EARTH SOLUTIONS NW

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

esnw.com info@esnw.com

August 8, 2025
ES-9607.02

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

Subject: Response to Building Permit Review Comments
Cheshire Property
7615 East Mercer Way
Mercer Island, Washington

City File No. 2503-130

Dear Derek and Eileen:

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

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), 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 remain relatively stable 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.

Review Comment

A maximum design earthquake acceleration of 0.35g was used in stability analyses as noted on page 6 of the geotechnical report. Please have the geotechnical engineer of record revise all analyses and design recommendations to include a peak ground acceleration associated with a 2% probability of exceedance in 50 years earthquake as required by IBC. Please clearly show what seismic coefficient was used in the stability analyses.

ESNW Response

The value used in the slope stability analysis is equal to one-half the site modified peak ground acceleration, along with a slope reduction that is shown via calculation in the referenced Land Use response dated August 5, 2025.

Review Comment

Unless otherwise determined, it should be assumed that the residence may be impacted by a future landslide since a landslide reached the garage in 1997.

In an email dated 5/5/2025 from PLUS, the source of this information cited 7615 West Mercer Way as the location of the slide. However, there is no such address on Mercer Island. Since the onsite subsurface explorations document the presence of landslide debris at the site, in the vicinity of the structure, an error in address given in the citation is likely.

Please have the geotechnical engineer of record provide mitigation recommendations for potential future slope instabilities. Please consider all types of landslide failures.

ESNW Response

There are numerous addresses on Mercer Island underlain by ancient landslide deposits and anecdotal information acquired by the design team suggest that the 1997 slide event occurred on a different site.

In any case, the referenced Land Use response provides mitigation that will protect the residence from landslide and debris flow failures.

Review Comment

Please have the geotechnical engineer of record review the soil strength values assigned under seismic loading conditions and provide supporting information for their use. An increase in cohesion while maintaining the same effective friction angle would result in a higher factor of safety against slope instability under seismic loading which would not be expected. Please revise soil strengths and slope stability analyses. Please include revised analyses in a design memo or revised geotechnical report for review.

ESNW Response

Updated slope stability modeling parameters are attached.

Review Comment

Please have the geotechnical engineer of record provide a scaled site plan with elevation contours showing the boring locations in the geotechnical report. Please include in a design memo or revised geotechnical report.

ESNW Response

Attached on Plate 2.

Review Comment

Please have the geotechnical engineer of record show on the slope stability cross-sections, the locations and subsurface information (SPT, soil type and groundwater condition) of the borings used to generate the stratigraphy shown on the sections. Please provide discussion on the stratigraphic changes from one section to another and how the groundwater level was determined across the sections.

ESNW Response

Updated slope stability modeling parameters are attached.

Review Comment

Please have the geotechnical engineer of record assess the potential for liquefaction at the site and estimate post-liquefaction settlement, lateral spreading or flow failures as required by IBC using a peak ground acceleration associated with a 2% probability of exceedance in 50 years earthquake. Please include liquefaction assessment calculations, any post-liquefaction settlement calculations, residual strength determinations and associated stability analyses and/or lateral deformation calculations for review.

ESNW Response

Liquefaction modeling results are attached. The results of slope stability analyses and soil conditions described in the boring logs suggest that lateral spread is a highly unlikely probability of occurrence. The updated foundation support system will further protect the structure from collapse.

Review Comment

Please have the geotechnical engineer of record provide a slope stability assessment of the entire site (including the slope west of the residence) under static and seismic loading conditions. Please include the computer printout of all the results of the slope stability analyses. Appendix B of the geotechnical report did not include this information in the submitted report.

ESNW Response

Updated slope stability modeling parameters are attached.

Review Comment

It is the opinion of the reviewer that the submitted geotechnical report (Earth Solutions NW, LLC, November 1, 2024) has not comprehensively assessed or provided design recommendations to effectively mitigate the risks of the geologic hazards at the site. The entire site should be assessed, including the steep slope to the west of the proposed residential structure. Please have the geotechnical engineer of record provide surface and subsurface information for the slope located to the west of the proposed structure.

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 search parameters were chosen to evaluate the entire slope area within the cross-section. The critical failure surface minimum factor of safety maintains the minimum acceptable value, suggesting the site remains stable. 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 help protect the residence from debris flow failure, although modeling suggests this occurrence is extremely unlikely.

