyses because of the rapid nature of earthquake loading. For cohesive soils of low to intermediate sensitivity, the static shear strength of the soil may be reduced by 10-15% when subjected to large magnitude earthquakes ($M > 7$) to account for a potential reduction in shear strength due to cyclic loading."

This FHWA reference does not support the geotechnical engineer of record's response that use of a higher strength under seismic loading is "consistent with local standards and based on published recommendations for values...". In reviewing slope stability analyses submitted by local geotechnical engineers for projects on Mercer Island, the use of higher soil strengths under seismic loading is not the standard of practice.

Please revise slope stability analyses to conform to local standard of practice and to the FHWA reference that indicates that "the peak shear strength is generally assumed to be equal or less than the peak static strength".

ESNW Response

Attached.

To evaluate the ascending slope to the west of the building pad, we assumed that this slope represents the intact slope (non-mobilized). A slope reduction calculation was completed for this slope and using average assumed soil parameters the model indicated a minimum FOS value of 1.3 for seismic conditions.

To evaluate the descending slope to the east of the building pad, we assumed that this slope represents the ancient landslide slope (mobilized). A slope reduction calculation was completed for this slope and using reduced (residual) assumed soil parameters based on blow count values reported in the referenced soil logs, the model indicated a minimum FOS value of 1.1 for seismic conditions.

The soil logs used for this analysis had no laboratory index testing on samples. The information used for the analysis was blow counts and field descriptions of soil units. In our opinion, given the scope of this project the information provided in the soil logs is adequate to evaluate the stability of this site. Soil parameters used for the updated modeling are attached that indicate seismic values are equal to static, as requested by the reviewer.

MI SUB 2 Review Comment 8

Please provide the calculation for the slope height reduction factor and the average peak acceleration that takes into account spatial incoherence. Please provide revised slope stability analyses using this average peak acceleration to verify that the FOS is a minimum of 1.1 for the western slope as indicated in ESNW response above.

From the debris flow discussion above:

"This condition suggests the slope is stable in the current condition and configuration. No modification is proposed for this slope; therefore, the stability will not be adversely impacted by the project."

Although no direct impact of the proposed development on the stability of the existing slope to the west is anticipated, the impact of the slope on the proposed development must be assessed. Therefore, not only the current condition, but future stability of the slope must be considered. If slope stability analyses indicate unstable conditions (e.g. under seismic loading conditions), please provide mitigation recommendations.

ESNW Response

Updated slope stability modeling results are attached along with slope height reduction calculations.

To evaluate the ascending slope to the west of the building pad, we assumed that this slope represents the intact slope (non-mobilized). A slope reduction calculation was completed for this slope and using average assumed soil parameters the model indicated a minimum FOS value of 1.3 for seismic conditions.

To evaluate the descending slope to the east of the building pad, we assumed that this slope represents the ancient landslide slope (mobilized). A slope reduction calculation was completed for this slope and using reduced (residual) assumed soil parameters based on blow count values reported in the referenced soil logs, the model indicated a minimum FOS value of 1.1 for seismic conditions.

With respect to soil strength parameters used for slope stability, the western slope was evaluated considering relatively undisturbed conditions and the eastern slope and building pad area were evaluated considering disturbed soil conditions. In either case, the values used were lower than peak values for the particular soil type and condition. WSDOT Chapter 5 and related engineering resources were referenced to determine appropriate soil strength parameters in the updated slope stability modeling. The analytical methods rely on the assumption that limited deformation is acceptable within the soil mass and that the structure can withstand this seismically induced deformation. This assumption allows for apparent cohesion to be used in analyses.

Updated slope stability analyses attached reinforce the opinion that the slope to the west is stable and will remain so subsequent to a design-level earthquake event. With respect to future stability, debris flow would be the most likely scenario. Given the topography, high level of vegetation and soil type, in our opinion, a debris flow would be a highly unlikely event. If a typical debris flow were to develop on this slope, the break in slope gradient at the base would attenuate the energy somewhat. If the flow progressed to the base of the slope, a catchment wall will provide a level of protection commensurate with the event such that life safety will be maintained. The catchment wall includes two feet of freeboard and is designed to withstand the impact forces from a typical debris flow event. No further evaluation or mitigation is warranted for this scenario.

In terms of surface conditions, the slope is heavily vegetated with forested growth and underbrush. Based on the conditions observed at the hand auger boring locations, the slope is comprised of firm glacial drift deposits, consistent with local geologic mapping.

MI SUB 2 Review Comment 9

Based on the variability of the soil conditions encountered at the site, worse or better conditions could be expected. This is the unknown associated with the site given the range of conditions encountered in the subsurface explorations. As such, a different conclusion that considers the range of conditions could be made. For example, post-liquefaction differential settlement could approach the maximum estimated post-liquefaction settlement value and that value may be greater if the subsurface explorations have not encountered the worst condition at the site.

Please provide maximum total and differential post-liquefaction settlement estimates so that the structural engineer can assess the potential associated damage and/or life safety issues. Please provide calculations for review to support the post-liquefaction settlement estimates given.

The groundwater conditions in borings B-6 and B-7, located to the west and north of the proposed structure seem to be very similar. The effects of liquefaction indicated for the B-7 conditions should be considered in the stability analyses. Please provide residual strength estimates for the liquefiable layers for review and include those strengths in revised stability analyses. Please provide an assessment for lateral spreading and/or debris flow failures using these residual strengths. Please provide associated calculations of lateral spreading and/or debris flow deformations. Please include mitigation recommendations for potential post-liquefaction effects. For example, if debris flow failures are anticipated, please determine debris flow volumes and runout and determine whether the proposed structure could be physically impacted by the debris flow. If so, please provide mitigation measures or provide impact loading values for the structural engineer to consider in the structural design. On the downslope side of the residence, please indicate whether lateral spreading or debris flow would undermine the structure and provide mitigation recommendations.

Please provide these results to other project members (e.g. the structural engineer and architect) so that the project team can provide a coordinated design that addresses these deformations without the potential for building collapse.

Please have the structural engineer state potential post-liquefaction settlement and lateral deformations in the design criteria section of the General Notes- Structural Design plan sheet.

Please have the structural engineer provide a statement on the General Notes- Structural Design plan sheet indicating the design approach used to accommodate the estimated post-liquefaction deformations and whether the proposed structural design can withstand these deformations without building collapse.

ESNW Response

Updated slope stability modeling results attached indicate that the soils under the new house pad will maintain a minimum factor of safety of 1.1 subsequent to a design-level earthquake event. The soil strength parameters used are considered conservative and reflective of a post-landslide condition, based on the N-values recorded in the boring logs. Because the slope is partially comprised of an ancient landslide, the blow-count values represent the in-situ or post-landslide strength and remain valid for the slope stability modeling. The failure surfaces generated from the stability modeling largely occur within the upper 20 feet or so of the soil profile; therefore, based on the analyses, even the weaker soil layer(s) at depth do not contribute to instability during a design-level earthquake event. On this basis, lateral spread is not a highly probable mode of failure for this site. The new home will be supported with pipe piles driven a minimum of 40 feet into the slope soils and helical anchors will be used for lateral restraint. The post-liquefaction deformation predicted to occur on this site will not adversely affect life-safety or building collapse.

Based on site-specific modeling of the site, the slope to the east may subside between three to six inches in response to liquefaction of saturated discrete sandy layers at depth. Slope stability modeling suggests that most instability is limited to the upper soils and therefore, lateral spread is not expected to occur. The building will be supported by pipe piles and helical anchors; therefore, subsidence of soils to the east of the building are expected to be limited to yard space and patio areas that are not pile-supported. This information has been distributed to the design team and is considered in the current submittal.

MI SUB 2 Review Comment 11

The foundation mitigation proposed must meet the requirements of MICC 19.07.160.B.3. Otherwise, the statement of risk required from the geotechnical engineer of record for building and critical area permit approval cannot be made.

Since the reviewer's opinion on the appropriate foundation design for the structure continues to differ significantly from the geotechnical engineer of record, an independent third-party review can be requested by the applicant. Please contact the Mercer Island Building Official (gareth.reece@mercergov.org).

ESNW Response

Since issuing the previous response to comments letter the design team has revised the project to include pipe pile and helical anchor support for the new home and a catchment wall along the toe of the ascending slope off the west side of the building pad that was designed to resist impacts generated from a typical debris flow event. The following responses include these components in the specific evaluation.

Pipe piles will consist of three-inch diameter schedule-40 steel driven to refusal estimated at about 40 feet below grade. The pipe piles were designed using an allowable axial capacity of 10 kips and no lateral resistance. Lateral resistance will be provided by helical anchors installed to depths of about 40 feet (torque-confirmed to achieve design capacity) and a capacity of 40 kips. The referenced structural plans were designed using the capacity values provided by ESNW. Installation parameters are provided in the referenced structural plans.

Plan Review

As part of this response preparation, the referenced submittal plans were reviewed and conform to the recommendations provided by ESNW during the design process. During the design process, cast-in-place retaining walls were developed for portions of the east and west sides of the project are to provide more useable space. The retaining walls range in height up to about five and one-half feet (exposed). The wall proposed along the western edge of the project will require excavation into a natural, moderately inclined slope (outside regulated steep slope hazard areas). ESNW provided sloped earth pressures to the structural engineering consultant for design purposes and those values are reflected in the current submittal package.

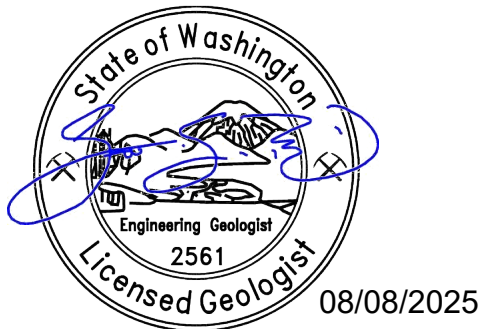
The additional analyses required during the permit review process have demonstrated that while this site contains geologic hazards, the overall stability of the site is favorable, and the project is designed in a thoughtful manner to preserve life-safety. The current design provides an acceptable level of risk mitigation commensurate with the scope of the project.

In our opinion, based on site conditions and slope stability analyses attached to this report, **“The landslide hazard area or seismic hazard area will be modified or the development has been designed so that the risk to the site and adjacent property is eliminated or mitigated such that the site is determined to be safe” (19.07.160.B.3.b)**. As noted in the Project Description, the new construction will essentially replace the same footprint area as the existing structure and will be of similar height; therefore, no significant increase in loading is expected from the project. Improved drainage controls will improve the overall stability of this site.

We trust this response letter meets your current needs. Should you have questions regarding the content herein, or require additional information, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC



