



November 1, 2024
ES-8157.03

Earth Solutions NW LLC

Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

Bay Equity, LLC
502 State Avenue, Suite 101A
Marysville, Washington 98270

Attention: John Murphy

**Subject: Landslide Repair and Stabilization
Proposed Mitigation
Pioneer Point
Arlington, Washington**

Dear John:

As requested, Earth Solutions NW, LLC (ESNW) has reviewed recently revised plans for residential development at the subject site. Specifically, development plans have been revised to better facilitate the application of structural elements necessary to achieve total stabilization of the site. Given the unique site characteristics and history of landslide activity, the new development will now incorporate stabilization elements of sufficient size and strength to protect future development areas and fully mitigate the risk of future earth movement. As such, and given that previous (more aggressive) proposals to develop the site have been abandoned, this report intends to provide a method for mitigating the landslide hazard for the new (less aggressive) development proposal. Based on prior discussions with the City of Arlington and their 3rd party consultant, the goal of the design team is to reach agreement with the City on the intended approach for achieving total site stabilization. Once concurrence with the City and their consultant is attained, preparation of final plans and engineering are expected to begin in earnest.

Site History

The attached site plan (Plate 1) illustrates the overall property limits and relevant site features. Such features include an existing road alignment and large expanse of hillside that dominates the site topographic environment. Earlier proposals for developing the site included residential construction and related infrastructure improvement that intended to occupy almost the entirety of the site and areas of associated hillside. In anticipation of this earlier plan for developing the site, a new road was extended along the base of the hillside and into the site. This work was reported to have occurred in 1994. Previous investigations (by others) had characterized the near surface geologic condition as consisting largely of lacustrine silts of moderate plasticity with consistency characterized as stiff to moderately stiff. Groundwater was identified in discrete layers throughout the hillside and overall soil moisture was found to be elevated. Given the identified geologic and topographic setting, and in response to the 1994 excavation and related road cut, a rotational landslide was initiated along the alignment of the completed roadway.

Review of follow up investigative reports and recent observation completed by the undersigned engineer suggest that the depth of rotation associated with the landslide was relatively shallow. The investigations (by others) conducted subsequent to the landslide identified head scarp features 30 to 40 feet uphill of the road cut. Consistent with the behavior of a classic rotational type rupture zone, uplift (“heave”) of the slide mass is visible at the termination, and is most pronounced at or near the centerline of the existing road alignment. The photograph below depicts the rough boundary (or edge) of the “heave” within the existing roadway.



Existing Road Alignment – Relic “Heave” Condition (1994 Slide)

It should be noted that underground utility installations within the roadway alignment pictured above still exist today. Additionally, it is our understanding that the original sewer alignment below the road reportedly remains intact. Further, it should be noted that continued creep (or displacement) of the slide mass since the initial 1994 landslide event has not been documented. In any case, and based on recent observations, it is the opinion of the undersigned engineer that the landslide likely has not remobilized to any significant extent since 1994, and probably resides currently in a state of near equilibrium (i.e. $FS \geq 1.0$).

Proposed Mitigation

Development plans currently propose construction of 10 separate multi-plex building structures combining to produce a total of 49 residential units. In contrast to earlier development proposals, the area of proposed construction will avoid the large expanse of hillside that dominates the central and southerly regions of the site. Instead, development will be focused throughout the topographically lower areas of the site located at the base of the hillside. A representative sippet of the development area is provided below.



Current Development Proposal – Located at Base of Hillside

As represented above, and in contrast to earlier proposals, the planned development will largely reside at the base the existing hillside. The decision to position the development area as shown above was strategic, and is intended to avoid disturbance and modification of the existing hillside to the greatest extent practicable. Also, it should be noted that the old road alignment established in 1994 will be abandoned as part of the new proposal. Access instead will be established along a new alignment positioned further to the north and farther away from the hillside. Notwithstanding the current plans to consolidate and further separate the development area from the hillside, additional measures to fully stabilize the site and mitigate the landslide hazard will be implemented for the project. The following methods of stabilization are proposed:

Rock Keyway and Drain – At the onset of construction, and during the process of abandoning the existing road alignment, installation of a deep rock keyway and drain is proposed along the base of the existing hillside. The rock keyway and drain installation will serve two purposes:

- 1) Interruption and related strengthening of the landslide rupture zone through the introduction of high shear strength rock aggregate that will penetrate through the zone of slippage.
- 2) Improved dissipation of excess pore pressure along the slip plane to help further improve the current (residual) shear strength characteristics of the relic slide mass.

Grade Modification (Resisting Force) – As previously mentioned, the current development plan intends to abandon the existing site access road and reestablish a new access positioned further to the north. Realigning the site access as proposed will help facilitate repositioning of the development area further to the north and away from the hillside. Most importantly, the plan to realign the road access will also involve raising the existing site grade 4 to 6 feet above the level of the old road surface. Raising the site in this manner will effectively restore the grade previously lost when the base of the hillside was cut to accommodate construction of the old road access. It should be emphasized that in the opinion of the undersigned engineer, excavation and related cuts executed in 1994 to construct the old road alignment likely provided the catalyst that initiated the rotational landslide at the site. Therefore, filling and restoring the areas of previous cut will effectively serve to reestablish stability of the hillside to its pre-1994 state. With respect to mitigation, the planned fill placement and its associated mass will also provide an added resisting force at the base of the hillside, essentially deriving an increased level of stability to the slope.

Passive Shear Pile (Soldier Pile Wall) – Relative to previous propositions, the current site plan represents a substantial reduction in the overall footprint area proposed for construction. The reduced size and repositioning of the development area will essentially lessen the overall impact to the existing hillside. However, some modification to the effective toe-of-slope resulting from the aforementioned grade modifications will be necessary to accommodate construction along the south margins of the development footprint. Essentially, cuts on the order of 8 feet at the base of the slope will be needed to establish the finish grade along the rear side of the buildings. Permanent support of the excavation will require construction of a retaining wall. More importantly, however, the necessary wall construction will also present an opportunity to install a series of closely spaced soldier piles intended to function both as a retaining wall and as a passive shear pile mitigation measure. Specifically, the soldier piles will be sized with sufficient length such that the pile and its encapsulating grouted shaft will fully penetrate through the landslide rupture zone. Below the zone of rupture, continued advancement of the pile will occur such that sufficient embedment into the undisturbed (very stiff) sediments is achieved. The application of passive shear piles in this manner will serve to reinforce the remanent zone of slippage associated with the 1994 rotational slope failure.

Stability Analysis

For purposes of this report and analysis of stability, the reader is directed to Plates 1 and 2 (attached) and the Slope/W limit equilibrium computer output (also attached). As outlined above, the current development plan intends to incorporate three measures of stabilization to ensure that a state of “total stabilization” is achieved for the site. The results of stability analysis conducted along representative Cross Section A-A’ indicate that stability is satisfied for the post construction (“mitigation”) case. To demonstrate the process by which the results of our analysis were obtained, the following models were developed:

Pre-1994 Rd. Cut – This model is intended to represent the natural topographic condition that predates the 1994 road excavation. Combined with the pre-1994 surface topography, subsurface data (acquired by others) were used to develop a representative cross section for the stability analysis. Once developed, this model formed the framework for subsequent model development.

Back Calculation (Post-1994 Rd. Cut) – The Pre-Road Cut (1994) model described above was used as a basis for formulating the “1994 Road-Cut” cross section. Essentially, this cross section presents a representation of the existing road alignment and areas of associated cut. Most importantly, the model provides the cross-sectional geometry necessary to “back-calculate” the intra-slide strength characteristics of the soil units during the time of slope failure. Traditionally, the process of “back-calculation” is iterative, and resolves to establish a reasonable representation of soil strength when stability is diminished to a state of equilibrium (i.e. FS = 1.0).

Post-Construction Mitigated Condition – The applied stabilization techniques described previously in this report are represented in the “Post-Construction Mitigated Condition” cross section. Specifically, the model geometry portrays the post-construction surface topography that will exist once the site is filled and raised to the level of the future road alignment. Structural elements in the form of the previously described “rock-keyway” and “passive shear piles” are also represented in the model. Most importantly, soil strength characteristics derived from the prior “back-calculation” model are assumed in calculating the static and seismic factors-of-safety for the post-mitigation case.

It is emphasized again that for purposes of this report and analysis of stability, the reader is directed to Plates 1 and 2 and the Slope/W limit equilibrium computer output developed for the three slope stability models outlined above (see attached). With respect to the soil strength parameters input into the Post-Construction Mitigated Condition model geometry, values derived from the “Back Calculation” analysis were selected and assigned to the underlying (“weak” and “strong”) native silt deposits. Additionally, for the “Post-Construction Mitigated Condition”, strength values were assumed for the “rock keyway” and “new structural fill” layers. For clarity, the strength parameters assumed for all layers in the limit equilibrium analyses are summarized below:

Soil Strength Parameters - Cross Section A-A' Model Geometries

New Structural Fill	Rock Keyway	Silt (Mottled)	Stiff / Hard Silt
Y = 125 pcf Φ = 34 deg. c = 0 psf	Y = 130 pcf Φ = 42 deg. c = 0 psf	Y = 115 pcf Φ = 14 deg. c = 75 psf*	Y = 120 pcf Φ = 28 deg. c = 750 psf

* It should be noted that for the temporary seismic case, an increased value of cohesion (175 psf) was assumed for the Silt (Mottled) soil unit. Such temporary increase for short-term loading (i.e. seismic force) is considered justified due to “dilation” of the soil structure during loading.