Review Comment

The statement of risk on page 5 of the geotechnical report indicates: “The development is so minor as not to pose a threat to the public health, safety and welfare.” The reviewer does not agree with this statement of risk when the potential impact of failure of the steep slope to the west and potential post-seismic impacts to the property and structure are considered. Please consider an alternate statement of risk available in MICC 19.07.160.B.3.

ESNW Response

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.

Review Comment

On page 14 of the geotechnical report, an interceptor drain was recommended by Earth Solutions NW to “improve site conditions related to stability...”. Please indicate where the interceptor drain is located along with specific design details such as depth, pipe diameter, construction recommendations, etc.

ESNW Response

Sheet A1.0 of the referenced architectural plans shows the retaining wall off the west side of the residence that has been designed as an interceptor drain and catchment wall. Design specifications are provided in the referenced civil plans.

Review Comment

The proposed foundation design as discussed on page 7 of the geotechnical report, involves the use of shallow foundations “bearing on undisturbed competent native soil, recompacted native soil, or new structural fill.” The recommendation goes on to indicate “Based on conditions observed during the fieldwork, we recommend new foundations be supported on a structural fill mat consisting of at least two feet of crushed rock structural fill placed on a woven geotextile (Mirafi 500X or approved alternative) that is underlain by a firm subgrade.” It is the opinion of the reviewer that the reported site conditions do not warrant the use of shallow foundations for support of the proposed structure. On page 3 of the report, “Native soils observed at the exploration sites chiefly consisted of loose to medium dense colluvial and ancient landslide deposits that were characterized as sand (USCS: SM, SP-SM and SP) and silt (USCS: ML) … The upper soils were described as colluvium due to chaotic texture and the presence of organic debris.” Reviewing logs for borings B-6 and B7, the thickness of what would be considered unsuitable soils for support of shallow foundations extends at least 25 feet below existing grade. Floating shallow foundations on landslide debris is not considered in conformance with the local geotechnical engineering standard of practice. Due to the “chaotic texture and presence of organic debris” it is unrealistic to accurately estimate foundation settlements over the lifespan of the structure. In addition, the presence of potentially liquefiable soils could result in post-earthquake differential ground surface settlement and/or lateral spreading or debris flow failure. These post-earthquake effects could significantly impact the structural integrity of the proposed structure. The associated life safety issue would require mitigation recommendations before a building permit could be approved. Since the City of Mercer Island's geotechnical peer reviewer’s opinion on the appropriate foundation design for the structure differs 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) to start this process, if needed.

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.

Review Comment

Please coordinate with the geotechnical engineer of record to design wall for slope surcharge loading. Please have the geotechnical engineer present their design recommendations for review in a design memo or revised geotechnical report. Please include seismic loading in the design of the wall. Please provide revised structural calculations showing inclusion of these surcharge loadings in the design of the walls for review.

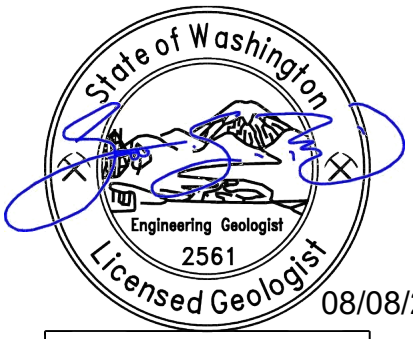
ESNW Response

The referenced structural plans include updated slope surcharge loading values provided by ESNW during the recent design coordination.