Scott S. Riegel

Scott S. Riegel, L.G., L.E.G.
Associate Principal Geologist



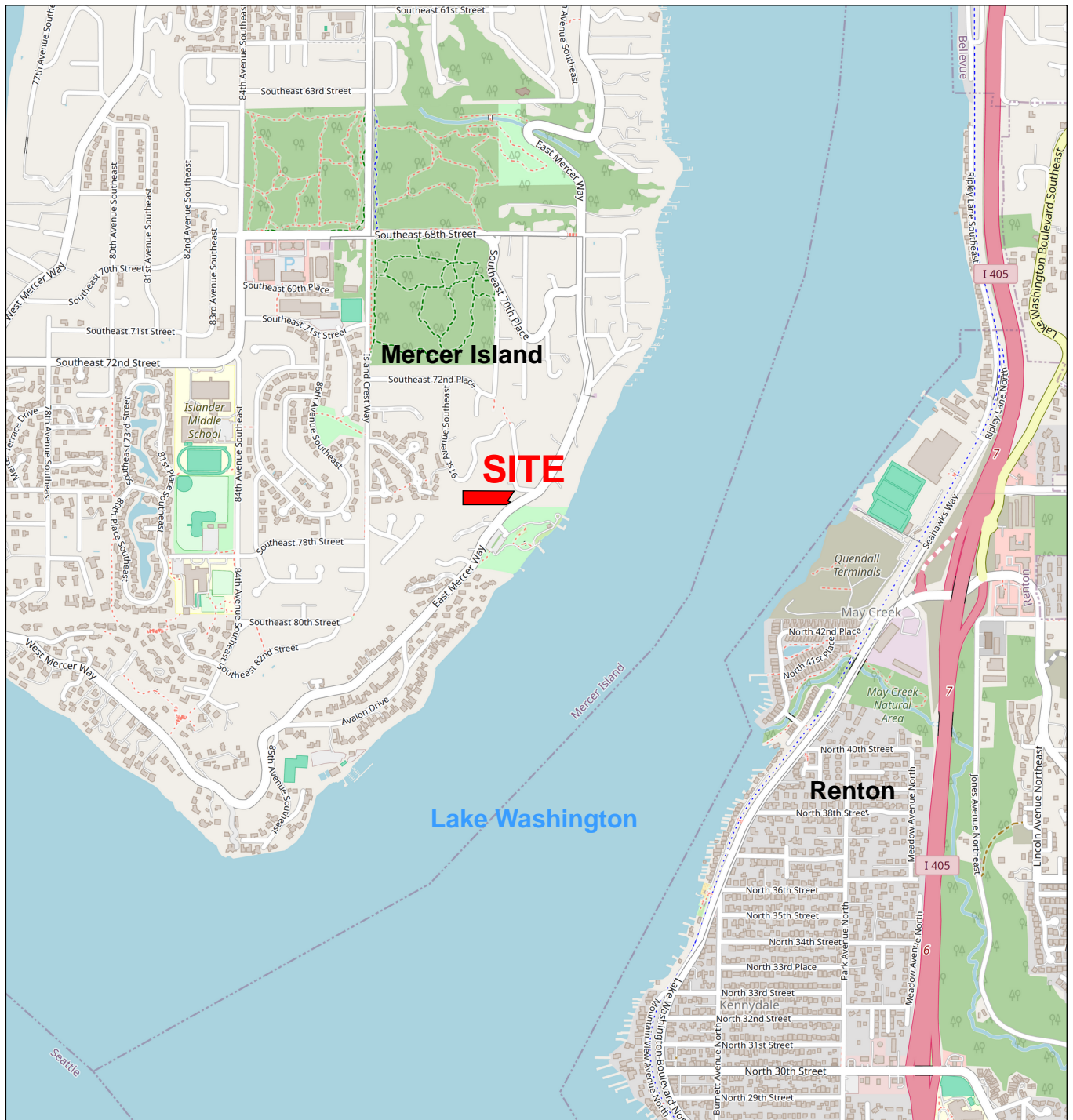
Kyle R. Campbell, P.E.
Senior Principal Engineer

Attachments: Plate 1 – Vicinity Map
Plate 2 – Subsurface Exploration Plan
Subsurface Exploration Logs
SlopeW Output
Liquefaction Analysis

cc: Plus Permit and Land Use Services
Attention: Marianne Stover

References:

- Architectural Plans Sub1, prepared by Patrick D. Lynch, LLC, dated June 9, 2025
- Civil Plans, prepared by LPD Engineering, PLLC, dated August 8, 2025
- Drainage Plan, prepared by LPD Engineering, PLLC, dated June 27, 2025
- Geotechnical Engineering Study, prepared by ESNW, ES-9607.01, updated January 23, 2025
- Review Letter, prepared by City of Mercer Island, dated July 10, 2025
- Structural Plans, prepared by Merrell Design Services, PLLC, dated August 4, 2025



Reference:
King County, Washington
OpenStreetMap.org

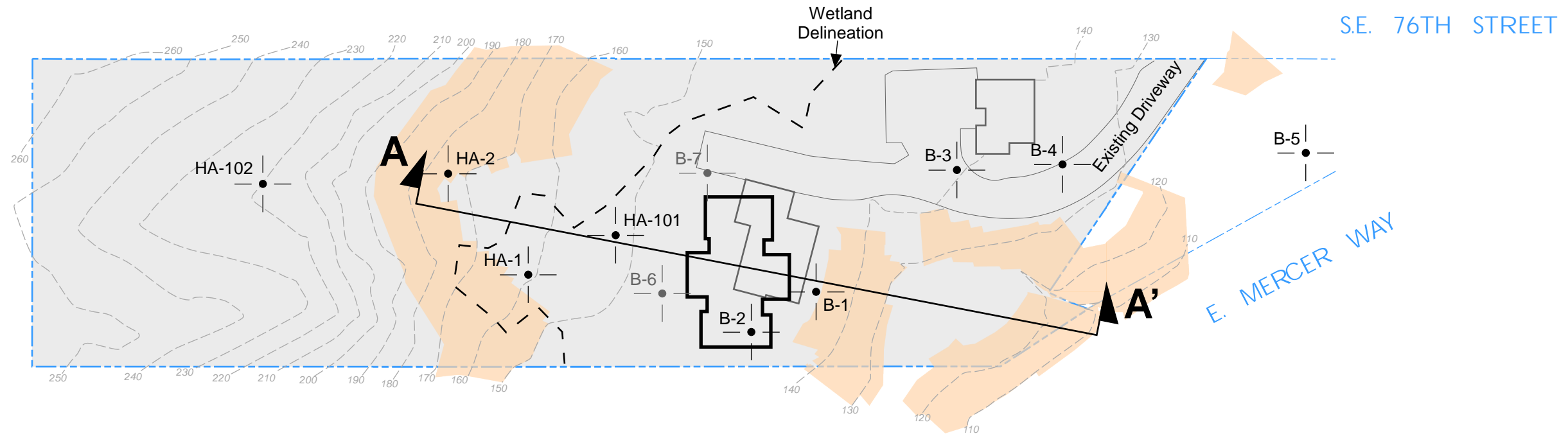
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.



Geotechnical Engineering
Environmental Services
Earthwork Observation & Testing
CESCL & Stormwater Services

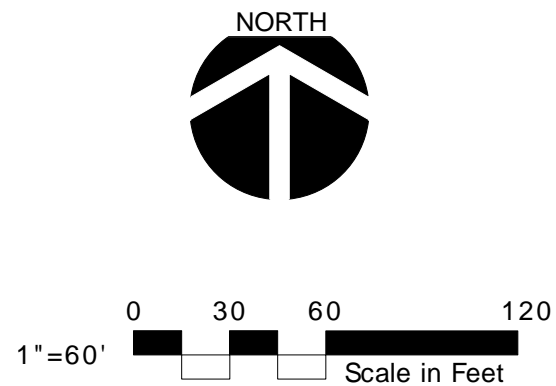
Vicinity Map
Cheshire Property
Mercer Island, Washington

Drawn CAM	Date 06/10/2025	Proj. No. 9607.02
Checked SSR	Date June 2025	Plate 1



LEGEND

- HA-101 | Approximate Location of ESNW Hand Auger Boring, Proj. No. ES-9607.02, June 2025
- HA-1 | Approximate Location of ESNW Hand Auger Boring, Proj. No. ES-9607.02, May 2025
- B-1 | Approximate Location of Geotech Consultants, Inc. Boring, Job 16095, March 2016
- B-6 | Approximate Location of Geotech Consultants, Inc. Boring, Job 23177, June 2023
- Subject Site
- Proposed Building
- Existing Building
- Cross-Section
- Approximate Location of Steep Slope Hazard Area



NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

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Subsurface Exploration Plan
 Cheshire Property
 Mercer Island, Washington

Geotechnical Engineering
 Environmental Services
 Earthwork Observation & Testing
 CESCL & Stormwater Services



Drawn
CAM

Checked
SSR


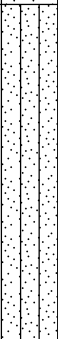
Date
06/11/2025

Proj. No.
9607.02

Plate
2

Coarse-Grained Soils - More Than 50% Retained on No. 200 Sieve		Moisture Content		Symbols																							
Gravels - More Than 50% of Coarse Fraction Retained on No. 4 Sieve		GW	Well-graded gravel with or without sand, little to no fines	Dry - Absence of moisture, dusty, dry to the touch																							
		GP	Poorly graded gravel with or without sand, little to no fines	Damp - Perceptible moisture, likely below optimum MC																							
		GM	Silty gravel with or without sand	Moist - Damp but no visible water, likely at/near optimum MC																							
		GC	Clayey gravel with or without sand	Wet - Water visible but not free draining, likely above optimum MC																							
Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve		SW	Well-graded sand with or without gravel, little to no fines	Saturated/Water Bearing - Visible free water, typically below groundwater table																							
		SP	Poorly graded sand with or without gravel, little to no fines																								
		SM	Silty sand with or without gravel																								
		SC	Clayey sand with or without gravel																								
Fine-Grained Soils - 50% or More Passes No. 200 Sieve		Terms Describing Relative Density and Consistency																									
Silt and Clays Liquid Limit Less Than 50		ML	Silt with or without sand or gravel; sandy or gravelly silt	Coarse-Grained Soils: <u>Density</u> <u>SPT blows/foot</u> Very Loose < 4 Loose 4 to 9 Medium Dense 10 to 29 Dense 30 to 49 Very Dense ≥ 50																							
		CL	Clay of low to medium plasticity; lean clay with or without sand or gravel; sandy or gravelly lean clay	Fine-Grained Soils: <u>Consistency</u> <u>SPT blows/foot</u> Very Soft < 2 Soft 2 to 3 Medium Stiff 4 to 7 Stiff 8 to 14 Very Stiff 15 to 29 Hard ≥ 30																							
		OL	Organic clay or silt of low plasticity	Test Symbols & Units Fines = Fines Content (%) MC = Moisture Content (%) DD = Dry Density (pcf) Str = Shear Strength (tsf) PID = Photoionization Detector (ppm) OC = Organic Content (%) CEC = Cation Exchange Capacity (meq/100 g) LL = Liquid Limit (%) PL = Plastic Limit (%) PI = Plasticity Index (%)																							
		MH	Elastic silt with or without sand or gravel; sandy or gravelly elastic silt																								
Silt and Clays Liquid Limit 50 or More		CH	Clay of high plasticity; fat clay with or without sand or gravel; sandy or gravelly fat clay	Component Definitions <table border="1"> <thead> <tr> <th>Descriptive Term</th> <th>Size Range and Sieve Number</th> </tr> </thead> <tbody> <tr> <td>Boulders</td> <td>Larger than 12"</td> </tr> <tr> <td>Cobbles</td> <td>3" to 12"</td> </tr> <tr> <td>Gravel</td> <td>3" to No. 4 (4.75 mm)</td> </tr> <tr> <td> Coarse Gravel</td> <td>3" to 3/4"</td> </tr> <tr> <td> Fine Gravel</td> <td>3/4" to No. 4 (4.75 mm)</td> </tr> <tr> <td>Sand</td> <td>No. 4 (4.75 mm) to No. 200 (0.075 mm)</td> </tr> <tr> <td> Coarse Sand</td> <td>No. 4 (4.75 mm) to No. 10 (2.00 mm)</td> </tr> <tr> <td> Medium Sand</td> <td>No. 10 (2.00 mm) to No. 40 (0.425 mm)</td> </tr> <tr> <td> Fine Sand</td> <td>No. 40 (0.425 mm) to No. 200 (0.075 mm)</td> </tr> <tr> <td>Silt and Clay</td> <td>Smaller than No. 200 (0.075 mm)</td> </tr> </tbody> </table>		Descriptive Term	Size Range and Sieve Number	Boulders	Larger than 12"	Cobbles	3" to 12"	Gravel	3" to No. 4 (4.75 mm)	Coarse Gravel	3" to 3/4"	Fine Gravel	3/4" to No. 4 (4.75 mm)	Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)	Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)	Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)	Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)	Silt and Clay	Smaller than No. 200 (0.075 mm)
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Highly Organic Soils		PT	Peat, muck, and other highly organic soils	Modifier Definitions <table border="1"> <thead> <tr> <th>Percentage by Weight (Approx.)</th> <th>Modifier</th> </tr> </thead> <tbody> <tr> <td>< 5</td> <td>Trace (sand, silt, clay, gravel)</td> </tr> <tr> <td>5 to 14</td> <td>Slightly (sandy, silty, clayey, gravelly)</td> </tr> <tr> <td>15 to 29</td> <td>Sandy, silty, clayey, gravelly</td> </tr> <tr> <td>≥ 30</td> <td>Very (sandy, silty, clayey, gravelly)</td> </tr> </tbody> </table>		Percentage by Weight (Approx.)	Modifier	< 5	Trace (sand, silt, clay, gravel)	5 to 14	Slightly (sandy, silty, clayey, gravelly)	15 to 29	Sandy, silty, clayey, gravelly	≥ 30	Very (sandy, silty, clayey, gravelly)												
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Fill		FILL	Made Ground	Classifications of soils in this geotechnical report and as shown on the exploration logs are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D2487 and D2488 were used as an identification guide for the Unified Soil Classification System.																							