It is reemphasized that the strength values used in the analysis were largely derived from the “back calculation” model geometry in which strength values in the “weak” mottled silt layer were adjusted sufficiently low such that a state of equilibrium (FS~1.0) was achieved. As such, and based on the above soil strength parameters specified for each soil unit represented in the model geometries, the following factors-of-safety were calculated:

Model Geometry Factors-Of-Safety

Model Geometry	Static Factor-of-Safety	Seismic Factor-of-Safety
Pre-1994 Rd. Cut	FS = 1.01	FS = 0.51
Back Calculation (Post 1994 Rd. Cut)	FS = 1.01	N/A
Mitigated Condition	FS = 4.0	FS = 1.1

It should be noted that for the seismic stability case, a lateral seismic coefficient of 0.255 was assumed for the analysis. This coefficient represents one-half of the modified peak ground acceleration mapped for the site. Further, it is noted that a seismic stability analysis was not developed for the “Back Calculation” case as such analysis was not necessary for estimating soil strength characteristics of the underlying native silt deposits.

Based on the above, and given that a general range of reasonable factors-of-safety were derived from analysis of the three model geometries, the following can be concluded:

- Prior to the 1994 excavation and removal of toe support along the existing access road alignment, the static stability of the hillside was generally poor (roughly FS = 1.0).
- Back calculation (Post 1994 Rd. Cut) to estimate soil strength properties based on the post-failure model geometry produced values of soil friction and cohesion that were reasonable and determined by the undersigned engineer as acceptable for use in the analysis of the mitigated (post-construction) model geometry.
- The addition of stabilization measures for the post-construction (“mitigated condition”) model geometry improved substantially the static and seismic factors-of-safety for the site.

Conclusions

Model geometry analysis of three representative slope configurations was undertaken for the express purpose of determining the appropriate level of stabilization necessary to mitigate landslide risk for the intended post-construction site configuration. As outlined previously in this report, and as compared to earlier proposals, the owner and project design team have substantially reduced the footprint area within which development is proposed. Specifically, the project development will no longer require significant modification and related impacts to the areas of hillside positioned within the south and central regions of the site. Instead, the majority of planned development will reside throughout topographically lower areas of the site located north of the hillside. Most significant as it relates to the current design concept are plans to raise the existing grade and abandon the current road access positioned along the toe of the hillside. As discussed earlier in this report, the 1994 road cuts and related excavation work along the toe of the hillside created conditions that formed the catalyst for the documented landslide at the site.

In consideration of plans to restore the old road access to its pre-1994 configuration, and as demonstrated through limit equilibrium analysis, the proposed “rock keyway” and passive shear pile installations will combine to achieve a state of total stabilization for the completed development. As demonstrated by way of slope stability analysis and related model geometries developed for the site, implementation of the stabilization methods outlined in this report will mitigate the landslide hazard to a level that meets or exceeds the code specified factors-of-safety for slope stability. More importantly, it is the professional opinion of the undersigned engineer that execution of the proposed mitigation, combined with efforts by the owner and design team to significantly reduce the development footprint and area of disturbance, post-construction total stabilization will be achieved for the project. As emphasized at the onset of this report, the goal of the owner and design team is to reach agreement with the City and their 3rd party consultant on the intended approach for achieving total site stabilization. Based on the findings of this report, it is the opinion of the undersigned engineer that stabilization methods proposed for installation at the site will fully mitigate the landslide risk for the project. In any case, it is acknowledged that ownership and the design team must reach concurrence with the City (and their 3rd party consultant) regarding our intended approach for stabilizing the site and future development area. Once such concurrence is obtained, design efforts to engineer the project are expected to commence.

We trust this report and geotechnical analysis of proposed site stabilization methods meet your current needs. If you have questions, or if additional information is required, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

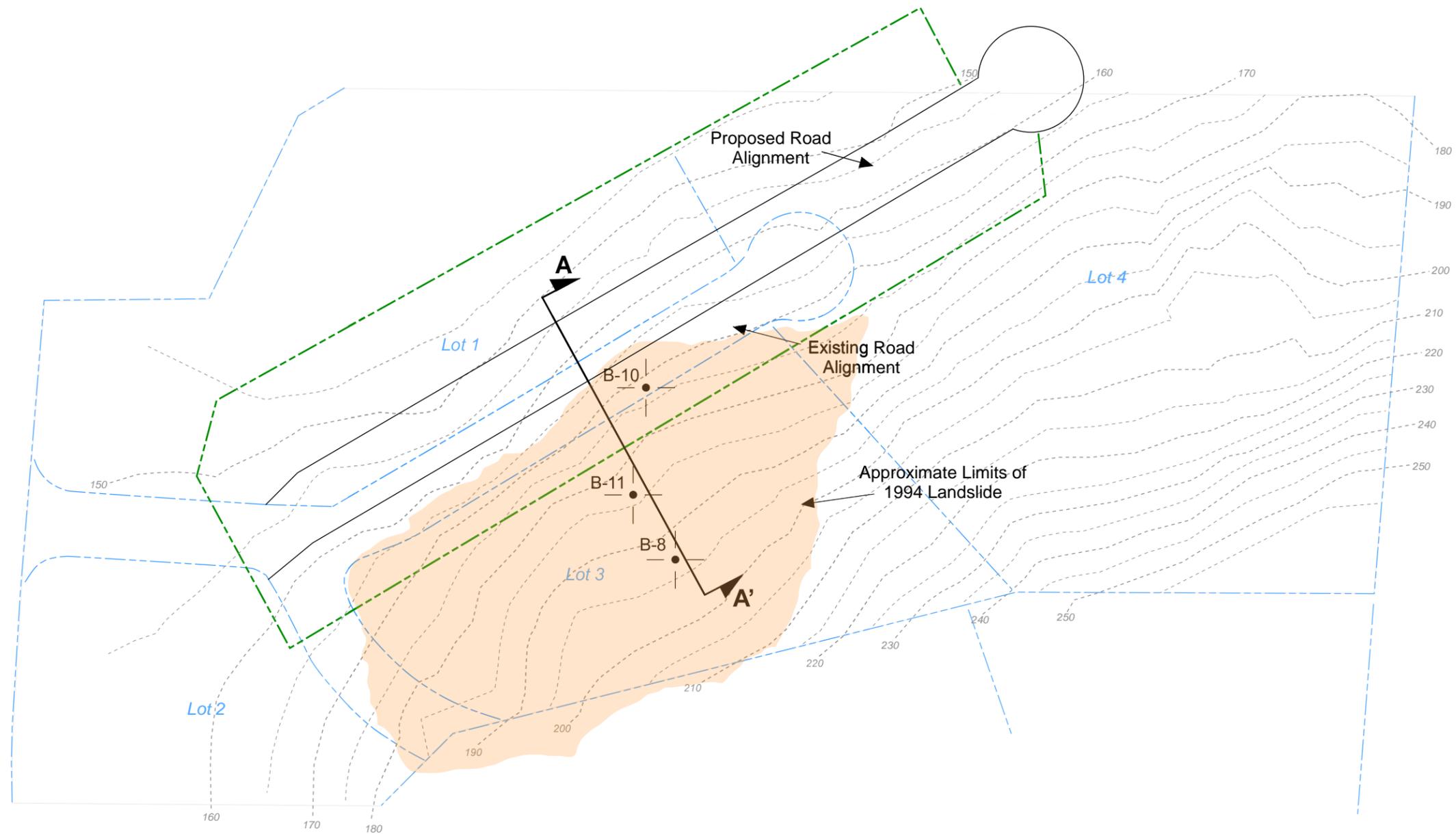


Raymond A. Coglas, P.E.
Senior Principal Engineer

Attachments: Plate 1 – Boring Location Plan / Orig. Topo. Overlay
Plate 2 – Cross Section A-A'
Stability Analysis

cc: Insight Engineering
Attention: Brian Kalab, P.E.

83RD AVENUE N.E.



LEGEND

-  Approximate Location of Cobalt Boring (2019/2022)
-  Newly Proposed Development Area
-  Cross-Section



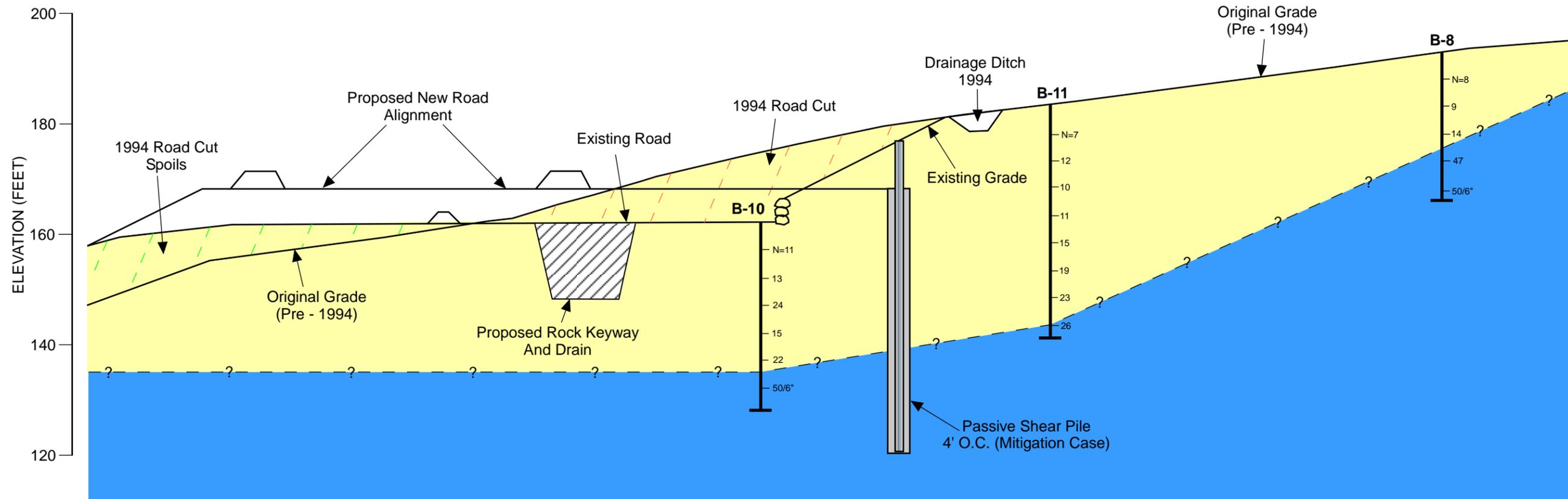
NOT - TO - SCALE

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.