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

Sincerely,

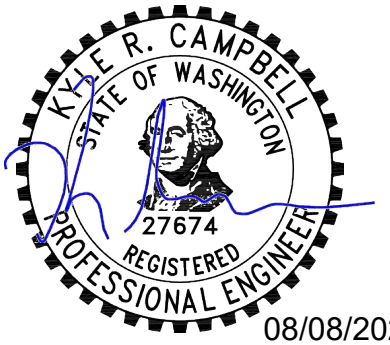
EARTH SOLUTIONS NW, LLC



08/08/2025

Scott S. Riegel

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



08/08/2025

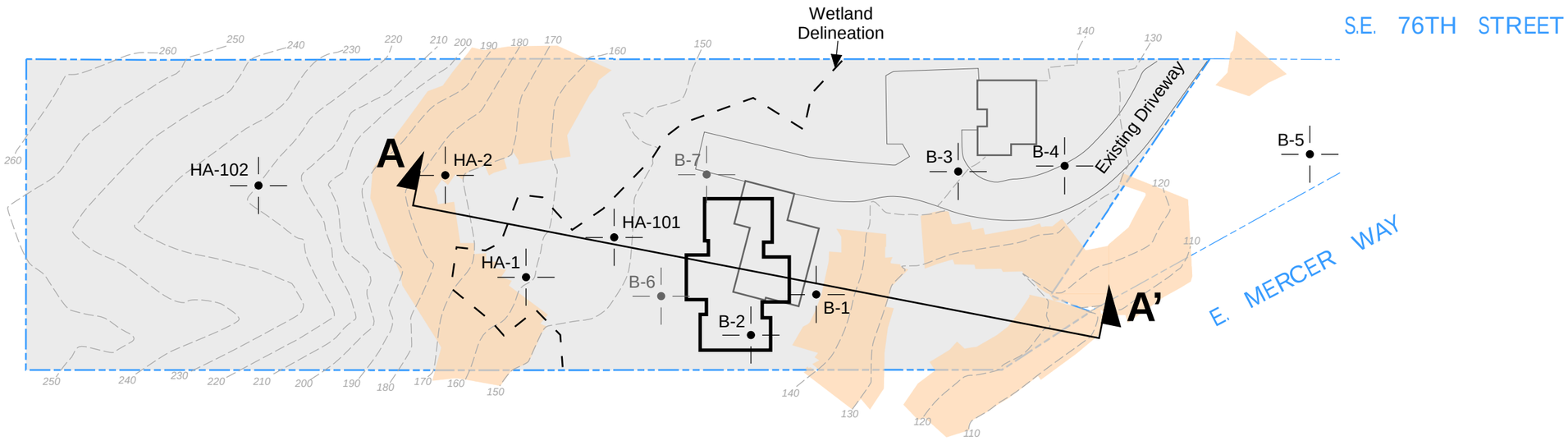
Kyle R. Campbell, P.E.
Senior Principal Engineer

Attachments: Plate 2 – Subsurface Exploration Plan
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 August 8, 2025
- Building Permit Review Matrix, prepared by City of Mercer Island
- 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
- Response to Land Use Review Comments Letter, prepared by ESNW, ES-9607.02, dated August 8, 2025
- Structural Plans, prepared by Merrell Design Services, PLLC, dated August 4, 2025



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

NORTH

1"=60'

0 30 60 120

Scale in Feet

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.

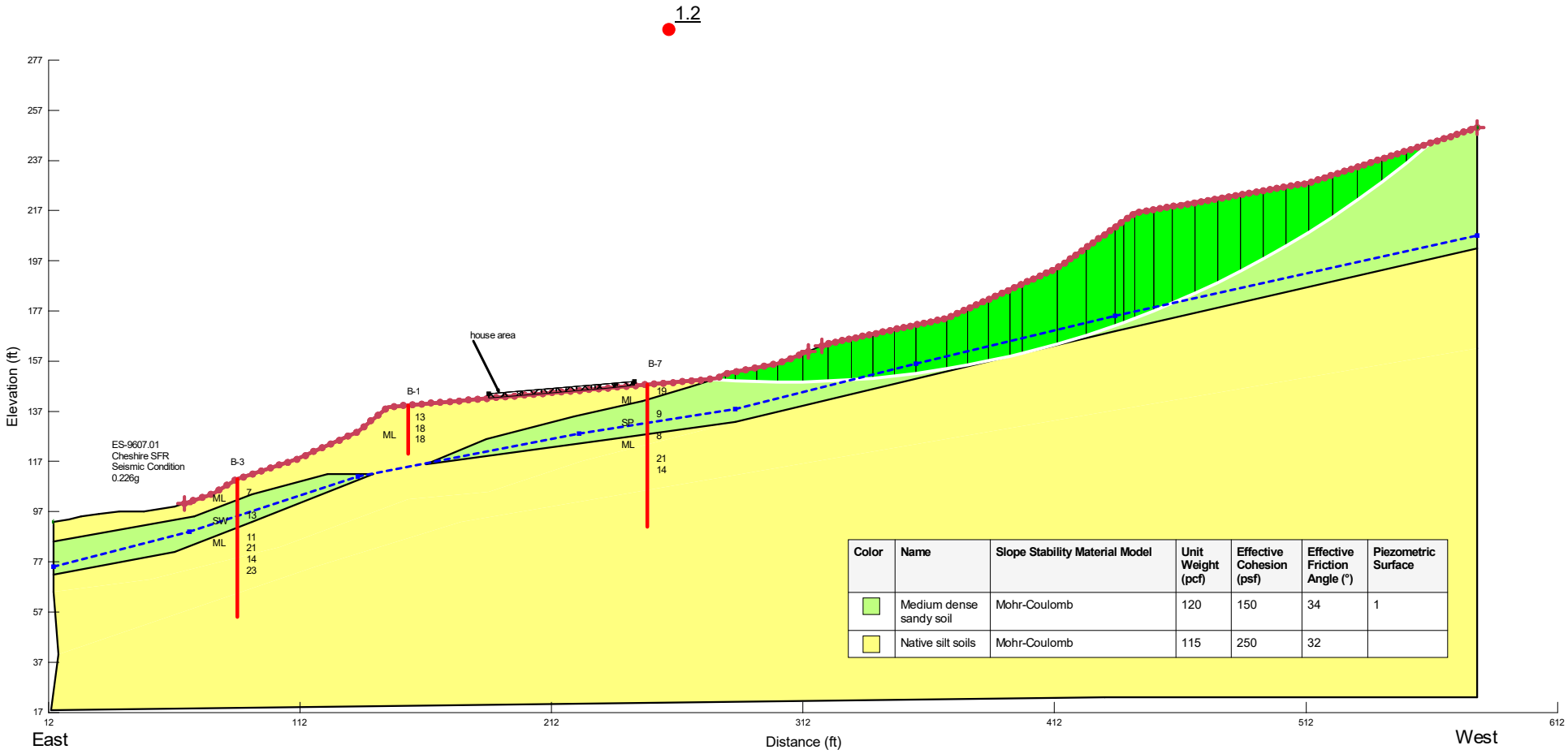
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Subsurface Exploration Plan
Cheshire Property
Mercer Island, Washington