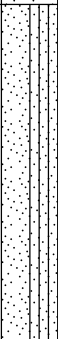

PROJECT NUMBER ES-9607.02 PROJECT NAME Cheshire Property
 DATE STARTED 6/4/25 COMPLETED 6/4/25 GROUND ELEVATION _____
 DRILLING CONTRACTOR ESNW Rep LATITUDE 47.53453 LONGITUDE -122.21661
 LOGGED BY JMN CHECKED BY SSR GROUND WATER LEVEL:
 NOTES _____ ∇ AT TIME OF DRILLING _____
 SURFACE CONDITIONS Field grass & underbrush AFTER DRILLING _____

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				
		TPSL		Dark brown TOPSOIL with thin roots and gravel
				0.5
		SM		Brown silty SAND with gravel, medium dense, moist
2.5				-probed 4" -becomes dense
				-probed 2"
				3.0

Hand auger boring terminated at 3.0 feet below existing grade due to refusal on significant gravel content of soil. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

PROJECT NUMBER ES-9607.02 PROJECT NAME Cheshire Property
 DATE STARTED 6/4/25 COMPLETED 6/4/25 GROUND ELEVATION _____
 DRILLING CONTRACTOR ESNW Rep LATITUDE 47.53461 LONGITUDE -122.21725
 LOGGED BY JMN CHECKED BY SSR GROUND WATER LEVEL:
 NOTES _____ ∇ AT TIME OF DRILLING _____
 SURFACE CONDITIONS Forest floor AFTER DRILLING _____

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				
		TPSL		Dark brown TOPSOIL with roots to 1.5'
			0.5	
		SP-SM		Tan poorly graded SAND with silt and gravel, loose, damp -becomes gray, medium dense
2.5			3.0	
		SM		Gray silty SAND, medium dense, moist -mottled texture
			3.5	

Hand auger boring terminated at 3.5 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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 DRILLING CONTRACTOR ESNW Rep LATITUDE 47.53450 LONGITUDE -122.21680
 LOGGED BY JMN CHECKED BY SSR GROUND WATER LEVEL:
 NOTES _____ ∇ AT TIME OF DRILLING _____
 SURFACE CONDITIONS Forest floor AFTER DRILLING _____

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				
		TPSL		Dark brown TOPSOIL with roots and gravel
		SM		Gray silty SAND with gravel, medium dense, moist -mottled, probed 6" -becomes wet, light groundwater seepage -increased gravel content, probed 6" -probed 4"

Hand auger boring terminated at 3.0 feet below existing grade due to refusal on gravel. Groundwater seepage encountered at 2.0 feet during excavation. No caving observed.

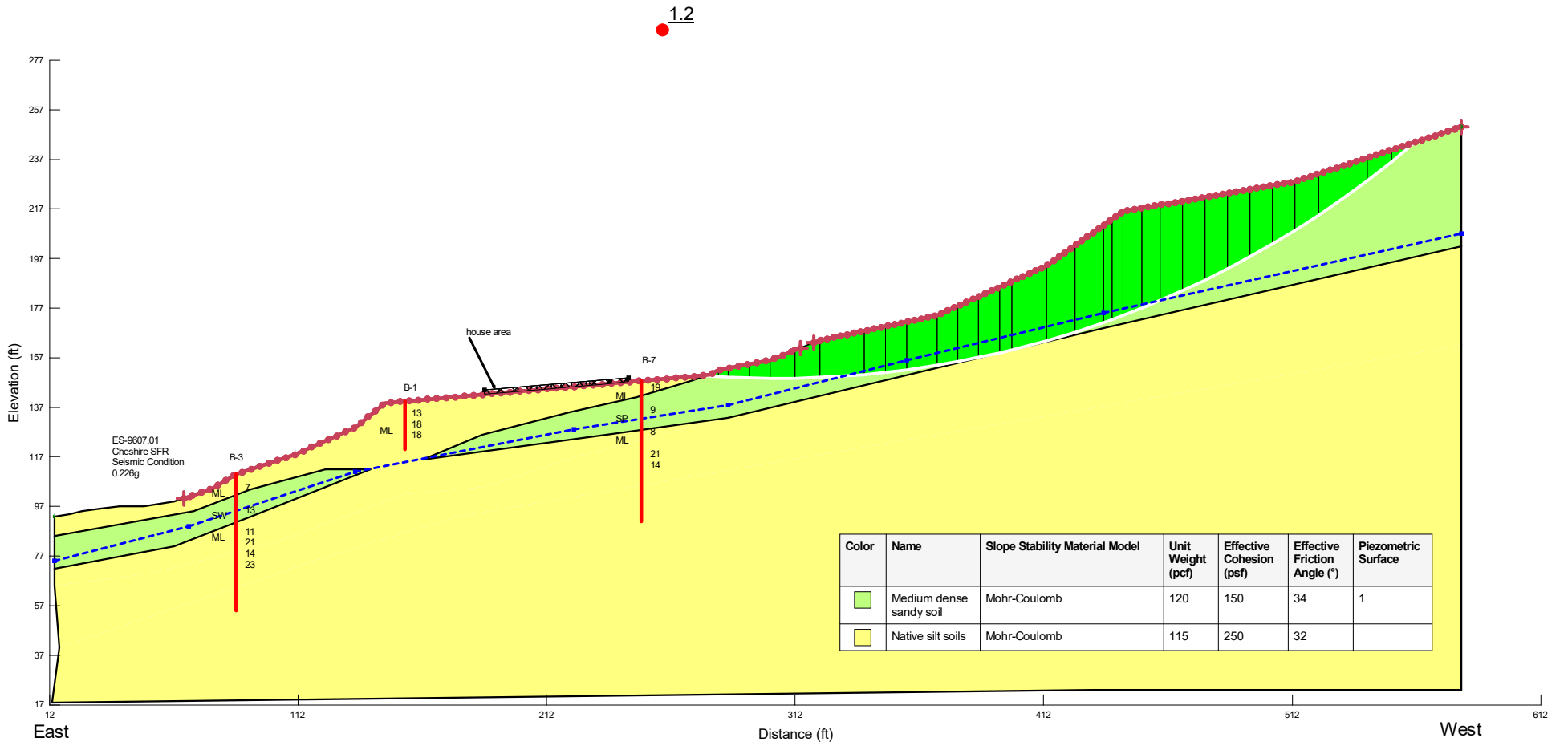
LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

PROJECT NUMBER ES-9607.02 PROJECT NAME Cheshire Property
 DATE STARTED 5/13/25 COMPLETED 5/13/25 GROUND ELEVATION _____
 DRILLING CONTRACTOR ESNW Rep LATITUDE 47.53463 LONGITUDE -122.21695
 LOGGED BY JMN CHECKED BY SSR GROUND WATER LEVEL:
 NOTES _____ ∇ AT TIME OF DRILLING _____
 SURFACE CONDITIONS Forest floor AFTER DRILLING _____

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				
		TPSL		Dark brown TOPSOIL with roots
				0.9
		SM		Brown silty SAND with gravel, medium dense, moist
2.5				-probed 8"
				-becomes gray, wet, mottled, probed 6"
				-increased silt content
				-probed 6"
				3.5

Hand auger boring terminated at 3.5 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.



K_s Calculations - West Slope

Equations:

$$K_s = r \times \alpha \times PGA_m$$

$$\alpha = 1 + 0.01H(0.5\beta - 1)$$

$$\beta = \frac{S_{m1}}{PGA_m}$$

Given Variables:

$$r = 0.5 \text{ (ductile system)}$$

$$PGA_m = 0.685 \text{ (Site Class D)}$$

$$H = 100 \text{ ft}$$

$$S_{m1} = 0.903^*$$

* Per ASCE Table 11.4-2
 Linear Interpolation

Solve for β

$$\beta = \frac{0.903}{0.685} = 1.318$$

Solve for α

$$\alpha = 1 + 1(0.659 - 1)$$

$$\alpha = 1 + (-0.341)$$

$$\alpha = 0.659$$

Solve for K_s

$$K_s = 0.5 \times 0.659 \times 0.685$$

$$K_s = 0.226$$

Seismic

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File Information

File Version: 11.08
Product Version: 25.1.0.1058
Title: Cheshire SFR ES-9607.01
Created By: Scott Riegel
Last Edited By: Brian Snow
Revision Number: 99
Date: 08/06/2025
Time: 08:43:12 AM
File Name: BCS seismic west slope draft 7.29.25.gsz
Directory: C:\Users\Brian.snow\Desktop\Desktop Working\9607.02 - (SLOPE) Cheshire Property\
Last Solved Date: 08/06/2025
Last Solved Time: 08:43:20 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Seismic

Kind: SLOPE/W
Analysis Type: Limit Equilibrium
Settings
Method: Morgenstern-Price
Side Function Settings
Side Function: Half-Sine
PWP Conditions from: Piezometric Surfaces
Apply Phreatic Correction: No
Staged Rapid Drawdown Analysis: No
Unit Weight of Water: 62.4 pcf
Slip Surface
Slip Surface Settings
Search Method: Entry and Exit
Specify Radius Tangent Lines: No
Direction of Movement: Right to Left
Use Passive Mode: No
No. of Critical Slip Surfaces to Store: 1
Geometry Settings
Minimum Slip Surface Depth: 3 ft
Number of Columns: 30
Tension Crack Option: (none)
Optimization
Optimize Critical Slip Surface: No
Convergence
Factor of Safety Convergence Settings
Maximum Number of Iterations: 100
Tolerable Difference in F of S: 0.001
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Maximum Absolute Lambda: 2

Materials

Native silt soils

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

Medium dense sandy soil

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 150 psf

Effective Friction Angle: 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Surface: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (66, 100.33333) ft
Left-Zone Right Coordinate: (314, 160.8) ft
Left-Zone Increment: 70
Right Type: Range
Right-Zone Left Coordinate: (319.5, 163) ft
Right-Zone Right Coordinate: (580, 250) ft
Right-Zone Increment: 100
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (14, 93) ft
Right Coordinate: (580, 250) ft

Piezometric Surfaces

Piezometric Surface 1

Coordinates

	X	Y
Coordinate 1	14 ft	75 ft
Coordinate 2	68 ft	89 ft
Coordinate 3	135 ft	111 ft
Coordinate 4	223 ft	128 ft
Coordinate 5	285 ft	138 ft
Coordinate 6	357 ft	156 ft
Coordinate 7	436 ft	175 ft
Coordinate 8	580 ft	207 ft

Seismic Coefficients

Horz Seismic Coef.: 0.226

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 125 pcf
Direction: Vertical

Coordinates

	X	Y
	187 ft	144 ft
	245 ft	149 ft

Geometry

Name: Seismic

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	87 ft	110 ft
Point 2	25 ft	95 ft
Point 3	14 ft	93 ft
Point 4	16 ft	40 ft
Point 5	118 ft	75 ft
Point 6	176 ft	93 ft
Point 7	433 ft	137 ft

Point 8	13 ft	18 ft
Point 9	432 ft	23 ft
Point 10	71 ft	59 ft
Point 11	436 ft	169 ft
Point 12	187 ft	105 ft
Point 13	155.05084 ft	101.94916 ft
Point 14	104 ft	83 ft
Point 15	14 ft	65 ft
Point 16	77 ft	104 ft
Point 17	62 ft	99 ft
Point 18	50 ft	97 ft
Point 19	40 ft	97 ft
Point 20	32 ft	96 ft
Point 21	20 ft	94 ft
Point 22	111 ft	118 ft
Point 23	224 ft	117 ft
Point 24	52 ft	70 ft
Point 25	277.42857 ft	150 ft
Point 26	147 ft	138.74483 ft
Point 27	135 ft	128.89655 ft
Point 28	106 ft	116.33333 ft
Point 29	155 ft	139.43518 ft
Point 30	169 ft	140.64329 ft
Point 31	190 ft	142.45546 ft
Point 32	211 ft	144.26763 ft
Point 33	225 ft	145.47574 ft
Point 34	234 ft	146.25238 ft
Point 35	241 ft	146.85644 ft
Point 36	250 ft	147.63308 ft
Point 37	264 ft	148.8412 ft
Point 38	248 ft	141 ft
Point 39	221 ft	135 ft
Point 40	186 ft	126 ft
Point 41	162 ft	116 ft
Point 42	236 ft	126 ft
Point 43	285 ft	132.74194 ft
Point 44	123 ft	112 ft
Point 45	93 ft	104 ft
Point 46	70 ft	95 ft
Point 47	14 ft	85 ft
Point 48	14 ft	72 ft
Point 49	62 ft	81 ft
Point 50	93 ft	93 ft
Point 51	141 ft	112 ft
Point 52	267 ft	146.81068 ft
Point 53	270.88889 ft	148 ft
Point 54	281 ft	152 ft
Point 55	266 ft	142 ft
Point 56	302 ft	156 ft
Point 57	322 ft	164 ft
Point 58	369 ft	174 ft
Point 59	413 ft	194 ft
Point 60	444 ft	216 ft
Point 61	513 ft	228 ft
Point 62	580 ft	250 ft
Point 63	580 ft	23 ft
Point 64	439.58071 ft	212.86373 ft
Point 65	580 ft	202 ft
Point 66	580 ft	162 ft