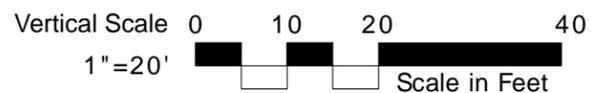


Drawn MRS
Checked RAC
Date 11/01/2024
Proj. No. 8157.03
Plate 1



LEGEND

- Silt/Clay Lacustrine (Soft / Stiff)
- Silt (Stiff / hard)



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Cross Section A-A'
Pioneer Point
Arlington, Washington

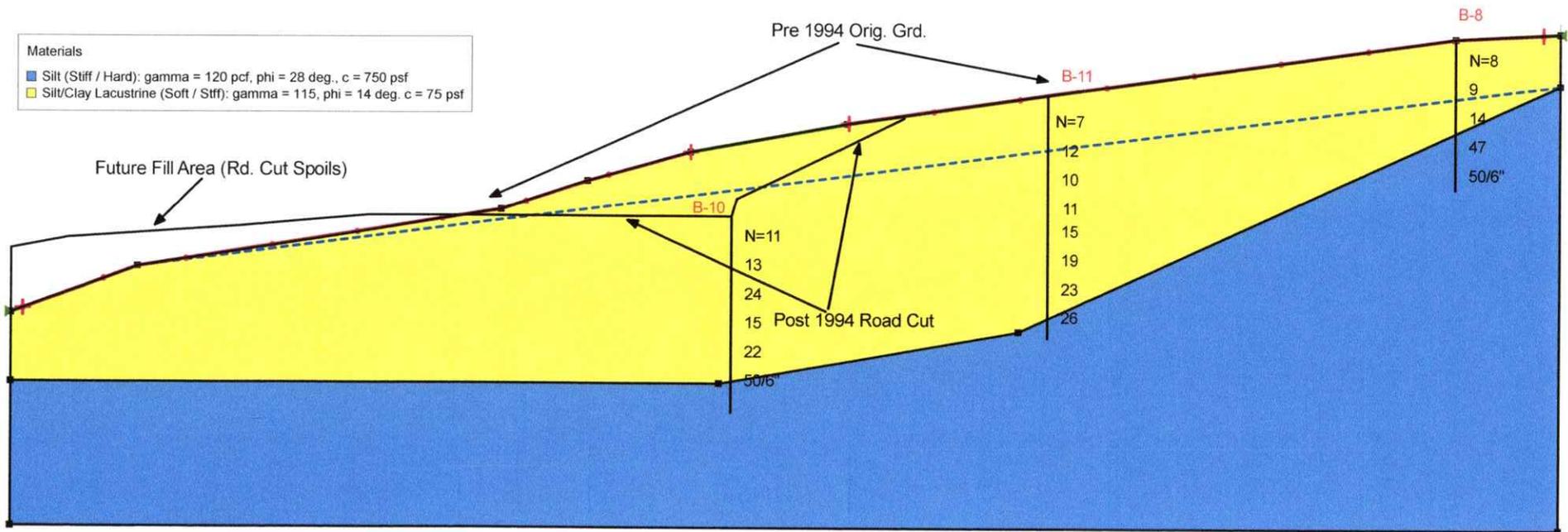
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Drawn MRS
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Date 11/01/2024
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Plate 2

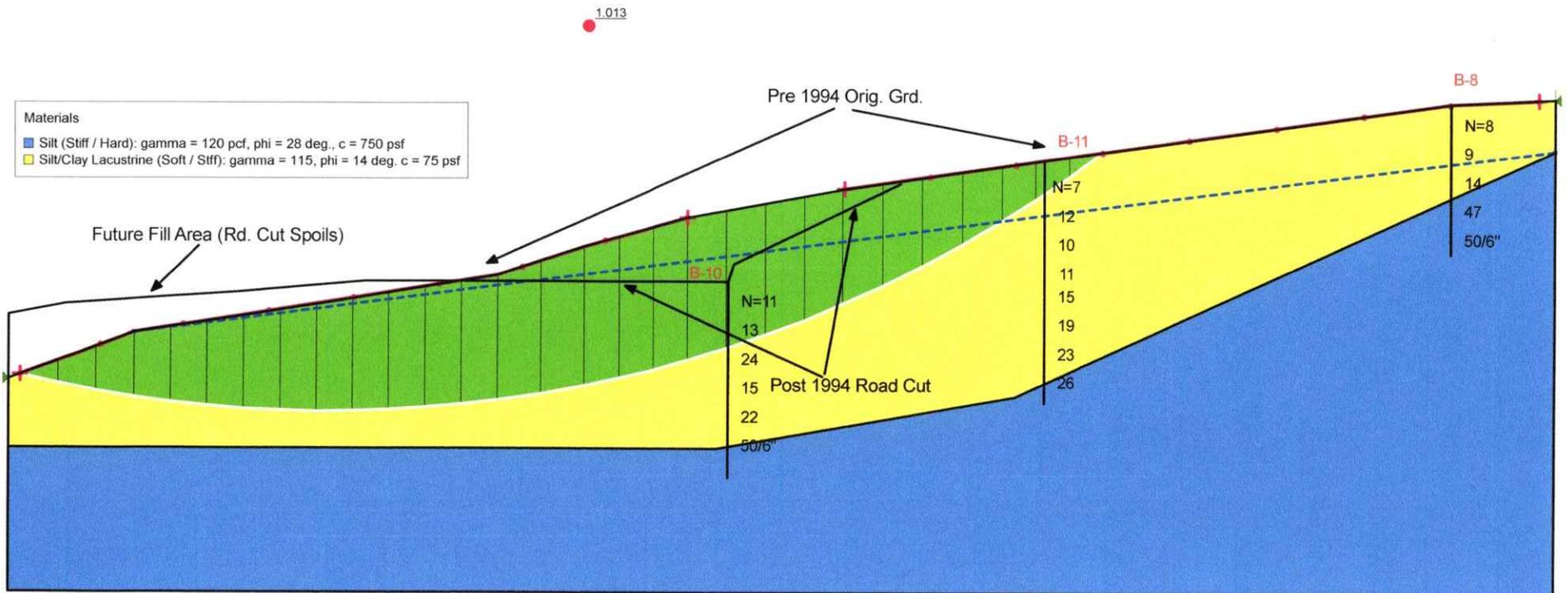
Section A-A'

Orig. Grd. - Pre 1994 Road Cut Model Geometry



Section A-A'

Orig. Grd. - Pre 1994 Road Cut (FS = 1.01 Static)



Pre-1994 Orig. Grd. - Static

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File Information

File Version: 10.02
Created By: Ray Coglas
Last Edited By: Ray Coglas
Revision Number: 21
Date: 11/01/2024
Time: 05:47:29 AM
Tool Version: 10.2.1.19666
File Name: Pre 1994 Orig. Grd.gsz
Directory: C:\Users\ray.coglas\Desktop\Pioneer Point 2\New Pre-1994 Orig. Grd\
Last Solved Date: 11/01/2024
Last Solved Time: 05:47:30 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Pre-1994 Orig. Grd.

Description: Orig. Stability

Kind: SLOPE/W

Method: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from: Piezometric Line

Apply Phreatic Correction: No

Use Staged Rapid Drawdown: No

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Right to Left

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: (none)

Distribution

F of S Calculation Option: Constant

Advanced

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

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
Max Absolute Lambda: 2

Materials

Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 75 psf
Phi': 14 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf

Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 750 psf
Phi': 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (2, 147.72727) ft
Left-Zone Right Coordinate: (118, 175) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (145.2994, 180.04277) ft
Right-Zone Right Coordinate: (265, 195.83333) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 147) ft
Right Coordinate: (268, 196) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	22 ft	155 ft
Coordinate 2	268 ft	187 ft

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	147 ft
Point 2	22 ft	155 ft
Point 3	85 ft	165 ft
Point 4	100 ft	170 ft
Point 5	118 ft	175 ft
Point 6	145 ft	180 ft
Point 7	250 ft	195 ft
Point 8	268 ft	196 ft
Point 9	268 ft	187 ft
Point 10	175 ft	144 ft
Point 11	123 ft	135 ft
Point 12	0 ft	135 ft
Point 13	268 ft	110 ft
Point 14	0 ft	110 ft

Regions

	Material	Points	Area
Region 1	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf	1,2,3,4,5,6,7,8,9,10,11,12	7,768 ft ²
Region 2	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf	12,11,10,9,13,14	9,770.5 ft ²

Slip Results

Slip Surfaces Analysed: 404 of 405 converged

Current Slip Surface

Slip Surface: 17

Factor of Safety: 1.013

Volume: 3,132.9999 ft³

Weight: 360,294.99 lbf

Resisting Moment: 15,496,539 lbf·ft

Activating Moment: 15,295,350 lbf·ft

Resisting Force: 65,756.705 lbf

Activating Force: 64,906.772 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (1.9999991, 147.72727) ft