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

EARTH SOLUTIONS NW
REDMOND • PASCO • SILVERDALE

Drawn	CAM
Checked	SSR
Date	06/11/2025
Proj. No.	9607.02
Plate	2


1.2
277
257
237
217
197
177
157
137
117
97
77
57
37
17
Elevation (ft)
ES-9607.01
Cheshire SFR
Seismic Condition
0.226g
B-3
B-1
B-7
house area
ML
SW
ML
ML
ML
SP
ML
7
13
11
21
14
23
13
18
18
19
9
8
21
14
12
112
212
312
412
512
612
East
Distance (ft)
West
Color
Name
Slope Stability Material Model
Unit Weight (pcf)
Effective Cohesion (psf)
Effective Friction Angle (°)
Piezometric Surface
Medium dense sandy soil
Mohr-Coulomb
120
150
34
1
Native silt soils
Mohr-Coulomb
115
250
32

EARTH SOLUTIONS NW

Name: Brian C. Snow, L.G.
Date: July 29, 2025
Project Number: ES-9607.02
Project Name: Cheshire Property
Scale: N/A

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:

$r = 0.5$ (ductile system)

$PGA_m = 0.685$ (Site Class D)

$H = 100$ 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

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 ft²
Region 2	Native silt soils	6,5,10,4,8,9,63,66,7	50,368 ft²
Region 3	Native silt soils	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft²
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 ft²

	sandy soil		
Region 5	Medium dense sandy soil	44,45,46,47,48,49,50,51	1,295.5 ft²