Regions

	Material	Points	Area
Region 1	Native silt soils	37,36,35,34,33,32,31,30,29,26,27,22,28,1,16,17,18,19,20,2,21,3,47,46,45,44,51,50,49,48,15,24,14,13,12,23,43,42,41,40,39,38,52,53,25	5,571.8 ft ²
Region 2	Native silt soils	6,5,10,4,8,9,63,66,7	50,368 ft ²
Region 3	Native silt soils	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft ²
Region 4	Medium dense	59,58,57,56,54,25,53,52,38,39,40,41,42,43,11,65,62,61,60,64	11,391 ft ²

	sandy soil		
Region 5	Medium dense sandy soil	44,45,46,47,48,49,50,51	1,295.5 ft ²

Slip Results

Slip Surfaces Analysed: 28640 of 35855 converged

Current Slip Surface

Slip Surface: 30,262

Factor of Safety: 1.2

Volume: 6,171.56 ft³

Weight: 740,585.85 lbf

Resisting Moment: 1.8636969e+08 lbf-ft

Activating Moment: 1.5155315e+08 lbf-ft

Resisting Force: 444,351.23 lbf

Activating Force: 361,462.21 lbf

Slip Rank: 1 of 35,855 slip surfaces

Exit: (561.53481, 243.9368) ft

Entry: (275.01567, 149.79178) ft

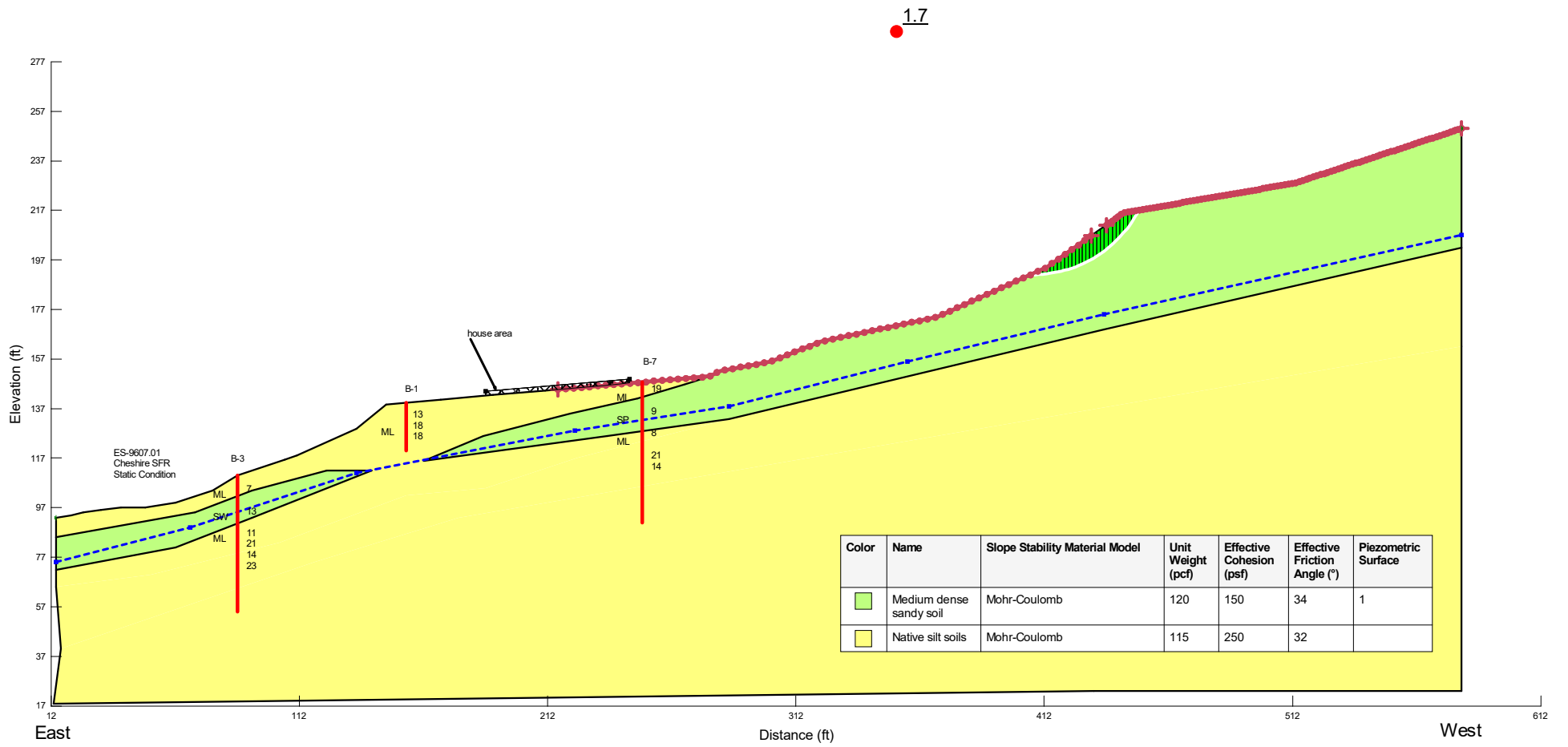
Radius: 393.6943 ft

Center: (304.75108, 542.36153) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Column Base Material
Column 1	556.68133 ft	239.89425 ft	-2,375.9537 psf	132.81577 psf	89.585368 psf	150 psf	0 psf	Medium dense sandy soil
Column 2	546.97437 ft	232.06301 ft	-2,021.8874 psf	512.40798 psf	345.62355 psf	150 psf	0 psf	Medium dense sandy soil
Column 3	537.26741 ft	224.72151 ft	-1,698.3809 psf	843.4225 psf	568.89566 psf	150 psf	0 psf	Medium dense sandy soil
Column 4	527.56044 ft	217.83645 ft	-1,403.3562 psf	1,135.1082 psf	765.64017 psf	150 psf	0 psf	Medium dense sandy soil
Column 5	517.85348 ft	211.37928 ft	-1,135.0324 psf	1,395.3686 psf	941.18802 psf	150 psf	0 psf	Medium dense sandy soil
Column 6	508.48705 ft	205.52472 ft	-899.5886 psf	1,680.1557 psf	1,133.2793 psf	150 psf	0 psf	Medium dense sandy soil
Column 7	499.46115 ft	200.22672 ft	-694.15287 psf	1,996.9422 psf	1,346.9546 psf	150 psf	0 psf	Medium dense sandy soil
Column 8	490.43526 ft	195.24427 ft	-508.40675 psf	2,303.2876 psf	1,553.5871 psf	150 psf	0 psf	Medium dense sandy soil
Column 9	481.40936 ft	190.56393 ft	-341.51275 psf	2,603.8868 psf	1,756.3438 psf	150 psf	0 psf	Medium dense sandy soil
Column 10	472.38346 ft	186.17379 ft	-192.72694 psf	2,902.6512 psf	1,957.8629 psf	150 psf	0 psf	Medium dense sandy soil
Column 11	463.35757 ft	182.06322 ft	-61.386762 psf	3,202.5996 psf	2,160.1807 psf	150 psf	0 psf	Medium dense sandy soil
Column 12	455.13346 ft	178.54260 ft	44.259227 psf	3,475.6712 psf	2,314.5166 psf	150 psf	0 psf	Medium dense sandy soil
Column 13	447.71115 ft	175.56219 ft	127.31389 psf	3,717.3517 psf	2,421.5111 psf	150 psf	0 psf	Medium dense sandy soil
Column 14	441.79035 ft	173.29530 ft	186.66631 psf	3,799.4806 psf	2,436.874 psf	150 psf	0 psf	Medium dense sandy soil
Column 15	437.79035 ft	171.83200 ft	222.50963 psf	3,723.9752 psf	2,361.7683 psf	150 psf	0 psf	Medium dense sandy soil
Column 16	430.25000 ft	169.25508 ft	272.18907 psf	3,564.4829 psf	2,220.6802 psf	150 psf	0 psf	Medium dense sandy soil
Column 17	418.75000 ft	165.58128 ft	328.8473 psf	3,286.1659 psf	1,994.7366 psf	150 psf	0 psf	Medium dense sandy soil
Column 18	406.03721 ft	161.98750 ft	362.31068 psf	3,095.3809 psf	1,843.4792 psf	150 psf	0 psf	Medium dense sandy soil
Column 19	396.67016 ft	159.55613 ft	373.4509 psf	3,035.5213 psf	1,795.5891 psf	150 psf	0 psf	Medium dense sandy soil
Column 20	390.05491 ft	158.04415 ft	368.52006 psf	2,963.9351 psf	1,750.6296 psf	150 psf	0 psf	Medium dense sandy soil
Column 21	381.63295 ft	156.27094 ft	352.77474 psf	2,843.1585 psf	1,679.7851 psf	150 psf	0 psf	Medium dense sandy soil
Column 22	373.21098 ft	154.68878 ft	325.10776 psf	2,682.3148 psf	1,589.9562 psf	150 psf	0 psf	Medium dense sandy soil

Column 23	363.00000 ft	153.04744 ft	274.2852 psf	2,599.6103 psf	1,568.4516 psf	150 psf	0 psf	Medium dense sandy soil
Column 24	352.70609 ft	151.62274 ft	206.15614 psf	2,586.246 psf	1,605.3909 psf	150 psf	0 psf	Medium dense sandy soil
Column 25	344.11827 ft	150.66419 ft	131.99922 psf	2,522.6595 psf	1,612.5207 psf	150 psf	0 psf	Medium dense sandy soil
Column 26	335.53045 ft	149.89589 ft	45.971643 psf	2,410.6517 psf	1,594.9969 psf	150 psf	0 psf	Medium dense sandy soil
Column 27	326.61827 ft	149.30220 ft	-56.012577 psf	2,233.298 psf	1,506.3785 psf	150 psf	0 psf	Medium dense sandy soil
Column 28	317.00000 ft	148.88962 ft	-180.31249 psf	1,862.3403 psf	1,256.1644 psf	150 psf	0 psf	Medium dense sandy soil
Column 29	307.00000 ft	148.70541 ft	-324.81739 psf	1,319.6144 psf	890.09116 psf	150 psf	0 psf	Medium dense sandy soil
Column 30	297.75000 ft	148.75244 ft	-472.05205 psf	906.22754 psf	611.25819 psf	150 psf	0 psf	Medium dense sandy soil
Column 31	289.25000 ft	148.99551 ft	-619.81967 psf	630.95918 psf	425.58734 psf	150 psf	0 psf	Medium dense sandy soil
Column 32	283.00000 ft	149.27365 ft	-723.60491 psf	420.89216 psf	283.89534 psf	150 psf	0 psf	Medium dense sandy soil
Column 33	279.21429 ft	149.50039 ft	-775.85506 psf	207.05135 psf	139.6579 psf	150 psf	0 psf	Medium dense sandy soil
Column 34	276.91950 ft	149.65255 ft	-808.44535 psf	51.040722 psf	34.427402 psf	150 psf	0 psf	Medium dense sandy soil
Column 35	275.71305 ft	149.74020 ft	0 psf	31.170107 psf	19.477245 psf	250 psf	0 psf	Native silt soils



Static

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File Information

File Version: 11.08
Product Version: 25.1.0.1058
Title: Cheshire SFR ES-9607.01
Created By: Scott Riegel
Last Edited By: Brian Snow
Revision Number: 99
Date: 08/06/2025
Time: 08:43:12 AM
File Name: BCS seismic west slope draft 7.29.25.gsz
Directory: C:\Users\Brian.snow\Desktop\Desktop Working\9607.02 - (SLOPE) Cheshire Property\
Last Solved Date: 08/06/2025
Last Solved Time: 08:43:26 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Static