Entry: (190.13918, 186.44845) ft

Radius: 224.98385 ft

Center: (55.055926, 366.36579) ft

Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	5.3333326 ft	146.97182 ft	0 psf	262.24034 psf	65.383861 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma =

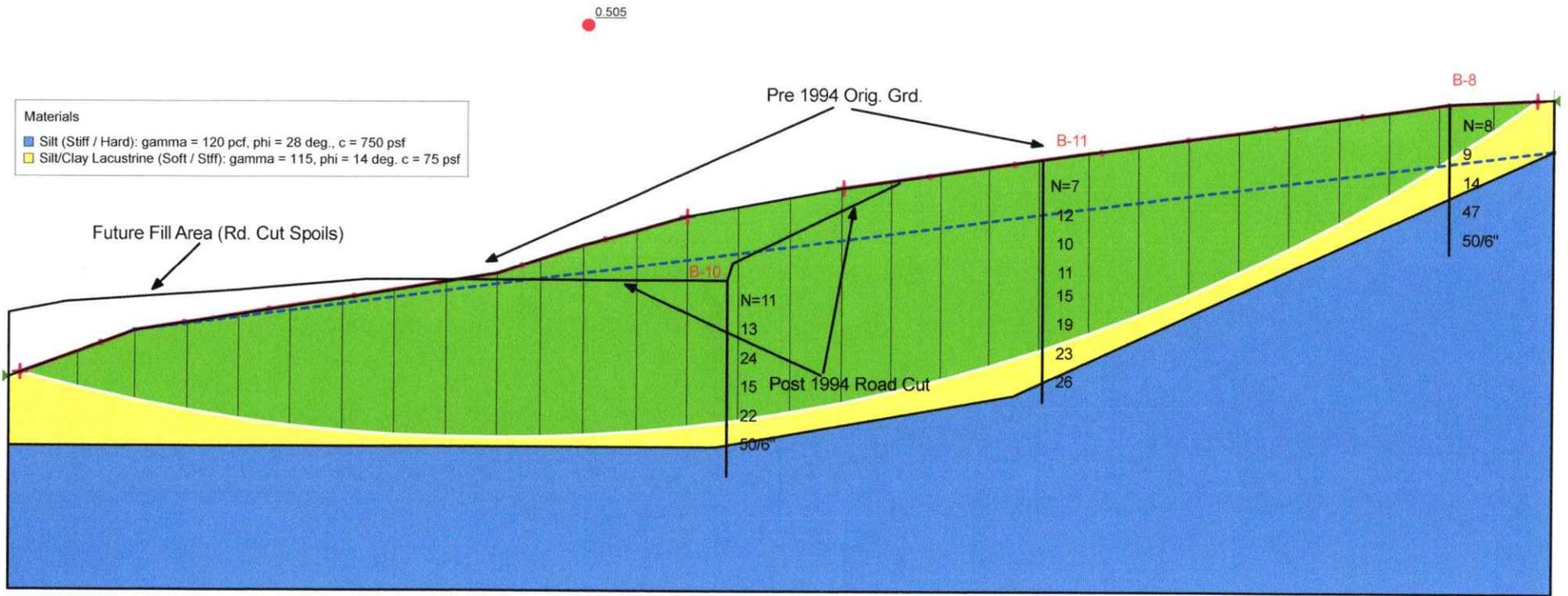
								115, phi = 14 deg. c = 75 psf
Slice 2	12 ft	145.56636 ft	0 psf	738.75611 psf	184.19259 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 3	18.666667 ft	144.36997 ft	0 psf	1,192.7765 psf	297.39258 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 4	25.15 ft	143.40107 ft	749.70468 psf	1,487.9958 psf	184.07666 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 5	31.45 ft	142.64619 ft	847.99423 psf	1,701.7455 psf	212.8641 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 6	37.75 ft	142.07077 ft	935.08004 psf	1,889.5582 psf	237.97814 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 7	44.05 ft	141.67343 ft	1,011.0483 psf	2,050.6937 psf	259.21272 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 8	50.35 ft	141.45323 ft	1,075.9578 psf	2,184.807 psf	276.46714 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 9	56.65 ft	141.40964 ft	1,129.8413 psf	2,291.9523 psf	289.74681 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 10	62.95 ft	141.54257 ft	1,172.705 psf	2,372.559 psf	299.15719 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 11	69.25 ft	141.85232 ft	1,204.5295 psf	2,427.3839 psf	304.89185 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 12	75.55 ft	142.33963 ft	1,225.2688 psf	2,457.4437 psf	307.21571 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 13	81.85 ft	143.00567 ft	1,234.8504 psf	2,463.934 psf	306.44494 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft /

								Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 14	88.75 ft	143.95163 ft	1,231.8284 psf	2,518.345 psf	320.76463 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 15	96.25 ft	145.21826 ft	1,213.6602 psf	2,614.513 psf	349.27183 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 16	103 ft	146.57118 ft	1,184.0138 psf	2,656.6356 psf	367.16584 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 17	109 ft	147.96657 ft	1,145.6256 psf	2,652.5219 psf	375.71146 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 18	115 ft	149.53693 ft	1,096.3133 psf	2,630.5826 psf	382.5363 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 19	121.375 ft	151.40757 ft	1,031.3008 psf	2,554.6809 psf	379.82132 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 20	128.125 ft	153.60793 ft	948.74864 psf	2,424.2352 psf	367.88012 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 21	134.875 ft	156.04789 ft	851.23761 psf	2,273.7933 psf	354.68298 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 22	141.625 ft	158.73593 ft	738.23963 psf	2,102.5886 psf	340.1704 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 23	148.46569 ft	161.72504 ft	607.18214 psf	1,891.4719 psf	320.20941 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 24	155.39707 ft	165.03424 ft	456.87807 psf	1,638.1178 psf	294.51613 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf

Slice 25	162.32846 ft	168.64176 ft	287.94956 psf	1,356.6218 psf	266.44991 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 26	169.25984 ft	172.5643 ft	99.354588 psf	1,043.0088 psf	235.27942 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 27	175.6278 ft	176.44913 ft	-91.461959 psf	735.39751 psf	183.35519 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 28	181.43235 ft	180.26253 ft	-282.39425 psf	440.18919 psf	109.75149 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf
Slice 29	187.2369 ft	184.34091 ft	-489.8696 psf	119.79231 psf	29.867577 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 75 psf

Section A-A'

Orig. Grd. - Pre 1994 Road Cut (FS = 0.51 Seismic)



Pre-1994 Orig. Grd. - Seismic

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File Information

File Version: 10.02
Created By: Ray Coglas
Last Edited By: Ray Coglas
Revision Number: 27
Date: 11/01/2024
Time: 06:04:18 AM
Tool Version: 10.2.1.19666
File Name: Pre 1994 Orig. Grd.gsz
Directory: C:\Users\ray.coglas\Desktop\Pioneer Point 2\New Pre-1994 Orig. Grd\
Last Solved Date: 11/01/2024
Last Solved Time: 06:04:19 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Pre-1994 Orig. Grd.

Description: Orig. Stability

Kind: SLOPE/W

Method: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from: Piezometric Line

Apply Phreatic Correction: No

Use Staged Rapid Drawdown: No

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Right to Left

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: (none)

Distribution

F of S Calculation Option: Constant

Advanced

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

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
Max Absolute Lambda: 2

Materials

Silt/Clay Lacustrine (Soft / Stiff): gamma = 115, phi = 14 deg. c = 175 psf

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 175 psf
Phi': 14 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf

Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 750 psf
Phi': 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (2, 147.72727) ft
Left-Zone Right Coordinate: (118, 175) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (145.2994, 180.04277) ft
Right-Zone Right Coordinate: (265, 195.83333) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 147) ft
Right Coordinate: (268, 196) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	22 ft	155 ft
Coordinate 2	268 ft	187 ft

Seismic Coefficients

Horz Seismic Coef.: 0.255

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	147 ft
Point 2	22 ft	155 ft
Point 3	85 ft	165 ft
Point 4	100 ft	170 ft
Point 5	118 ft	175 ft
Point 6	145 ft	180 ft
Point 7	250 ft	195 ft
Point 8	268 ft	196 ft
Point 9	268 ft	187 ft
Point 10	175 ft	144 ft
Point 11	123 ft	135 ft
Point 12	0 ft	135 ft
Point 13	268 ft	110 ft
Point 14	0 ft	110 ft

Regions

	Material	Points	Area
Region 1	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf	1,2,3,4,5,6,7,8,9,10,11,12	7,768 ft ²
Region 2	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf	12,11,10,9,13,14	9,770.5 ft ²

Slip Results

Slip Surfaces Analysed: 398 of 405 converged

Current Slip Surface

Slip Surface: 42

Factor of Safety: 0.505

Volume: 6,471.2586 ft³

Weight: 744,194.74 lbf

Resisting Moment: 46,423,556 lbf·ft

Activating Moment: 91,972,916 lbf·ft

Resisting Force: 145,605.92 lbf

Activating Force: 288,602.97 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (1.9999991, 147.72727) ft