Slip Results

Slip Surfaces Analysed: 28640 of 35855 converged

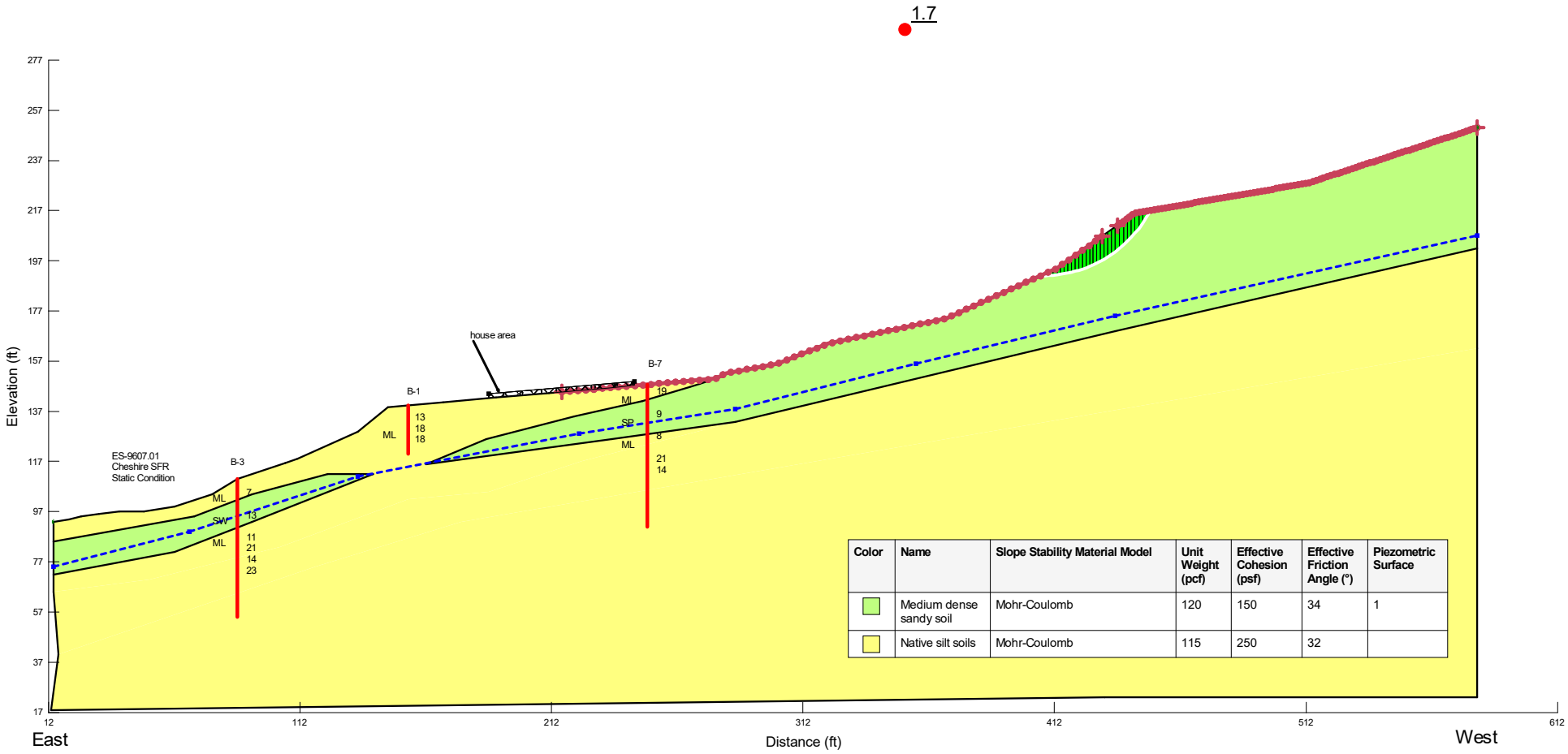
Current Slip Surface

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


1.7
277
257
237
217
197
177
157
137
117
97
77
57
37
17
Elevation (ft)
12
112
212
312
412
512
612
East
Distance (ft)
West
house area
B-1
B-3
B-7
ES-9607.01
Cheshire SFR
Static Condition
ML
SW
ML
ML
ML
SP
ML
13
18
18
7
13
11
21
14
23
19
9
8
21
14
Color | Name | Slope Stability Material Model | Unit Weight (pcf) | Effective Cohesion (psf) | Effective Friction Angle (°) | Piezometric Surface
Medium dense sandy soil | Mohr-Coulomb | 120 | 150 | 34 | 1
Native silt soils | Mohr-Coulomb | 115 | 250 | 32

Static

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 ft²
Region 2	Native silt soils	6,5,10,4,8,9,63,66,7	50,368 ft²
Region 3	Native silt soils	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft²
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 ft²

	sandy soil		
Region 5	Medium dense sandy soil	44,45,46,47,48,49,50,51	1,295.5 ft²