Kind: SLOPE/W
Analysis Type: Limit Equilibrium
Settings
Method: Morgenstern-Price
Side Function Settings
Side Function: Half-Sine
PWP Conditions from: Piezometric Surfaces
Apply Phreatic Correction: No
Staged Rapid Drawdown Analysis: No
Unit Weight of Water: 62.4 pcf
Slip Surface
Slip Surface Settings
Search Method: Entry and Exit
Specify Radius Tangent Lines: No
Direction of Movement: Right to Left
Use Passive Mode: No
No. of Critical Slip Surfaces to Store: 1
Geometry Settings
Minimum Slip Surface Depth: 3 ft
Number of Columns: 30
Tension Crack Option: (none)
Optimization
Optimize Critical Slip Surface: No
Convergence
Factor of Safety Convergence Settings
Maximum Number of Iterations: 100
Tolerable Difference in F of S: 0.001
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Maximum Absolute Lambda: 2

Materials

Native silt soils

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

Medium dense sandy soil

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 150 psf

Effective Friction Angle: 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Surface: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (216, 144.6991) ft
Left-Zone Right Coordinate: (431, 206.77419) ft
Left-Zone Increment: 70
Right Type: Range
Right-Zone Left Coordinate: (436.95455, 211) ft
Right-Zone Right Coordinate: (580, 250) ft
Right-Zone Increment: 100
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (14, 93) ft
Right Coordinate: (580, 250) ft

Piezometric Surfaces

Piezometric Surface 1

Coordinates

	X	Y
Coordinate 1	14 ft	75 ft
Coordinate 2	68 ft	89 ft
Coordinate 3	135 ft	111 ft
Coordinate 4	223 ft	128 ft
Coordinate 5	285 ft	138 ft
Coordinate 6	357 ft	156 ft
Coordinate 7	436 ft	175 ft
Coordinate 8	580 ft	207 ft

Seismic Coefficients

Horz Seismic Coef.: 0

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 125 pcf
Direction: Vertical

Coordinates

	X	Y
	187 ft	144 ft
	245 ft	149 ft

Geometry

Name: Static

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	87 ft	110 ft
Point 2	25 ft	95 ft
Point 3	14 ft	93 ft
Point 4	16 ft	40 ft
Point 5	118 ft	75 ft
Point 6	176 ft	93 ft
Point 7	433 ft	137 ft

Point 8	13 ft	18 ft
Point 9	432 ft	23 ft
Point 10	71 ft	59 ft
Point 11	436 ft	169 ft
Point 12	187 ft	105 ft
Point 13	155.05084 ft	101.94916 ft
Point 14	104 ft	83 ft
Point 15	14 ft	65 ft
Point 16	77 ft	104 ft
Point 17	62 ft	99 ft
Point 18	50 ft	97 ft
Point 19	40 ft	97 ft
Point 20	32 ft	96 ft
Point 21	20 ft	94 ft
Point 22	111 ft	118 ft
Point 23	224 ft	117 ft
Point 24	52 ft	70 ft
Point 25	277.42857 ft	150 ft
Point 26	147 ft	138.74483 ft
Point 27	135 ft	128.89655 ft
Point 28	106 ft	116.33333 ft
Point 29	155 ft	139.43518 ft
Point 30	169 ft	140.64329 ft
Point 31	190 ft	142.45546 ft
Point 32	211 ft	144.26763 ft
Point 33	225 ft	145.47574 ft
Point 34	234 ft	146.25238 ft
Point 35	241 ft	146.85644 ft
Point 36	250 ft	147.63308 ft
Point 37	264 ft	148.8412 ft
Point 38	248 ft	141 ft
Point 39	221 ft	135 ft
Point 40	186 ft	126 ft
Point 41	162 ft	116 ft
Point 42	236 ft	126 ft
Point 43	285 ft	132.74194 ft
Point 44	123 ft	112 ft
Point 45	93 ft	104 ft
Point 46	70 ft	95 ft
Point 47	14 ft	85 ft
Point 48	14 ft	72 ft
Point 49	62 ft	81 ft
Point 50	93 ft	93 ft
Point 51	141 ft	112 ft
Point 52	267 ft	146.81068 ft
Point 53	270.88889 ft	148 ft
Point 54	281 ft	152 ft
Point 55	266 ft	142 ft
Point 56	302 ft	156 ft
Point 57	322 ft	164 ft
Point 58	369 ft	174 ft
Point 59	413 ft	194 ft
Point 60	444 ft	216 ft
Point 61	513 ft	228 ft
Point 62	580 ft	250 ft
Point 63	580 ft	23 ft
Point 64	439.58071 ft	212.86373 ft
Point 65	580 ft	202 ft
Point 66	580 ft	162 ft

Regions

	Material	Points	Area
Region 1	Native silt soils	37,36,35,34,33,32,31,30,29,26,27,22,28,1,16,17,18,19,20,2,21,3,47,46,45,44,51,50,49,48,15,24,14,13,12,23,43,42,41,40,39,38,52,53,25	5,571.8 ft ²
Region 2	Native silt soils	6,5,10,4,8,9,63,66,7	50,368 ft ²
Region 3	Native silt soils	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft ²
Region 4	Medium dense	59,58,57,56,54,25,53,52,38,39,40,41,42,43,11,65,62,61,60,64	11,391 ft ²

	sandy soil		
Region 5	Medium dense sandy soil	44,45,46,47,48,49,50,51	1,295.5 ft ²

Slip Results

Slip Surfaces Analysed: 34760 of 35855 converged

Current Slip Surface

Slip Surface: 30,858

Factor of Safety: 1.7

Volume: 279.68942 ft³

Weight: 33,562.731 lbf

Resisting Moment: 1,370,532.6 lbf-ft

Activating Moment: 808,505.59 lbf-ft

Resisting Force: 23,856.078 lbf

Activating Force: 14,076.504 lbf

Slip Rank: 1 of 35,855 slip surfaces

Exit: (450.18723, 217.07604) ft

Entry: (406.50945, 191.04975) ft

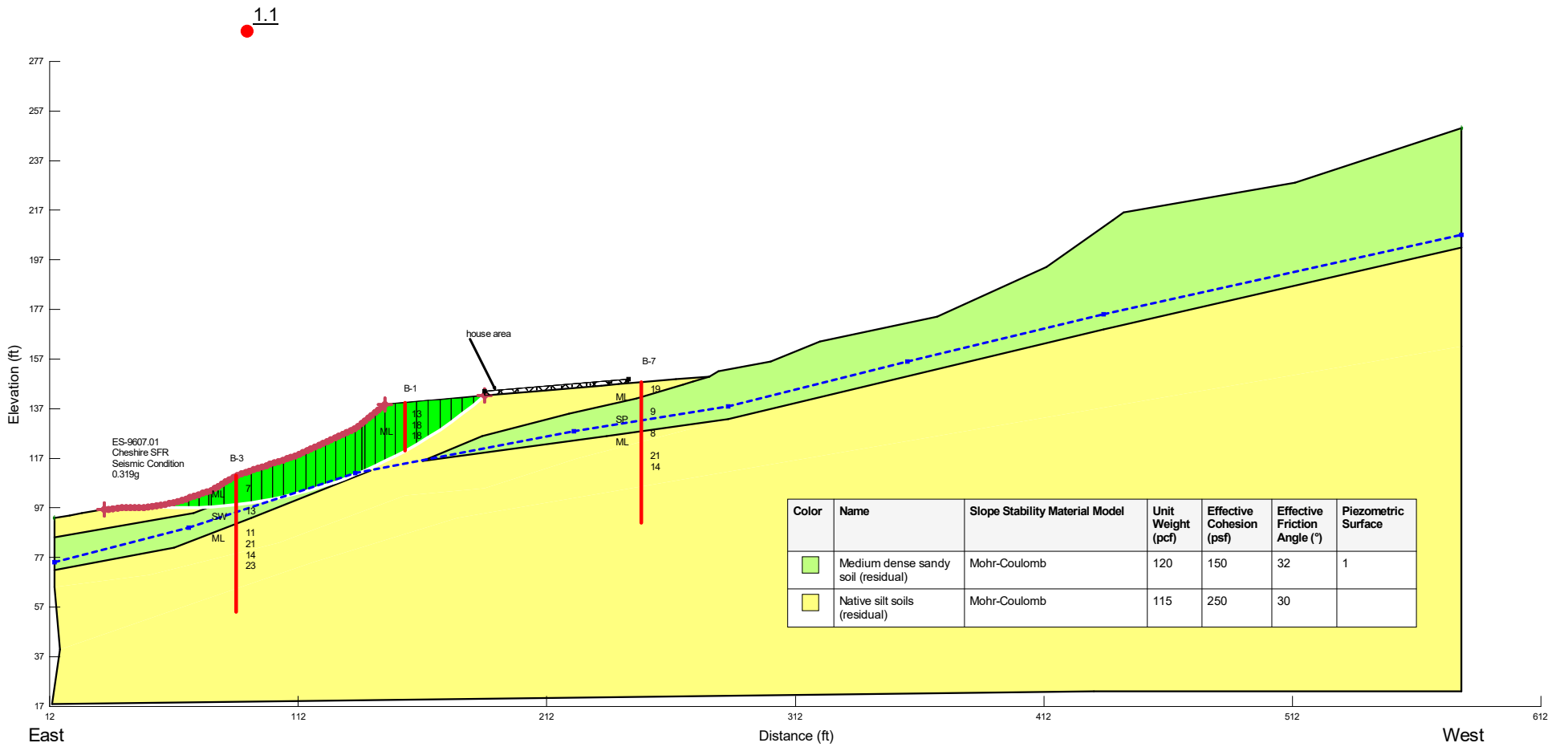
Radius: 48.352468 ft

Center: (407.29449, 239.39584) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Column Base Material
Column 1	449.41383 ft	215.70124 ft	-2,353.7525 psf	-1.2899824 psf	-0.87010414 psf	150 psf	0 psf	Medium dense sandy soil
Column 2	447.86702 ft	213.13170 ft	-2,214.8621 psf	173.06935 psf	116.73675 psf	150 psf	0 psf	Medium dense sandy soil
Column 3	446.32021 ft	210.87856 ft	-2,095.7149 psf	320.91634 psf	216.46081 psf	150 psf	0 psf	Medium dense sandy soil
Column 4	444.77340 ft	208.87057 ft	-1,991.8658 psf	451.3074 psf	304.41069 psf	150 psf	0 psf	Medium dense sandy soil
Column 5	443.26345 ft	207.10065 ft	-1,902.3608 psf	539.59551 psf	363.96177 psf	150 psf	0 psf	Medium dense sandy soil
Column 6	441.79035 ft	205.53006 ft	-1,824.7831 psf	589.12648 psf	397.37083 psf	150 psf	0 psf	Medium dense sandy soil
Column 7	440.31726 ft	204.09088 ft	-1,755.4047 psf	633.5774 psf	427.35335 psf	150 psf	0 psf	Medium dense sandy soil
Column 8	438.68553 ft	202.63747 ft	-1,687.3389 psf	678.02119 psf	457.33106 psf	150 psf	0 psf	Medium dense sandy soil
Column 9	436.89518 ft	201.17964 ft	-1,621.1963 psf	723.23213 psf	487.82623 psf	150 psf	0 psf	Medium dense sandy soil
Column 10	435.28125 ft	199.97598 ft	-1,569.2881 psf	761.22976 psf	513.45596 psf	150 psf	0 psf	Medium dense sandy soil
Column 11	433.84375 ft	198.99339 ft	-1,529.5477 psf	792.14591 psf	534.30916 psf	150 psf	0 psf	Medium dense sandy soil
Column 12	432.40625 ft	198.08418 ft	-1,494.3867 psf	820.30908 psf	553.30546 psf	150 psf	0 psf	Medium dense sandy soil
Column 13	430.96875 ft	197.24361 ft	-1,463.5081 psf	845.09178 psf	570.0216 psf	150 psf	0 psf	Medium dense sandy soil
Column 14	429.53125 ft	196.46762 ft	-1,436.6599 psf	865.59723 psf	583.8527 psf	150 psf	0 psf	Medium dense sandy soil
Column 15	428.09375 ft	195.75277 ft	-1,413.6266 psf	880.67444 psf	594.02241 psf	150 psf	0 psf	Medium dense sandy soil
Column 16	426.65625 ft	195.09609 ft	-1,394.2233 psf	888.94822 psf	599.60315 psf	150 psf	0 psf	Medium dense sandy soil
Column 17	425.21875 ft	194.49503 ft	-1,378.2905 psf	888.87187 psf	599.55165 psf	150 psf	0 psf	Medium dense sandy soil
Column 18	423.78125 ft	193.94738 ft	-1,365.6903 psf	878.80908 psf	592.76421 psf	150 psf	0 psf	Medium dense sandy soil
Column 19	422.34375 ft	193.45122 ft	-1,356.3033 psf	857.14851 psf	578.15397 psf	150 psf	0 psf	Medium dense sandy soil
Column 20	420.90625 ft	193.00490 ft	-1,350.0264 psf	822.44878 psf	554.74871 psf	150 psf	0 psf	Medium dense sandy soil
Column 21	419.46875 ft	192.60699 ft	-1,346.7704 psf	773.60423 psf	521.80264 psf	150 psf	0 psf	Medium dense sandy soil
Column 22	418.03125 ft	192.25627 ft	-1,346.4588 psf	710.01261 psf	478.90956 psf	150 psf	0 psf	Medium dense sandy soil