Entry: (265, 195.83333) ft

Radius: 306.87258 ft

Center: (83.799582, 443.49679) ft

Slip Slices

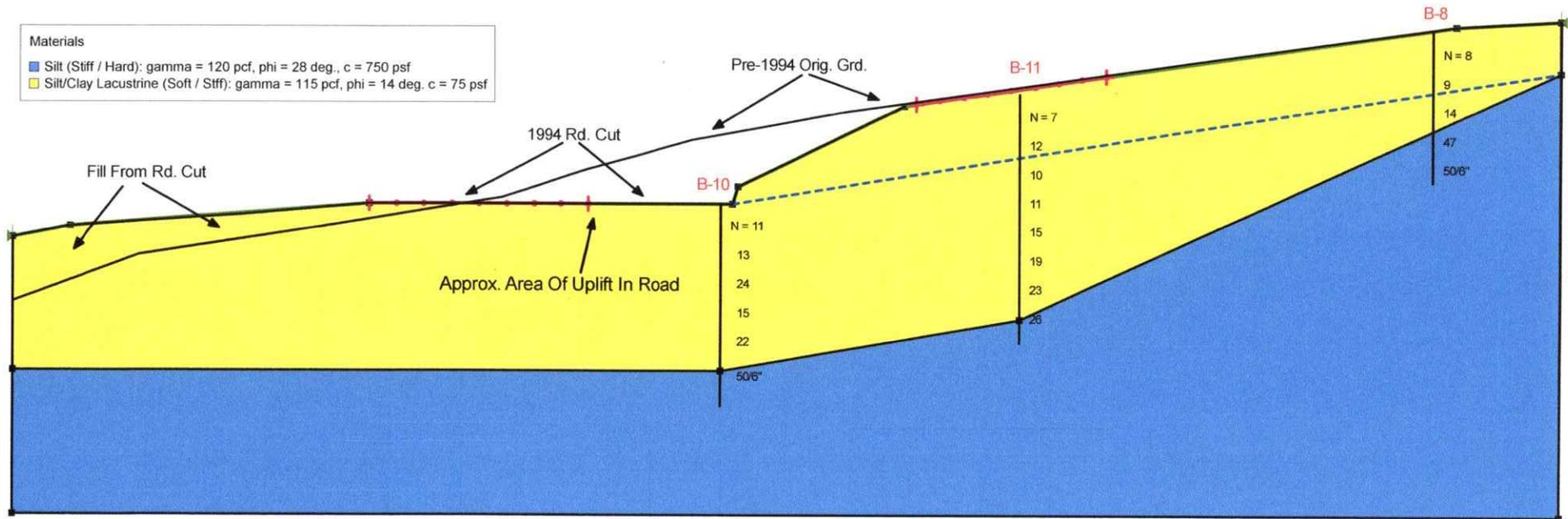
	X	Y	PWP	Base Normal	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
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				Stress				
Slice 1	6.9999993 ft	146.43462 ft	0 psf	553.80151 psf	138.07823 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 2	17 ft	144.02667 ft	0 psf	1,442.1608 psf	359.57108 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 3	26.5 ft	142.05599 ft	844.64145 psf	1,967.3498 psf	279.92264 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 4	35.5 ft	140.48332 ft	1,015.9128 psf	2,386.7053 psf	341.77695 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 5	44.5 ft	139.18489 ft	1,170.063 psf	2,752.8192 psf	394.62543 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 6	53.5 ft	138.1572 ft	1,307.3107 psf	3,058.9852 psf	436.74151 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 7	62.5 ft	137.39753 ft	1,427.8262 psf	3,301.168 psf	467.07656 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 8	71.5 ft	136.90387 ft	1,531.7342 psf	3,478.3555 psf	485.34721 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 9	80.5 ft	136.67495 ft	1,619.1147 psf	3,592.545 psf	492.03145 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 10	88.75 ft	136.68707 ft	1,685.3567 psf	3,729.6285 psf	509.69421 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 11	96.25 ft	136.89985 ft	1,732.9797 psf	3,899.6281 psf	540.20612 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 12	104.5 ft	137.35641 ft	1,771.4749 psf	4,010.5793 psf	558.27144 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma =

								115, phi = 14 deg. c = 175 psf
Slice 13	113.5 ft	138.09832 ft	1,798.2463 psf	4,061.0929 psf	564.19102 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 14	122.5 ft	139.10809 ft	1,808.2953 psf	4,026.2632 psf	553.00151 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 15	131.5 ft	140.3884 ft	1,801.4546 psf	3,918.1788 psf	527.75861 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 16	140.5 ft	141.94269 ft	1,777.5089 psf	3,792.1966 psf	502.31806 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 17	149.30395 ft	143.7293 ft	1,737.4674 psf	3,638.0461 psf	473.86749 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 18	157.91184 ft	145.74105 ft	1,681.7781 psf	3,460.6318 psf	443.51805 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 19	166.51974 ft	148.01721 ft	1,609.5814 psf	3,277.83 psf	415.9411 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 20	175.12763 ft	150.56396 ft	1,520.4922 psf	3,089.255 psf	391.13648 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 21	183.73553 ft	153.38842 ft	1,414.0652 psf	2,893.169 psf	368.78199 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 22	192.34342 ft	156.49881 ft	1,289.788 psf	2,686.6551 psf	348.27809 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 23	200.95132 ft	159.90454 ft	1,147.0724 psf	2,465.7691 psf	328.78802 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 24	209.55921 ft	163.6164 ft	985.24472 psf	2,225.6556 psf	309.26918 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft /

								Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 25	218.16711 ft	167.64678 ft	803.53231 psf	1,960.6173 psf	288.49369 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 26	226.775 ft	172.00987 ft	601.04838 psf	1,664.1385 psf	265.05814 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 27	235.3829 ft	176.72203 ft	376.77224 psf	1,328.8649 psf	237.38336 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 28	243.99079 ft	181.80214 ft	129.52474 psf	946.53959 psf	203.70468 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 29	249.14737 ft	184.98206 ft	-27.122011 psf	702.82498 psf	175.23395 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 30	253.75 ft	188.02204 ft	-179.53027 psf	459.74124 psf	114.62636 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf
Slice 31	261.25 ft	193.175 ft	-440.32309 psf	34.534745 psf	8.6104789 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115, phi = 14 deg. c = 175 psf

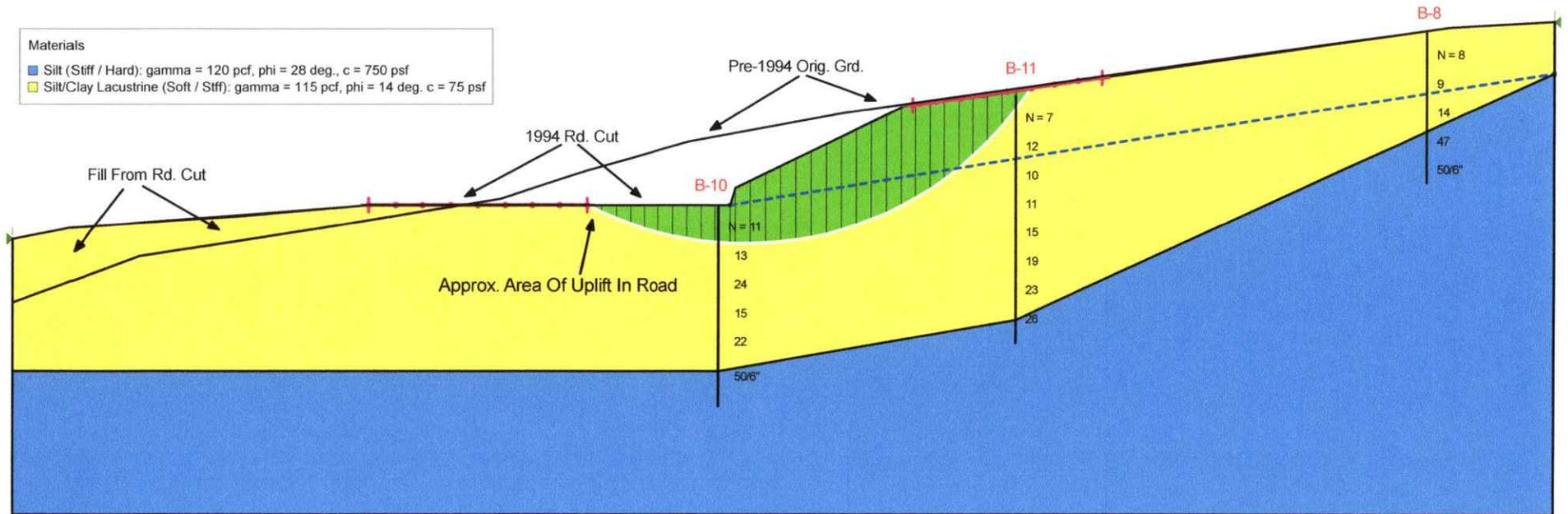
Section A-A' 1994 Rd. Cut - Back Calculation (Model Geometry)



Section A-A'

1994 Rd. Cut - Back Calculation (FS = 1.01 Static)

1.003



1994 Rd. Cut - Back Calc. → Static Only

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File Information

File Version: 10.02
Created By: Ray Coglas
Last Edited By: Ray Coglas
Revision Number: 34
Date: 11/01/2024
Time: 05:59:32 AM
Tool Version: 10.2.1.19666
File Name: 1994 Rd. Cut Back Calculation.gsz
Directory: C:\Users\ray.coglas\Desktop\Pioneer Point 2\New 1994 Rd. Cut\
Last Solved Date: 11/01/2024
Last Solved Time: 05:59:33 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

1994 Rd. Cut - Back Calc.

Description: Back Calculation

Kind: SLOPE/W

Method: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from: Piezometric Line

Apply Phreatic Correction: No

Use Staged Rapid Drawdown: No

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Right to Left

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: (none)

Distribution

F of S Calculation Option: Constant

Advanced

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

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
Max Absolute Lambda: 2

Materials

Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 75 psf
Phi': 14 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf

Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 750 psf
Phi': 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (62, 164) ft
Left-Zone Right Coordinate: (100, 164) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (157, 181.29474) ft
Right-Zone Right Coordinate: (190, 186.15789) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 158) ft
Right Coordinate: (268, 196) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	125 ft	164 ft
Coordinate 2	268 ft	187 ft