Slip Results

Slip Surfaces Analysed: 34760 of 35855 converged

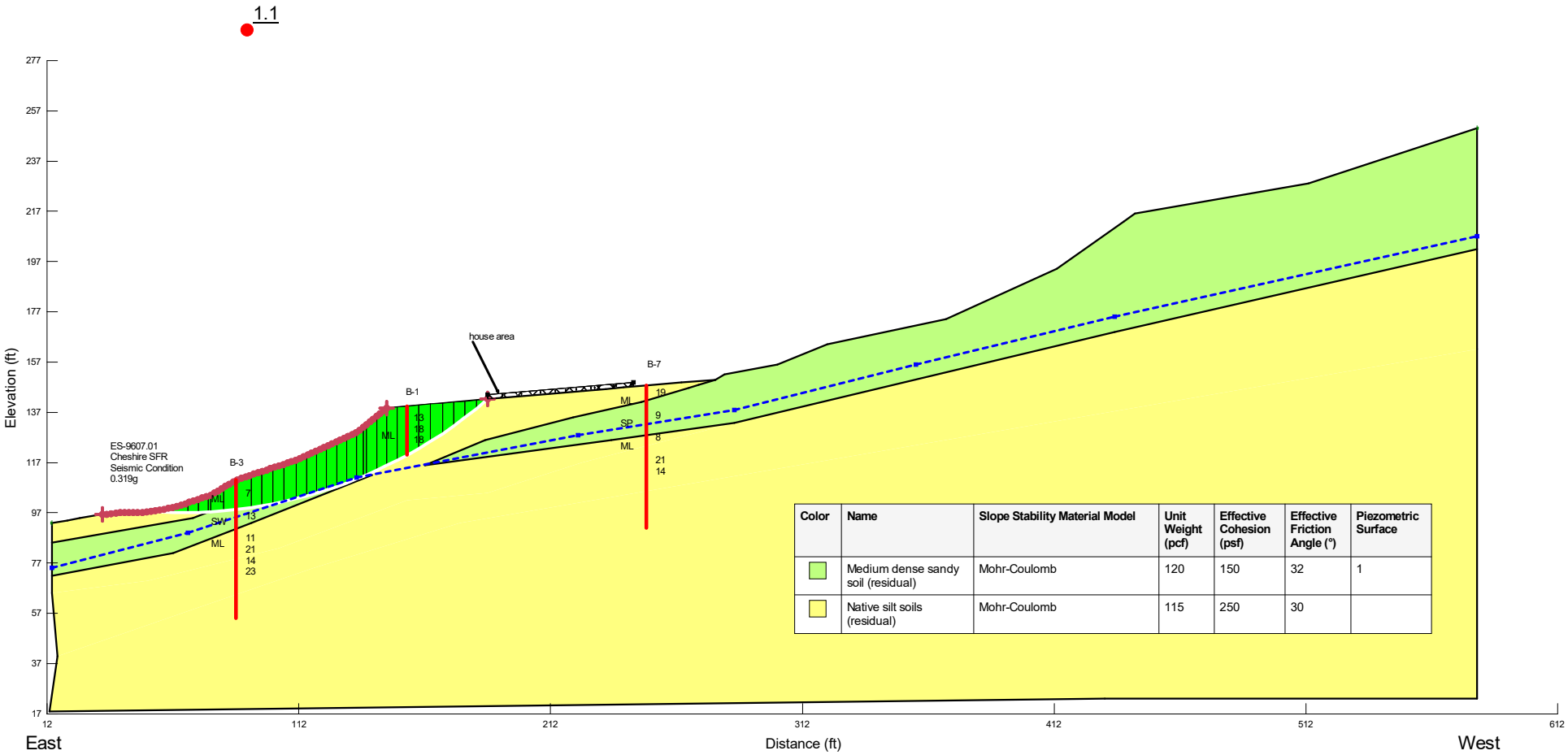
Current Slip Surface

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



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Piezometric Surface
	Medium dense sandy soil (residual)	Mohr-Coulomb	120	150	32	1
	Native silt soils (residual)	Mohr-Coulomb	115	250	30	

EARTH SOLUTIONS NW

Name: Brian C. Snow, L.G.
Date: July 29, 2025
Project Number: ES-9607.02
Project Name: Cheshire Property
Scale: N/A

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:

$r = 0.5$ (ductile system)

$PGA_m = 0.685$ (Site Class D)

$H = 20$ 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

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 ft²
Region 2	Native silt soils (residual)	6,5,10,4,8,9,63,66,7	50,368 ft²
Region 3	Native silt soils (residual)	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft²
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 ft²

	sandy soil (residual)		
Region 5	Medium dense sandy soil (residual)	44,45,46,47,48,49,50,51	1,295.5 ft²