Column 23	416.59375 ft	191.95168 ft	-1,349.0261 psf	631.71839 psf	426.09943 psf	150 psf	0 psf	Medium dense sandy soil
Column 24	415.15625 ft	191.69235 ft	-1,354.4172 psf	539.50161 psf	363.89843 psf	150 psf	0 psf	Medium dense sandy soil
Column 25	413.71875 ft	191.47754 ft	-1,362.5863 psf	434.8863 psf	293.33451 psf	150 psf	0 psf	Medium dense sandy soil
Column 26	412.18868 ft	191.29862 ft	-1,374.3845 psf	337.61944 psf	227.72719 psf	150 psf	0 psf	Medium dense sandy soil
Column 27	410.56604 ft	191.16103 ft	-1,390.1511 psf	248.79033 psf	167.81119 psf	150 psf	0 psf	Medium dense sandy soil
Column 28	408.94340 ft	191.07832 ft	-1,409.3415 psf	152.5434 psf	102.89182 psf	150 psf	0 psf	Medium dense sandy soil
Column 29	407.32077 ft	191.05019 ft	-1,431.9382 psf	51.98783 psf	35.066234 psf	150 psf	0 psf	Medium dense sandy soil



K_s Calculations — East Slope

Equations:

$$K_s = r \times \alpha \times PGA_m$$

$$\alpha = 1 + 0.01H(0.5\beta - 1)$$

$$\beta = \frac{S_{m1}}{PGA_m}$$

Given Variables:

$$r = 0.5 \quad (\text{ductile system})$$

$$PGA_m = 0.685 \quad (\text{Site Class D})$$

$$H = 20 \text{ ft}$$

$$S_{m1} = 0.903^*$$

* Per ASCE Table 11.4-2
Linear Interpolation

Solve for β

$$\beta = \frac{0.903}{0.685} = 1.318$$

Solve for α

$$\alpha = 1 + 0.2(0.659 - 1)$$

$$\alpha = 1 + 0.2(-0.341)$$

$$\alpha = 1 + (-0.068)$$

$$\alpha = 0.932$$

Solve for K_s

$$K_s = 0.5 \times 0.932 \times 0.685$$

$$K_s = 0.319$$

Seismic

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File Information

File Version: 11.08
Product Version: 25.1.0.1058
Title: Cheshire SFR ES-9607.01
Created By: Scott Riegel
Last Edited By: Brian Snow
Revision Number: 112
Date: 08/06/2025
Time: 08:45:31 AM
File Name: BCS seismic east slope (residual) draft 7.29.25.gsz
Directory: C:\Users\Brian.snow\Desktop\Desktop Working\9607.02 - (SLOPE) Cheshire Property\
Last Solved Date: 08/06/2025
Last Solved Time: 08:45:31 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Seismic

Kind: SLOPE/W
Analysis Type: Limit Equilibrium
Settings
Method: Morgenstern-Price
Side Function Settings
Side Function: Half-Sine
PWP Conditions from: Piezometric Surfaces
Apply Phreatic Correction: No
Staged Rapid Drawdown Analysis: No
Unit Weight of Water: 62.4 pcf
Slip Surface
Slip Surface Settings
Search Method: Entry and Exit
Specify Radius Tangent Lines: No
Direction of Movement: Right to Left
Use Passive Mode: No
No. of Critical Slip Surfaces to Store: 1
Geometry Settings
Minimum Slip Surface Depth: 3 ft
Number of Columns: 30
Tension Crack Option: (none)
Optimization
Optimize Critical Slip Surface: No
Convergence
Factor of Safety Convergence Settings
Maximum Number of Iterations: 100
Tolerable Difference in F of S: 0.001
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Maximum Absolute Lambda: 2

Materials

Native silt soils (residual)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Medium dense sandy soil (residual)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 150 psf
Effective Friction Angle: 32 °

Phi-B: 0 °
Pore Water Pressure
Piezometric Surface: 1

Slip Surface Entry and Exit

Left Type: [Range](#)
Left-Zone Left Coordinate: (34, 96.25) ft
Left-Zone Right Coordinate: (147, 138.74483) ft
Left-Zone Increment: 70
Right Type: [Point](#)
Right Coordinate: (187, 142.19658) ft
Right-Zone Increment: 100
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (14, 93) ft
Right Coordinate: (580, 250) ft

Piezometric Surfaces

Piezometric Surface 1

Coordinates

	X	Y
Coordinate 1	14 ft	75 ft
Coordinate 2	68 ft	89 ft
Coordinate 3	135 ft	111 ft
Coordinate 4	223 ft	128 ft
Coordinate 5	285 ft	138 ft
Coordinate 6	357 ft	156 ft
Coordinate 7	436 ft	175 ft
Coordinate 8	580 ft	207 ft

Seismic Coefficients

Horz Seismic Coef.: 0.319

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 125 pcf
Direction: [Vertical](#)

Coordinates

	X	Y
	187 ft	144 ft
	245 ft	149 ft

Geometry

Name: [Seismic](#)

Settings

View: [2D](#)
Element Thickness: 1 ft

Points

	X	Y
Point 1	87 ft	110 ft
Point 2	25 ft	95 ft
Point 3	14 ft	93 ft
Point 4	16 ft	40 ft
Point 5	118 ft	75 ft
Point 6	176 ft	93 ft
Point 7	433 ft	137 ft
Point 8	13 ft	18 ft
Point 9	432 ft	23 ft

Point 10	71 ft	59 ft
Point 11	436 ft	169 ft
Point 12	187 ft	105 ft
Point 13	155.05084 ft	101.94916 ft
Point 14	104 ft	83 ft
Point 15	14 ft	65 ft
Point 16	77 ft	104 ft
Point 17	62 ft	99 ft
Point 18	50 ft	97 ft
Point 19	40 ft	97 ft
Point 20	32 ft	96 ft
Point 21	20 ft	94 ft
Point 22	111 ft	118 ft
Point 23	224 ft	117 ft
Point 24	52 ft	70 ft
Point 25	277.42857 ft	150 ft
Point 26	147 ft	138.74483 ft
Point 27	135 ft	128.89655 ft
Point 28	106 ft	116.33333 ft
Point 29	155 ft	139.43518 ft
Point 30	169 ft	140.64329 ft
Point 31	190 ft	142.45546 ft
Point 32	211 ft	144.26763 ft
Point 33	225 ft	145.47574 ft
Point 34	234 ft	146.25238 ft
Point 35	241 ft	146.85644 ft
Point 36	250 ft	147.63308 ft
Point 37	264 ft	148.8412 ft
Point 38	248 ft	141 ft
Point 39	221 ft	135 ft
Point 40	186 ft	126 ft
Point 41	162 ft	116 ft
Point 42	236 ft	126 ft
Point 43	285 ft	132.74194 ft
Point 44	123 ft	112 ft
Point 45	93 ft	104 ft
Point 46	70 ft	95 ft
Point 47	14 ft	85 ft
Point 48	14 ft	72 ft
Point 49	62 ft	81 ft
Point 50	93 ft	93 ft
Point 51	141 ft	112 ft
Point 52	267 ft	146.81068 ft
Point 53	270.88889 ft	148 ft
Point 54	281 ft	152 ft
Point 55	266 ft	142 ft
Point 56	302 ft	156 ft
Point 57	322 ft	164 ft
Point 58	369 ft	174 ft
Point 59	413 ft	194 ft
Point 60	444 ft	216 ft
Point 61	513 ft	228 ft
Point 62	580 ft	250 ft
Point 63	580 ft	23 ft
Point 64	439.58071 ft	212.86373 ft
Point 65	580 ft	202 ft
Point 66	580 ft	162 ft

Regions

	Material	Points	Area
Region 1	Native silt soils (residual)	37,36,35,34,33,32,31,30,29,26,27,22,28,1,16,17,18,19,20,2,21,3,47,46,45,44,51,50,49,48,15,24,14,13,12,23,43,42,41,40,39,38,52,53,25	5,571.8 ft ²
Region 2	Native silt soils (residual)	6,5,10,4,8,9,63,66,7	50,368 ft ²
Region 3	Native silt soils (residual)	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft ²
Region 4	Medium dense	59,58,57,56,54,25,53,52,38,39,40,41,42,43,11,65,62,61,60,64	11,391 ft ²

	sandy soil (residual)		
Region 5	Medium dense sandy soil (residual)	44,45,46,47,48,49,50,51	1,295.5 ft ²