Seismic Coefficients

Horz Seismic Coef.: 0

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	158 ft
Point 2	10 ft	160 ft
Point 3	62 ft	164 ft
Point 4	125 ft	164 ft
Point 5	126 ft	167 ft
Point 6	155 ft	181 ft
Point 7	250 ft	195 ft
Point 8	268 ft	196 ft
Point 9	268 ft	187 ft
Point 10	175 ft	144 ft
Point 11	123 ft	135 ft
Point 12	0 ft	135 ft
Point 13	268 ft	110 ft
Point 14	0 ft	110 ft

Regions

	Material	Points	Area
Region 1	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf	1,2,3,4,5,6,7,8,9,10,11,12	7,686 ft ²
Region 2	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf	12,11,10,9,13,14	9,770.5 ft ²

Slip Results

Slip Surfaces Analysed: 300 of 405 converged

Current Slip Surface

Slip Surface: 388

Factor of Safety: 1.003

Volume: 775.96125 ft³

Weight: 89,235.543 lbf

Resisting Moment: 1,504,929.9 lbf-ft

Activating Moment: 1,499,773.9 lbf-ft

Resisting Force: 22,748.175 lbf

Activating Force: 22,678.117 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (100, 164) ft

Entry: (177.625, 184.33421) ft

Radius: 59.727386 ft

Center: (127.60074, 216.96754) ft

Slip Slices

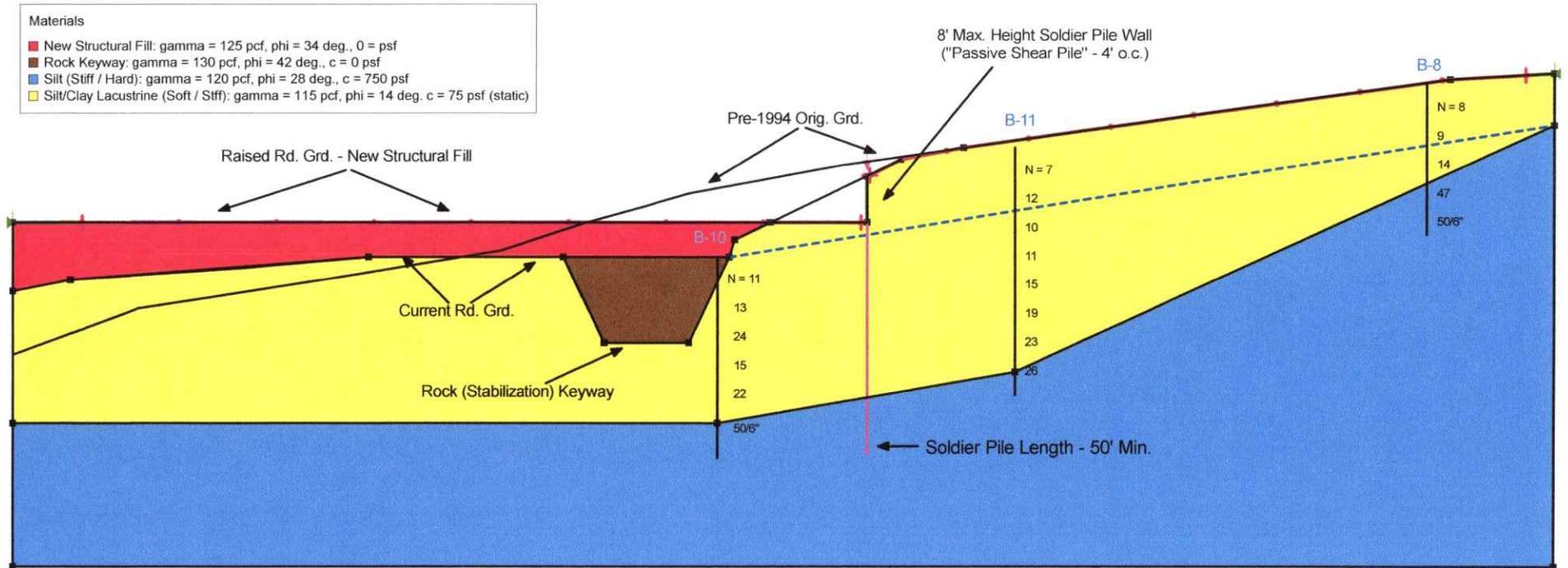
	X	Y	PWP	Base Normal	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
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				Stress				
Slice 1	101.25 ft	163.38527 ft	0 psf	127.40232 psf	31.764965 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 2	103.75 ft	162.22593 ft	0 psf	285.85475 psf	71.271594 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 3	106.25 ft	161.20272 ft	0 psf	428.73957 psf	106.89678 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 4	108.75 ft	160.30825 ft	0 psf	554.6949 psf	138.30097 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 5	111.25 ft	159.53649 ft	0 psf	662.48359 psf	165.17571 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 6	113.75 ft	158.88254 ft	0 psf	751.13479 psf	187.27894 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 7	116.25 ft	158.34245 ft	0 psf	820.04565 psf	204.46034 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 8	118.75 ft	157.91309 ft	0 psf	869.03779 psf	216.67546 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 9	121.25 ft	157.59205 ft	0 psf	898.36806 psf	223.98831 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 10	123.75 ft	157.37758 ft	0 psf	908.69758 psf	226.56375 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 11	125.5 ft	157.2792 ft	424.6013 psf	1,063.1532 psf	159.20887 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 12	127.31818 ft	157.25537 ft	444.34609 psf	1,309.0731 psf	215.60066 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma =

								115 pcf, phi = 14 deg. c = 75 psf
Slice 13	129.95455 ft	157.30113 ft	467.96135 psf	1,422.8122 psf	238.07107 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 14	132.59091 ft	157.46368 ft	484.28574 psf	1,514.5986 psf	256.88585 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 15	135.22727 ft	157.74397 ft	493.25911 psf	1,585.8409 psf	272.41123 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 16	137.86364 ft	158.14371 ft	494.77618 psf	1,638.1429 psf	285.07334 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 17	140.5 ft	158.66533 ft	488.68324 psf	1,673.158 psf	295.32272 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 18	143.13636 ft	159.31217 ft	474.77331 psf	1,692.4576 psf	303.6028 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 19	145.77273 ft	160.0885 ft	452.77906 psf	1,697.4178 psf	310.32329 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 20	148.40909 ft	160.99973 ft	422.36324 psf	1,689.1217 psf	315.83836 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 21	151.04545 ft	162.05259 ft	383.10547 psf	1,668.2751 psf	320.42876 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 22	153.68182 ft	163.25543 ft	334.48424 psf	1,635.1259 psf	324.28638 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 23	156.25677 ft	164.583 ft	277.45961 psf	1,550.1045 psf	317.30601 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 24	158.77032 ft	166.03968 ft	211.75758 psf	1,414.8544 psf	299.96573 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft /

								Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 25	161.28387 ft	167.66753 ft	135.36956 psf	1,267.9521 psf	282.38454 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 26	163.79742 ft	169.48424 ft	47.191296 psf	1,106.5847 psf	264.13643 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 27	166.31128 ft	171.51285 ft	-54.213038 psf	934.80891 psf	233.07404 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 28	168.82544 ft	173.78346 ft	-170.72238 psf	752.72567 psf	187.67559 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 29	171.3396 ft	176.33674 ft	-304.87917 psf	550.22393 psf	137.18623 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 30	173.85376 ft	179.23076 ft	-460.3077 psf	321.29159 psf	80.106989 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf
Slice 31	176.36792 ft	182.55287 ft	-642.46259 psf	57.579287 psf	14.356129 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf

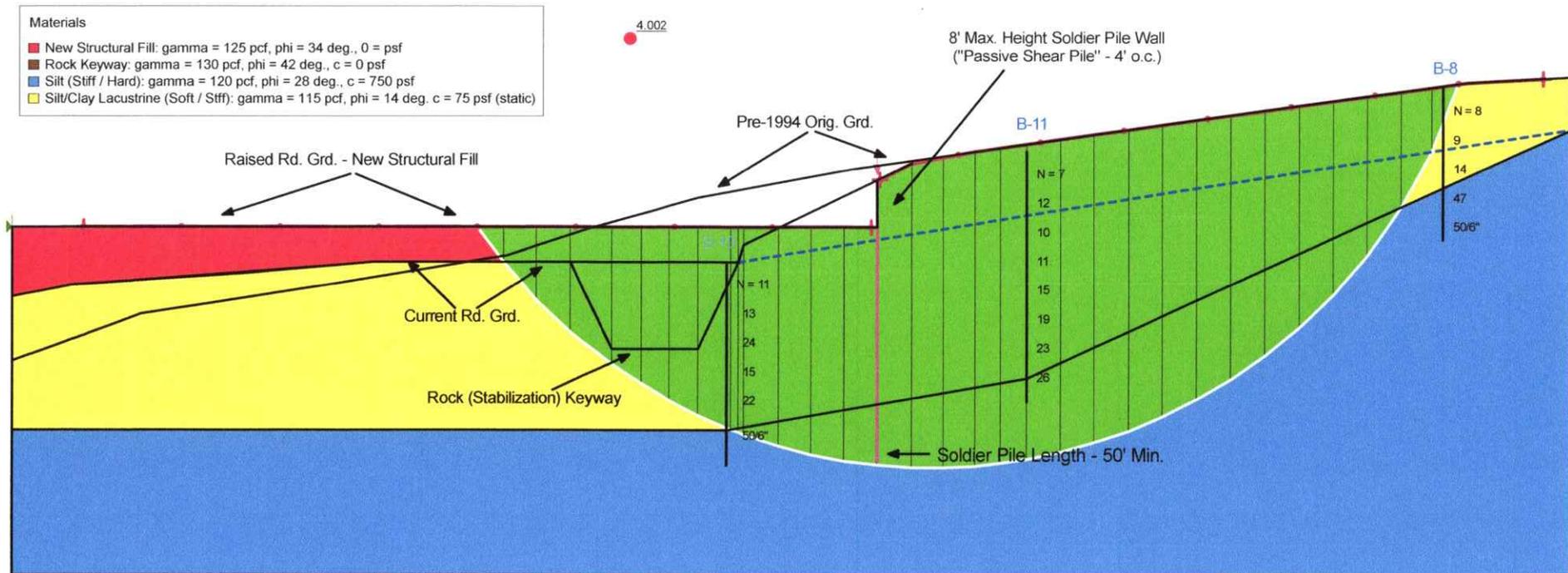
Section A-A' Proposed Mitigation Case Model Geometry