Slip Results

Slip Surfaces Analysed: 342 of 355 converged

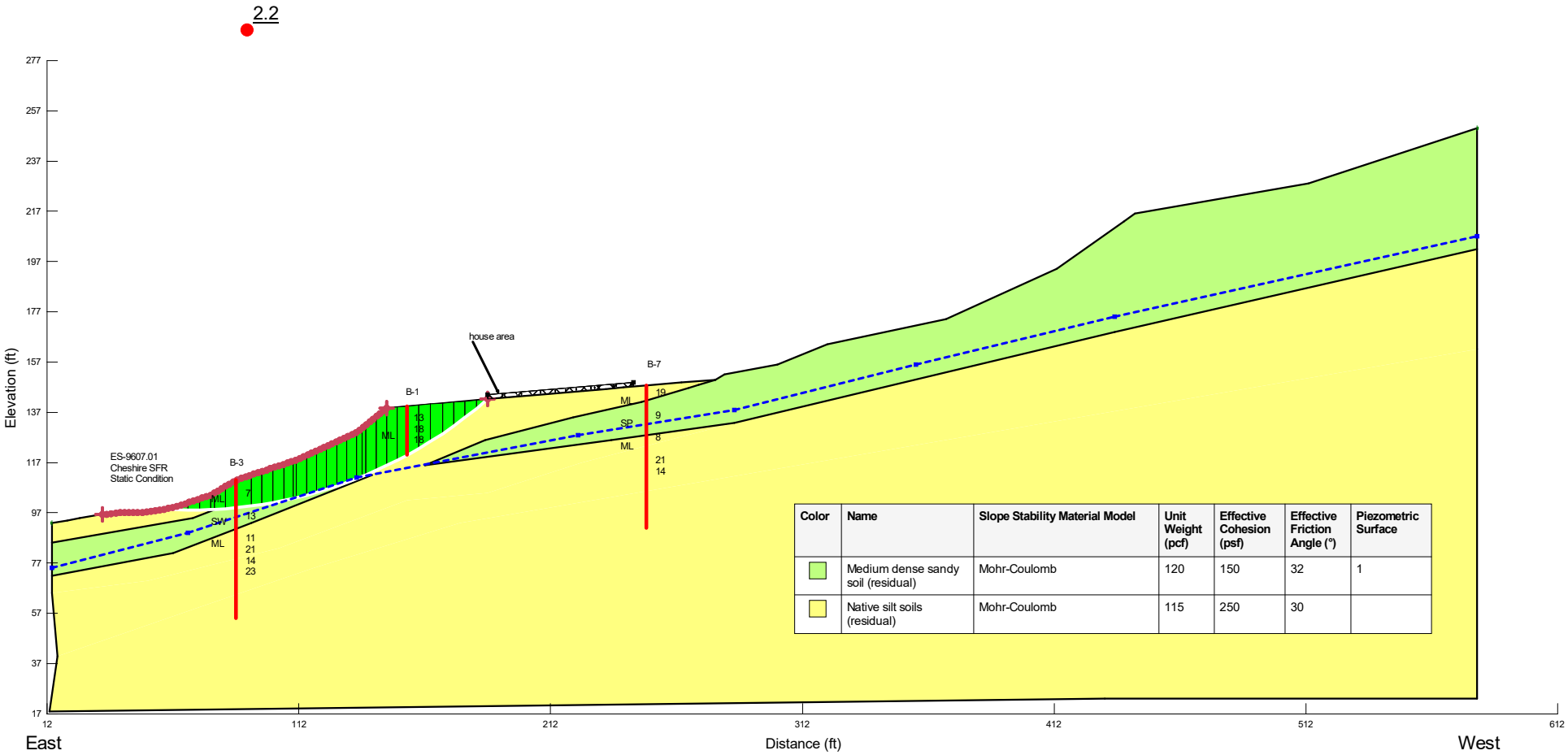
Current Slip Surface

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)



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Piezometric Surface
	Medium dense sandy soil (residual)	Mohr-Coulomb	120	150	32	1
	Native silt soils (residual)	Mohr-Coulomb	115	250	30	

Static

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 ft²
Region 2	Native silt soils (residual)	6,5,10,4,8,9,63,66,7	50,368 ft²
Region 3	Native silt soils (residual)	43,23,12,13,14,24,15,4,10,5,6,7,66,65,11	13,407 ft²
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 ft²

	sandy soil (residual)		
Region 5	Medium dense sandy soil (residual)	44,45,46,47,48,49,50,51	1,295.5 ft²

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)