Slip Results

Slip Surfaces Analysed: 342 of 355 converged

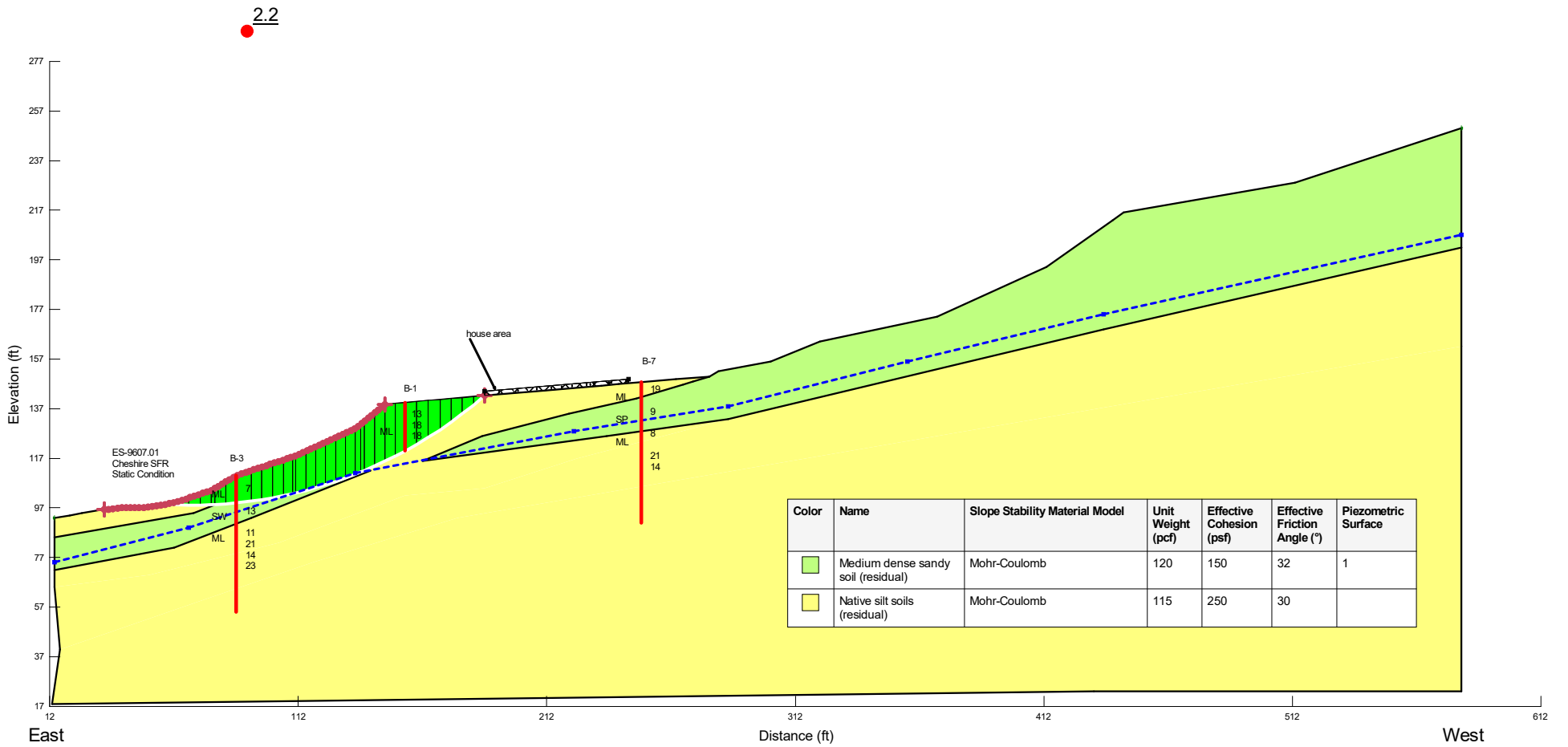
Current Slip Surface

Slip Surface: 57
 Factor of Safety: 1.1
 Volume: 1,665.3195 ft³
 Weight: 192,846.64 lbf
 Resisting Moment: 24,070,334 lbf-ft
 Activating Moment: 22,034,923 lbf-ft
 Resisting Force: 121,609.51 lbf
 Activating Force: 111,389.01 lbf
 Slip Rank: 1 of 355 slip surfaces
 Exit: (187, 142.19658) ft
 Entry: (53.216355, 97.536059) ft
 Radius: 184.96363 ft
 Center: (65.963667, 282.05991) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Column Base Material
Column 1	184.75000 ft	140.31107 ft	0 psf	10.654844 psf	6.1515772 psf	250 psf	0 psf	Native silt soils (residual)
Column 2	180.25000 ft	136.65706 ft	0 psf	281.72348 psf	162.65313 psf	250 psf	0 psf	Native silt soils (residual)
Column 3	175.75000 ft	133.22883 ft	0 psf	519.21134 psf	299.76681 psf	250 psf	0 psf	Native silt soils (residual)
Column 4	171.25000 ft	130.01109 ft	0 psf	730.28042 psf	421.62759 psf	250 psf	0 psf	Native silt soils (residual)
Column 5	166.66667 ft	126.93831 ft	0 psf	924.50571 psf	533.76362 psf	250 psf	0 psf	Native silt soils (residual)
Column 6	162.00000 ft	124.00576 ft	0 psf	1,107.308 psf	639.30458 psf	250 psf	0 psf	Native silt soils (residual)
Column 7	157.33333 ft	121.26213 ft	0 psf	1,280.627 psf	739.37037 psf	250 psf	0 psf	Native silt soils (residual)
Column 8	153.00000 ft	118.86958 ft	0 psf	1,438.1698 psf	830.32775 psf	250 psf	0 psf	Native silt soils (residual)
Column 9	149.00000 ft	116.79799 ft	0 psf	1,583.4977 psf	914.23285 psf	250 psf	0 psf	Native silt soils (residual)
Column 10	144.92603 ft	114.81389 ft	0 psf	1,619.5415 psf	935.0427 psf	250 psf	0 psf	Native silt soils (residual)
Column 11	140.77808 ft	112.91735 ft	0 psf	1,544.5673 psf	891.75633 psf	250 psf	0 psf	Native silt soils (residual)
Column 12	138.08650 ft	111.73847 ft	-8.8743007 psf	1,491.6608 psf	932.09313 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 13	136.23445 ft	110.96993 ft	16.757189 psf	1,456.6886 psf	899.76899 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 14	133.00000 ft	109.68511 ft	41.069831 psf	1,453.0232 psf	882.28641 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 15	129.00000 ft	108.18225 ft	52.890257 psf	1,496.6248 psf	902.14547 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 16	125.00000 ft	106.78355 ft	58.211084 psf	1,540.7204 psf	926.37466 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 17	121.00000 ft	105.48653 ft	57.186868 psf	1,581.7699 psf	952.66524 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 18	117.00000 ft	104.28897 ft	49.956579 psf	1,617.1507 psf	979.29157 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 19	113.00000 ft	103.18886 ft	36.644942 psf	1,645.488 psf	1,005.3167 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 20	108.50000 ft	102.07211 ft	14.126967 psf	1,692.8448 psf	1,048.9793 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 21	103.83333 ft	101.02805 ft	-16.341424 psf	1,744.2683 psf	1,089.9398 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 22	99.50000 ft	100.17532 ft	-51.918774 psf	1,762.4367 psf	1,101.2927 psf	150 psf	0 psf	Medium dense sandy soil (residual)

Column 23	95.16667 ft	99.42937 ft	-94.159564 psf	1,751.2363 psf	1,094.2939 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 24	90.00000 ft	98.68967 ft	-153.86515 psf	1,690.0762 psf	1,056.0768 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 25	84.50000 ft	98.04459 ft	-226.30507 psf	1,493.616 psf	933.31486 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 26	79.50000 ft	97.60929 ft	-301.59013 psf	1,176.7713 psf	735.32833 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 27	76.53109 ft	97.39899 ft	-349.29889 psf	985.109 psf	615.56442 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 28	74.04664 ft	97.28399 ft	0 psf	899.18885 psf	519.14692 psf	250 psf	0 psf	Native silt soils (residual)
Column 29	70.01555 ft	97.15165 ft	0 psf	717.45918 psf	414.22525 psf	250 psf	0 psf	Native silt soils (residual)
Column 30	65.00000 ft	97.12312 ft	0 psf	469.13464 psf	270.85501 psf	250 psf	0 psf	Native silt soils (residual)
Column 31	59.80409 ft	97.21192 ft	0 psf	242.2543 psf	139.86559 psf	250 psf	0 psf	Native silt soils (residual)
Column 32	55.41227 ft	97.41058 ft	0 psf	92.34674 psf	53.316415 psf	250 psf	0 psf	Native silt soils (residual)



Static

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File Information

File Version: 11.08
Product Version: 25.1.0.1058
Title: Cheshire SFR ES-9607.01
Created By: Scott Riegel
Last Edited By: Brian Snow
Revision Number: 112
Date: 08/06/2025
Time: 08:45:31 AM
File Name: BCS seismic east slope (residual) draft 7.29.25.gsz
Directory: C:\Users\Brian.snow\Desktop\Desktop Working\9607.02 - (SLOPE) Cheshire Property\
Last Solved Date: 08/06/2025
Last Solved Time: 08:45:31 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Static

Kind: SLOPE/W
Analysis Type: Limit Equilibrium
Settings
Method: Morgenstern-Price
Side Function Settings
Side Function: Half-Sine
PWP Conditions from: Piezometric Surfaces
Apply Phreatic Correction: No
Staged Rapid Drawdown Analysis: No
Unit Weight of Water: 62.4 pcf
Slip Surface
Slip Surface Settings
Search Method: Entry and Exit
Specify Radius Tangent Lines: No
Direction of Movement: Right to Left
Use Passive Mode: No
No. of Critical Slip Surfaces to Store: 1
Geometry Settings
Minimum Slip Surface Depth: 3 ft
Number of Columns: 30
Tension Crack Option: (none)
Optimization
Optimize Critical Slip Surface: No
Convergence
Factor of Safety Convergence Settings
Maximum Number of Iterations: 100
Tolerable Difference in F of S: 0.001
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Maximum Absolute Lambda: 2

Materials

Native silt soils (residual)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Medium dense sandy soil (residual)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 150 psf
Effective Friction Angle: 32 °

Phi-B: 0 °
Pore Water Pressure
Piezometric Surface: 1

Slip Surface Entry and Exit

Left Type: [Range](#)
Left-Zone Left Coordinate: (34, 96.25) ft
Left-Zone Right Coordinate: (147, 138.74483) ft
Left-Zone Increment: 70
Right Type: [Point](#)
Right Coordinate: (187, 142.19658) ft
Right-Zone Increment: 100
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (14, 93) ft
Right Coordinate: (580, 250) ft

Piezometric Surfaces

Piezometric Surface 1

Coordinates

	X	Y
Coordinate 1	14 ft	75 ft
Coordinate 2	68 ft	89 ft
Coordinate 3	135 ft	111 ft
Coordinate 4	223 ft	128 ft
Coordinate 5	285 ft	138 ft
Coordinate 6	357 ft	156 ft
Coordinate 7	436 ft	175 ft
Coordinate 8	580 ft	207 ft

Seismic Coefficients

Horz Seismic Coef.: 0

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 125 pcf
Direction: [Vertical](#)

Coordinates

	X	Y
	187 ft	144 ft
	245 ft	149 ft

Geometry

Name: [Static](#)

Settings

View: [2D](#)
Element Thickness: 1 ft

Points

	X	Y
Point 1	87 ft	110 ft
Point 2	25 ft	95 ft
Point 3	14 ft	93 ft
Point 4	16 ft	40 ft
Point 5	118 ft	75 ft
Point 6	176 ft	93 ft
Point 7	433 ft	137 ft
Point 8	13 ft	18 ft
Point 9	432 ft	23 ft

Point 10	71 ft	59 ft
Point 11	436 ft	169 ft
Point 12	187 ft	105 ft
Point 13	155.05084 ft	101.94916 ft
Point 14	104 ft	83 ft
Point 15	14 ft	65 ft
Point 16	77 ft	104 ft
Point 17	62 ft	99 ft
Point 18	50 ft	97 ft
Point 19	40 ft	97 ft
Point 20	32 ft	96 ft
Point 21	20 ft	94 ft
Point 22	111 ft	118 ft
Point 23	224 ft	117 ft
Point 24	52 ft	70 ft
Point 25	277.42857 ft	150 ft
Point 26	147 ft	138.74483 ft
Point 27	135 ft	128.89655 ft
Point 28	106 ft	116.33333 ft
Point 29	155 ft	139.43518 ft
Point 30	169 ft	140.64329 ft
Point 31	190 ft	142.45546 ft
Point 32	211 ft	144.26763 ft
Point 33	225 ft	145.47574 ft
Point 34	234 ft	146.25238 ft
Point 35	241 ft	146.85644 ft
Point 36	250 ft	147.63308 ft
Point 37	264 ft	148.8412 ft
Point 38	248 ft	141 ft
Point 39	221 ft	135 ft
Point 40	186 ft	126 ft
Point 41	162 ft	116 ft
Point 42	236 ft	126 ft
Point 43	285 ft	132.74194 ft
Point 44	123 ft	112 ft
Point 45	93 ft	104 ft
Point 46	70 ft	95 ft
Point 47	14 ft	85 ft
Point 48	14 ft	72 ft
Point 49	62 ft	81 ft
Point 50	93 ft	93 ft
Point 51	141 ft	112 ft
Point 52	267 ft	146.81068 ft
Point 53	270.88889 ft	148 ft
Point 54	281 ft	152 ft
Point 55	266 ft	142 ft
Point 56	302 ft	156 ft
Point 57	322 ft	164 ft
Point 58	369 ft	174 ft
Point 59	413 ft	194 ft
Point 60	444 ft	216 ft
Point 61	513 ft	228 ft
Point 62	580 ft	250 ft
Point 63	580 ft	23 ft
Point 64	439.58071 ft	212.86373 ft
Point 65	580 ft	202 ft
Point 66	580 ft	162 ft

Regions

	Material	Points	Area
Region 1	Native silt soils (residual)	37,36,35,34,33,32,31,30,29,26,27,22,28,1,16,17,18,19,20,2,21,3,47,46,45,44,51,50,49,48,15,24,14,13,12,23,43,42,41,40,39,38,52,53,25	5,571.8 ft ²
Region 2	Native silt soils (residual)	6,5,10,4,8,9,63,66,7	50,368 ft ²
Region 3	Native silt soils (residual)	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft ²
Region 4	Medium dense	59,58,57,56,54,25,53,52,38,39,40,41,42,43,11,65,62,61,60,64	11,391 ft ²

	sandy soil (residual)		
Region 5	Medium dense sandy soil (residual)	44,45,46,47,48,49,50,51	1,295.5 ft ²