Section A-A'

Proposed Mitigation Case

FS = 4.0 (Static)



Proposed Mitigation - Static

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File Information

File Version: 10.02
Created By: Ray Coglas
Last Edited By: Ray Coglas
Revision Number: 86
Date: 11/01/2024
Time: 06:15:59 AM
Tool Version: 10.2.1.19666
File Name: Proposed Mitigation Case.gsz
Directory: C:\Users\ray.coglas\Desktop\Pioneer Point 2\New Mitigation Case\
Last Solved Date: 11/01/2024
Last Solved Time: 06:16:00 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Proposed Mitigation

Description: Mitigation Case

Kind: SLOPE/W

Method: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from: Piezometric Line

Apply Phreatic Correction: No

Use Staged Rapid Drawdown: No

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Right to Left

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: (none)

Distribution

F of S Calculation Option: Constant

Advanced

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

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
Max Absolute Lambda: 2

Materials

Silt/Clay Lacustrine (Soft / Stff): $\gamma = 115$ pcf, $\phi = 14$ deg. $c = 75$ psf (static)

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 75 psf
Phi': 14 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Silt (Stiff / Hard): $\gamma = 120$ pcf, $\phi = 28$ deg., $c = 750$ psf

Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 750 psf
Phi': 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

New Structural Fill: $\gamma = 125$ pcf, $\phi = 34$ deg., $c = 0$ psf

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 0 psf
Phi': 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Rock Keyway: $\gamma = 130$ pcf, $\phi = 42$ deg., $c = 0$ psf

Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 0 psf
Phi': 42 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforcements

New Reinforcement

Type: Pile
Shear Force: 162,000 lbf
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 4 ft

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (12, 170) ft

Left-Zone Right Coordinate: (148, 170) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (149.43506, 178.21753) ft
Right-Zone Right Coordinate: (263, 195.72222) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 170) ft
Right Coordinate: (268, 196) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	125 ft	164 ft
Coordinate 2	268 ft	187 ft

Seismic Coefficients

Horz Seismic Coef.: 0
Vert Seismic Coef.: 0

Reinforcement Lines

Reinforcement Line 1

Reinforcement: New Reinforcement
Lock to Ground Surface: No
Outside Point: (149, 178) ft
Inside Point: (149, 130) ft
Length: 48 ft
Orientation: -90 °
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	268 ft	187 ft
Point 2	175 ft	144 ft
Point 3	123 ft	135 ft

Point 4	0 ft	135 ft
Point 5	268 ft	110 ft
Point 6	0 ft	110 ft
Point 7	0 ft	158 ft
Point 8	10 ft	160 ft
Point 9	62 ft	164 ft
Point 10	96 ft	164 ft
Point 11	103 ft	149 ft
Point 12	118 ft	149 ft
Point 13	125 ft	164 ft
Point 14	126 ft	167 ft
Point 15	0 ft	170 ft
Point 16	132.21429 ft	170 ft
Point 17	132 ft	170 ft
Point 18	149 ft	170 ft
Point 19	149 ft	178 ft
Point 20	155 ft	181 ft
Point 21	166 ft	183 ft
Point 22	250 ft	195 ft
Point 23	268 ft	196 ft

Regions

	Material	Points	Area
Region 1	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf	4,3,2,1,5,6	9,770.5 ft ²
Region 2	Rock Keyway: gamma = 130 pcf, phi = 42 deg., c = 0 psf	10,13,12,11	330 ft ²
Region 3	New Structural Fill: gamma = 125 pcf, phi = 34 deg., 0 = psf	15,7,8,9,10,13,14,17	917.5 ft ²
Region 4	Silt/Clay Lacustrine (Soft / Stiff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)	7,4,3,2,1,23,22,21,20,19,18,17,14,13,12,11,10,9,8	7,306 ft ²

Slip Results

Slip Surfaces Analysed: 91 of 405 converged

Current Slip Surface

Slip Surface: 219

Factor of Safety: 4.002

Volume: 6,163.437 ft³

Weight: 723,179.63 lbf

Resisting Moment: 32,178,781 lbf·ft

Activating Moment: 8,041,163.6 lbf·ft

Resisting Force: 298,244.65 lbf

Activating Force: 74,527.684 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (80, 170) ft

Entry: (248.62464, 194.80352) ft

Radius: 94.729954 ft

Center: (158.292, 223.33035) ft

Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	82.221506 ft	167 ft	0 psf	497.55724 psf	335.6066 psf	0 psf	0 psf	New Structural Fill: gamma = 125 pcf, phi = 34 deg., 0 = psf
Slice 2	87.332259 ft	160.72519 ft	0 psf	1,292.4237 psf	322.23741 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 3	93.110753 ft	154.70608 ft	0 psf	2,086.6119 psf	520.25077 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 4	99.5 ft	149.18649 ft	0 psf	2,947.7011 psf	734.94444 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 5	105.5 ft	144.73201 ft	0 psf	3,662.2781 psf	913.10848 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 6	110.5 ft	141.59112 ft	0 psf	4,069.9487 psf	1,014.7522 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 7	115.5 ft	138.86287 ft	0 psf	4,410.8997 psf	1,099.7608 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 8	120.86858 ft	136.36197 ft	0 psf	4,604.924 psf	1,148.1365 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 9	124.36858 ft	134.8854 ft	0 psf	4,923.9293 psf	2,618.0996 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 10	125.5 ft	134.45873 ft	1,849.2876 psf	4,795.8547 psf	1,566.7175 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf

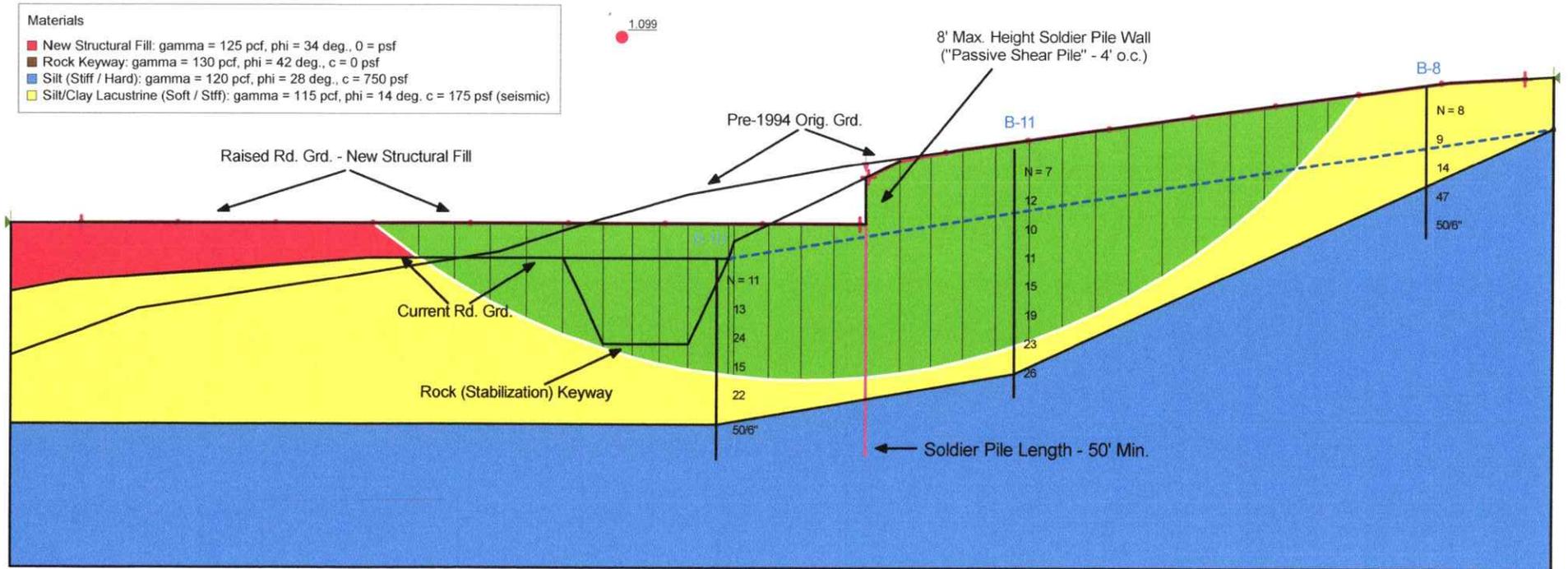
Slice 11	129 ft	133.29819 ft	1,956.8847 psf	4,872.4797 psf	1,550.2494 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 12	134.83333 ft	131.59757 ft	2,121.6282 psf	4,995.6364 psf	1,528.1372 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 13	140.5 ft	130.33096 ft	2,257.6036 psf	5,066.1944 psf	1,493.3542 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 14	146.16667 ft	129.42306 ft	2,371.1839 psf	5,079.0879 psf	1,439.8181 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 15	152 ft	128.85742 ft	2,465.071 psf	6,173.1663 psf	1,971.6292 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 16	157.75 ft	128.64187 ft	2,536.2645 psf	6,301.466 psf	2,001.9932 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 17	163.25 ft	128.77032 ft	2,583.4722 psf	6,269.5041 psf	1,959.8979 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 18	168.25 ft	129.15241 ft	2,609.8241 psf	6,197.9844 psf	1,907.8587 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 19	172.75 ft	129.7379 ft	2,618.4578 psf	6,096.3217 psf	1,849.2131 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 20	177.90358 ft	130.70022 ft	2,610.1282 psf	5,955.3697 psf	1,778.6965 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 21	183.71074 ft	132.12417 ft	2,579.5413 psf	5,770.6233 psf	1,696.7284 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 22	189.51789 ft	133.94775 ft	2,524.0057 psf	5,553.4863 psf	1,610.8034 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 23	195.32505 ft	136.19618 ft	2,441.9472 psf	5,303.9218 psf	1,521.7389 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 24	201.13221 ft	138.90358 ft	2,331.2345 psf	5,020.065 psf	1,429.6765 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 25	206.93936 ft	142.11617 ft	2,188.9827 psf	4,697.7939 psf	1,333.9585 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf,