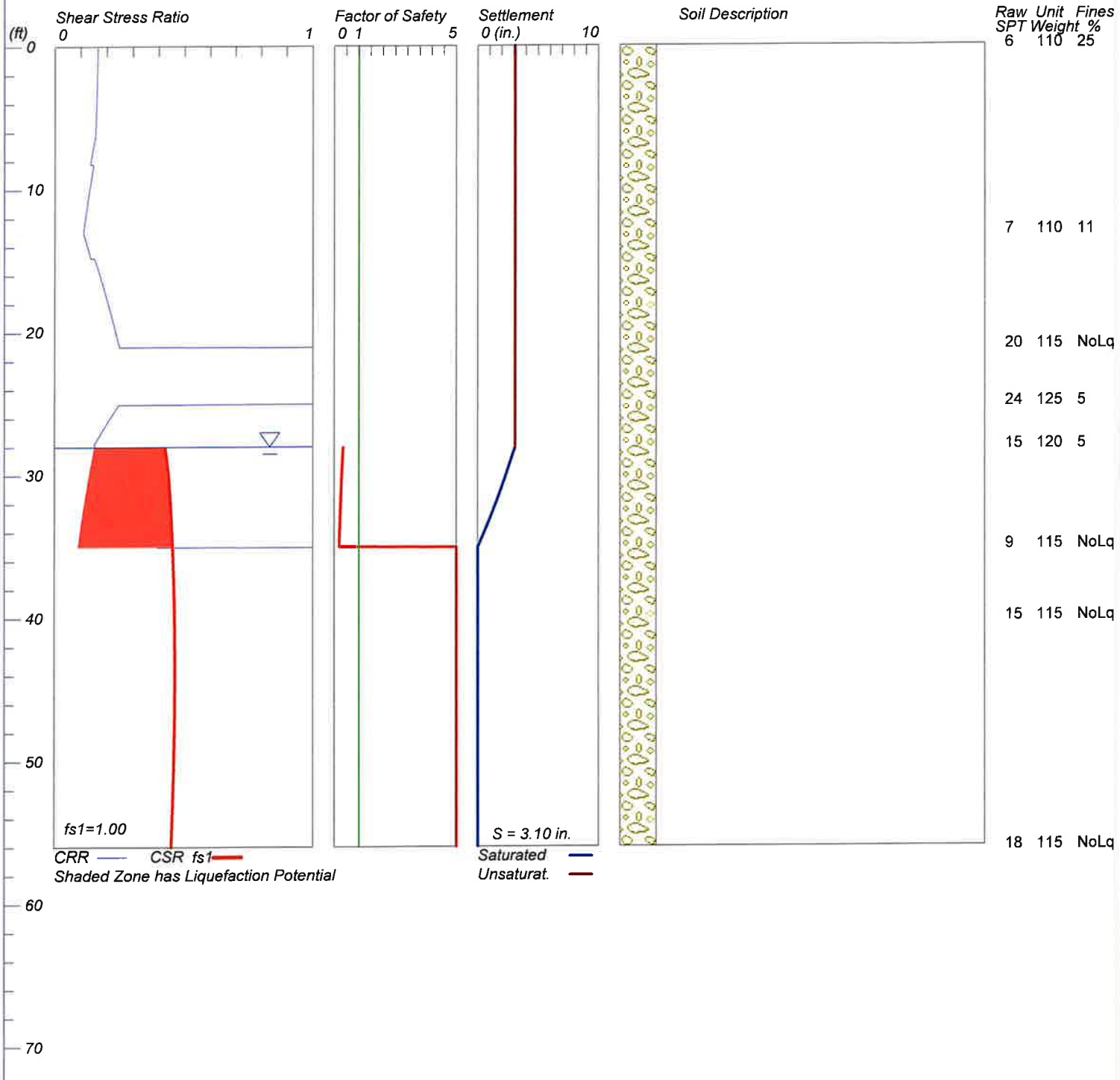
Column 23	99.50000 ft	100.66080 ft	-82.213105 psf	1,616.7545 psf	1,010.2603 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 24	95.16667 ft	99.97280 ft	-128.06989 psf	1,548.6 psf	967.67271 psf	150 psf	0 psf	Medium dense sandy soil (residual)
Column 25	90.00000 ft	99.30608 ft	-192.32928 psf	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



LIQUEFACTION ANALYSIS

7615 E. Mercer Way

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

Magnitude=7
Acceleration=0.7g