Slip Results

Slip Surfaces Analysed: 348 of 355 converged

Current Slip Surface

Slip Surface: 72
 Factor of Safety: 2.2
 Volume: 1,619.7132 ft³
 Weight: 187,478.66 lbf
 Resisting Moment: 24,462,370 lbf-ft
 Activating Moment: 11,267,842 lbf-ft
 Resisting Force: 126,683.51 lbf
 Activating Force: 58,353.86 lbf
 Slip Rank: 1 of 355 slip surfaces
 Exit: (187, 142.19658) ft
 Entry: (58.410369, 98.401728) ft
 Radius: 179.20376 ft
 Center: (69.241628, 277.27786) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Column Base Material
Column 1	184.75000 ft	140.29925 ft	0 psf	82.679031 psf	47.734761 psf	250 psf	0 psf	Native silt soils (residual)
Column 2	180.25000 ft	136.62612 ft	0 psf	394.53773 psf	227.78647 psf	250 psf	0 psf	Native silt soils (residual)
Column 3	175.75000 ft	133.18718 ft	0 psf	679.12234 psf	392.09147 psf	250 psf	0 psf	Native silt soils (residual)
Column 4	171.25000 ft	129.96598 ft	0 psf	941.98736 psf	543.85665 psf	250 psf	0 psf	Native silt soils (residual)
Column 5	166.66667 ft	126.89628 ft	0 psf	1,192.0534 psf	688.23236 psf	250 psf	0 psf	Native silt soils (residual)
Column 6	162.00000 ft	123.97283 ft	0 psf	1,432.8793 psf	827.27325 psf	250 psf	0 psf	Native silt soils (residual)
Column 7	157.33333 ft	121.24370 ft	0 psf	1,662.9672 psf	960.11456 psf	250 psf	0 psf	Native silt soils (residual)
Column 8	153.00000 ft	118.86888 ft	0 psf	1,869.807 psf	1,079.5336 psf	250 psf	0 psf	Native silt soils (residual)
Column 9	149.00000 ft	116.81727 ft	0 psf	2,055.3375 psf	1,186.6497 psf	250 psf	0 psf	Native silt soils (residual)
Column 10	144.87589 ft	114.83416 ft	0 psf	2,091.4074 psf	1,207.4746 psf	250 psf	0 psf	Native silt soils (residual)
Column 11	140.62767 ft	112.92259 ft	0 psf	1,972.8438 psf	1,139.0219 psf	250 psf	0 psf	Native silt soils (residual)
Column 12	137.77138 ft	111.69697 ft	-10.083066 psf	1,889.2029 psf	1,180.505 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 13	136.01960 ft	110.98450 ft	13.258102 psf	1,836.2842 psf	1,139.1531 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 14	133.00000 ft	109.81360 ft	33.051985 psf	1,811.9817 psf	1,111.5986 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 15	129.00000 ft	108.34467 ft	42.755372 psf	1,821.5654 psf	1,111.5238 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 16	125.00000 ft	106.98235 ft	45.806047 psf	1,820.467 psf	1,108.9313 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 17	121.00000 ft	105.72410 ft	42.36261 psf	1,805.2985 psf	1,101.6046 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 18	117.00000 ft	104.56764 ft	32.567087 psf	1,774.8695 psf	1,088.7114 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 19	113.00000 ft	103.51095 ft	16.546382 psf	1,730.433 psf	1,070.9552 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 20	110.39352 ft	102.86421 ft	3.4973464 psf	1,702.7736 psf	1,061.8256 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 21	107.89352 ft	102.30284 ft	-12.696856 psf	1,692.6942 psf	1,057.7127 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 22	103.83333 ft	101.45828 ft	-43.187755 psf	1,664.7609 psf	1,040.2581 psf	150 psf	0 psf	Medium dense sandy soil (residual)

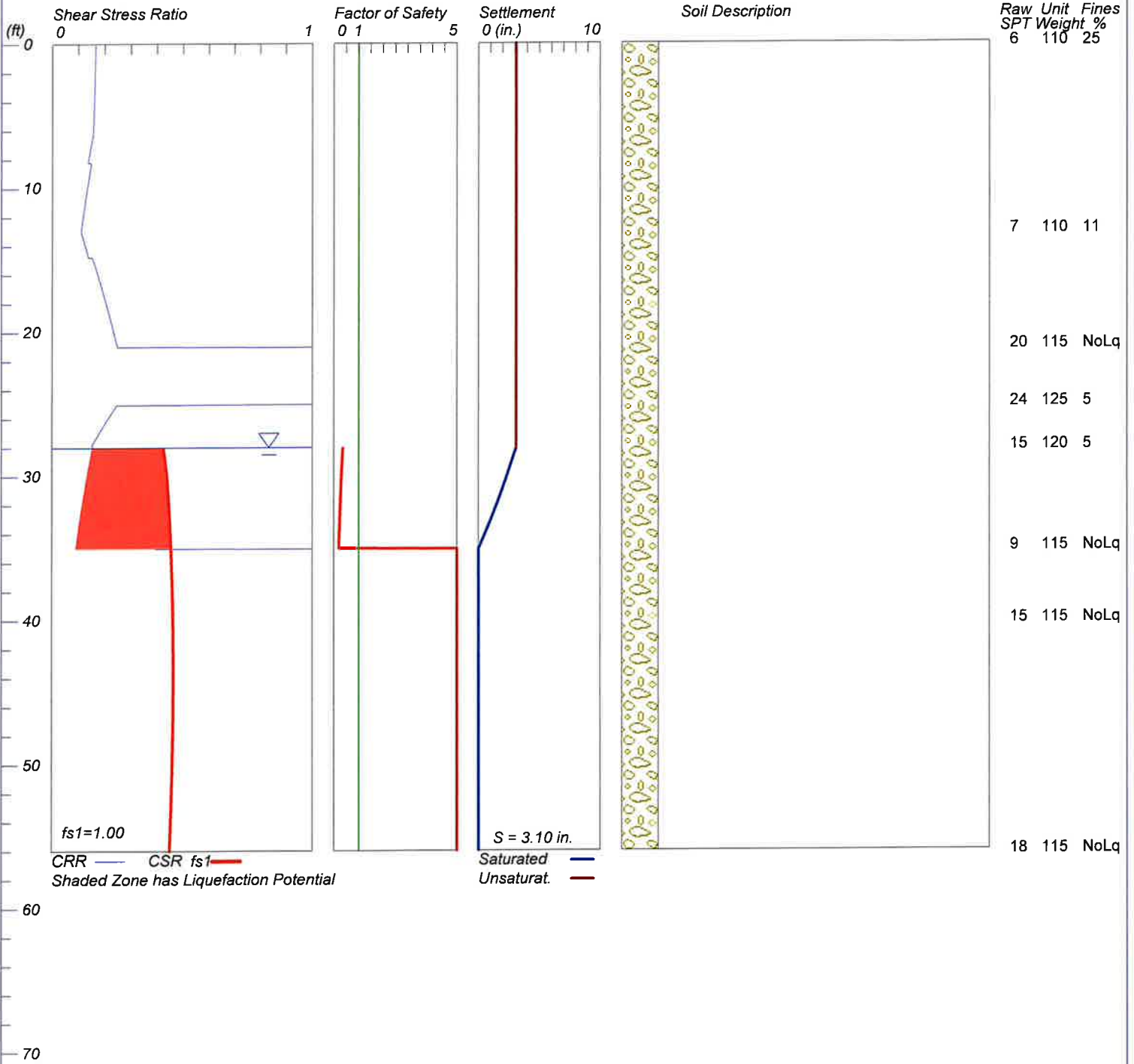
Column 23	99.50000 ft	100.66080 ft	-82.213105 psf	1,616.7545 psf	1,010.2603 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 24	95.16667 ft	99.97280 ft	-128.06989 psf	1,548.6 psf	967.67271 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 25	90.00000 ft	99.30608 ft	-192.32928 psf	1,436.7658 psf	897.79089 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 26	84.86568 ft	98.76936 ft	-264.03766 psf	1,232.1375 psf	769.92496 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 27	80.59704 ft	98.44702 ft	-331.38662 psf	961.09357 psf	600.55792 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 28	77.73136 ft	98.27681 ft	0 psf	774.86767 psf	447.37006 psf	250 psf	0 psf	Native silt soils (residual)
Column 29	74.75000 ft	98.17293 ft	0 psf	641.56079 psf	370.40529 psf	250 psf	0 psf	Native silt soils (residual)
Column 30	70.25000 ft	98.09107 ft	0 psf	464.04941 psf	267.91905 psf	250 psf	0 psf	Native silt soils (residual)
Column 31	65.00000 ft	98.14944 ft	0 psf	238.27651 psf	137.56901 psf	250 psf	0 psf	Native silt soils (residual)
Column 32	60.20518 ft	98.31110 ft	0 psf	56.105442 psf	32.392492 psf	250 psf	0 psf	Native silt soils (residual)

LIQUEFACTION ANALYSIS

7615 E. Mercer Way

Hole No.=B-6 Water Depth=28 ft

Magnitude=7
Acceleration=0.7g



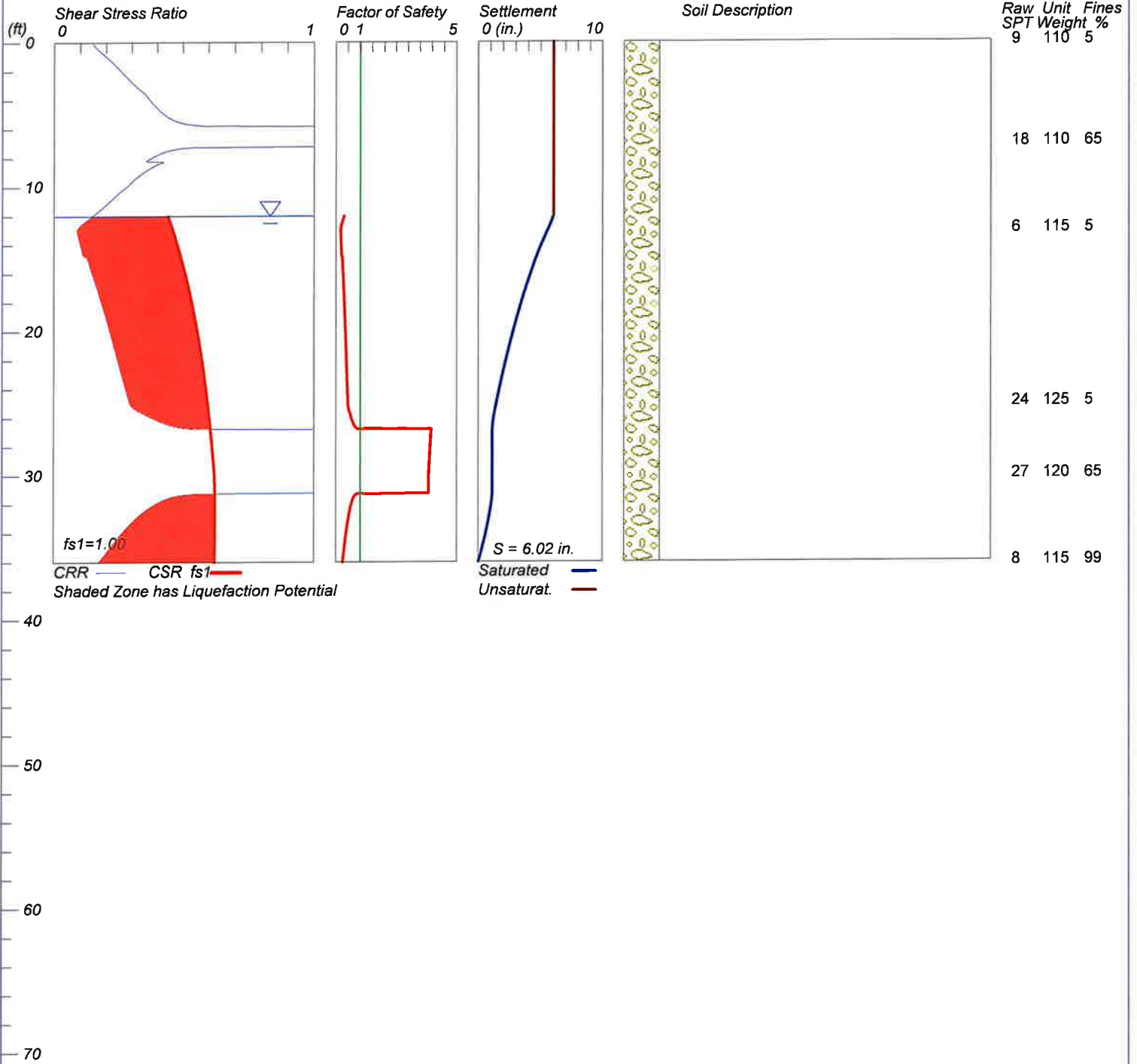
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LIQUEFACTION ANALYSIS

7615 E. Mercer Way

Hole No.=B-7 Water Depth=12 ft

Magnitude=7
Acceleration=0.7g



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