								phi = 28 deg., c = 750 psf
Slice 26	212.74652 ft	145.89735 ft	2,011.234 psf	4,330.0486 psf	1,232.9356 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 27	218.55368 ft	150.33639 ft	1,792.4147 psf	3,905.6701 psf	1,123.6378 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 28	224.36083 ft	155.56436 ft	1,524.3425 psf	3,407.2632 psf	1,001.1667 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 29	230.16799 ft	161.78624 ft	1,194.2201 psf	2,806.8594 psf	857.45556 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 30	235.97515 ft	169.3563 ft	779.93116 psf	2,055.7372 psf	678.35809 psf	750 psf	0 psf	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf
Slice 31	241.47918 ft	178.344 ft	274.09455 psf	1,510.6875 psf	308.31726 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)
Slice 32	246.35214 ft	188.97809 ft	-340.86373 psf	490.91412 psf	122.39864 psf	75 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 75 psf (static)

Section A-A'

Proposed Mitigation Case

FS = 1.1 (Seismic)



Proposed Mitigation - Seismic

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File Information

File Version: 10.02
Created By: Ray Coglas
Last Edited By: Ray Coglas
Revision Number: 88
Date: 11/01/2024
Time: 06:20:57 AM
Tool Version: 10.2.1.19666
File Name: Proposed Mitigation Case.gsz
Directory: C:\Users\ray.coglas\Desktop\Pioneer Point 2\New Mitigation Case\
Last Solved Date: 11/01/2024
Last Solved Time: 06:20:58 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Proposed Mitigation

Description: Mitigation Case

Kind: SLOPE/W

Method: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from: Piezometric Line

Apply Phreatic Correction: No

Use Staged Rapid Drawdown: No

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Right to Left

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: (none)

Distribution

F of S Calculation Option: Constant

Advanced

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

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
Max Absolute Lambda: 2

Materials

Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 175 psf
Phi': 14 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf

Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 750 psf
Phi': 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

New Structural Fill: gamma = 125 pcf, phi = 34 deg., 0 = psf

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 0 psf
Phi': 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Rock Keyway: gamma = 130 pcf, phi = 42 deg., c = 0 psf

Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 0 psf
Phi': 42 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforcements

New Reinforcement

Type: Pile
Shear Force: 162,000 lbf
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 4 ft

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (12, 170) ft

Left-Zone Right Coordinate: (148, 170) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (149.43506, 178.21753) ft
Right-Zone Right Coordinate: (263, 195.72222) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 170) ft
Right Coordinate: (268, 196) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	125 ft	164 ft
Coordinate 2	268 ft	187 ft

Seismic Coefficients

Horz Seismic Coef.: 0.255
Vert Seismic Coef.: 0

Reinforcement Lines

Reinforcement Line 1

Reinforcement: New Reinforcement
Lock to Ground Surface: No
Outside Point: (149, 178) ft
Inside Point: (149, 130) ft
Length: 48 ft
Orientation: -90 °
Slip Surface Intersection: (149, 143.33259) ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	268 ft	187 ft
Point 2	175 ft	144 ft

Point 3	123 ft	135 ft
Point 4	0 ft	135 ft
Point 5	268 ft	110 ft
Point 6	0 ft	110 ft
Point 7	0 ft	158 ft
Point 8	10 ft	160 ft
Point 9	62 ft	164 ft
Point 10	96 ft	164 ft
Point 11	103 ft	149 ft
Point 12	118 ft	149 ft
Point 13	125 ft	164 ft
Point 14	126 ft	167 ft
Point 15	0 ft	170 ft
Point 16	132.21429 ft	170 ft
Point 17	132 ft	170 ft
Point 18	149 ft	170 ft
Point 19	149 ft	178 ft
Point 20	155 ft	181 ft
Point 21	166 ft	183 ft
Point 22	250 ft	195 ft
Point 23	268 ft	196 ft

Regions

	Material	Points	Area
Region 1	Silt (Stiff / Hard): gamma = 120 pcf, phi = 28 deg., c = 750 psf	4,3,2,1,5,6	9,770.5 ft ²
Region 2	Rock Keyway: gamma = 130 pcf, phi = 42 deg., c = 0 psf	10,13,12,11	330 ft ²
Region 3	New Structural Fill: gamma = 125 pcf, phi = 34 deg., 0 = psf	15,7,8,9,10,13,14,17	917.5 ft ²
Region 4	Silt/Clay Lacustrine (Soft / Stiff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)	7,4,3,2,1,23,22,21,20,19,18,17,14,13,12,11,10,9,8	7,306 ft ²

Slip Results

Slip Surfaces Analysed: 164 of 405 converged

Current Slip Surface

Slip Surface: 168

Factor of Safety: 1.099

Volume: 3,979.8674 ft³

Weight: 466,253.67 lbf

Resisting Moment: 14,994,702 lbf·ft

Activating Moment: 13,642,764 lbf·ft

Resisting Force: 116,490.19 lbf

Activating Force: 105,957.56 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (63, 170) ft

Entry: (234.36008, 192.76573) ft

Radius: 117.60252 ft

Center: (138.17757, 260.43609) ft

Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	66.934536 ft	167 ft	0 psf	796.01413 psf	536.91831 psf	0 psf	0 psf	New Structural Fill: gamma = 125 pcf, phi = 34 deg., 0 = psf
Slice 2	74.010437 ft	161.95322 ft	0 psf	1,455.0792 psf	362.79199 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 3	80.293169 ft	158.12909 ft	0 psf	2,043.373 psf	509.4701 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 4	86.575902 ft	154.81697 ft	0 psf	2,544.4364 psf	634.39923 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 5	92.858634 ft	151.9697 ft	0 psf	2,950.927 psf	735.74872 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 6	99.5 ft	149.43761 ft	0 psf	3,406.0768 psf	849.23034 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 7	105.5 ft	147.4947 ft	0 psf	3,738.3527 psf	932.076 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 8	110.5 ft	146.16584 ft	0 psf	3,835.214 psf	956.22625 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 9	115.5 ft	145.06889 ft	0 psf	3,876.7411 psf	966.58011 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 10	121.5 ft	144.07583 ft	0 psf	3,735.9665 psf	931.48107 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma =

								115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 11	125.5 ft	143.51997 ft	1,283.593 psf	3,426.7293 psf	534.34389 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 12	129 ft	143.23084 ft	1,336.7875 psf	3,336.9633 psf	498.69983 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 13	134.83333 ft	142.9153 ft	1,415.0604 psf	3,205.4337 psf	446.3902 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 14	140.5 ft	142.89065 ft	1,473.4993 psf	3,065.1536 psf	396.84399 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 15	146.16667 ft	143.13961 ft	1,514.857 psf	2,904.8982 psf	346.5762 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 16	152 ft	143.68778 ft	1,539.2087 psf	5,207.8893 psf	914.70479 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 17	157.75 ft	144.50725 ft	1,545.786 psf	3,683.3604 psf	532.95716 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 18	163.25 ft	145.5718 ft	1,534.5525 psf	3,546.1024 psf	501.53574 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 19	168.894 ft	146.9554 ft	1,504.8466 psf	3,388.1482 psf	469.55982 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 20	174.68199 ft	148.68408 ft	1,455.0437 psf	3,210.8951 psf	437.78293 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft /

								Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 21	180.46999 ft	150.74523 ft	1,384.4842 psf	3,027.7808 psf	409.71985 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 22	186.25799 ft	153.15809 ft	1,291.9676 psf	2,835.8804 psf	384.9407 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 23	192.04598 ft	155.94711 ft	1,175.9669 psf	2,630.5927 psf	362.67895 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 24	197.83398 ft	159.14351 ft	1,034.5335 psf	2,405.4911 psf	341.8181 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 25	203.62197 ft	162.7875 ft	865.15704 psf	2,152.002 psf	320.84648 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 26	209.40997 ft	166.93174 ft	664.54996 psf	1,858.8135 psf	297.76335 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 27	215.19796 ft	171.64681 ft	428.30548 psf	1,510.8402 psf	269.90623 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 28	220.98596 ft	177.03049 ft	150.31991 psf	1,087.3909 psf	233.63804 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
Slice 29	226.49999 ft	182.88781 ft	-159.98615 psf	620.63271 psf	154.74111 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)

Slice 30	231.74005 ft	189.31879 ft	-508.85672 psf	109.59405 psf	27.324865 psf	175 psf	0 psf	Silt/Clay Lacustrine (Soft / Stff): gamma = 115 pcf, phi = 14 deg. c = 175 psf (seismic)
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