APPENDIX F-1

Geology and Soils

GeoLabs Report Sept 14, 2018

APPENDIX F

GEOLABS-WESTLAKE VILLAGE
Foundation and Soils Engineering, Geology
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a dba of
R & R Services
Corporation

September 14, 2018
W.O. 8980

SLPR, LLC.
c/o Manuel Mancha
865 S. Miliken Ave., Suite E
Ontario, California 91761

Attention: Mr. Manuel Mancha

SUBJECT: Update Geotechnical Report,
Tentative Tract Map 5658-A, North Canyon Ranch,
City of Simi Valley, California

Mr. Mancha:

In accordance with your request, we present herein a report to address modifications to the Tentative Tract map and their impact on feasibility of the proposed development. Updated geotechnical design criteria pertain to slope stability. The scope of work included a review of the latest Tentative Tract Map 5658-A provided by Christiansen & Company, referenced reports, current codes, and local practices. The interested reader may consult the referenced Geolabs-Westlake Village reports for a more thorough characterization of the on-site soil conditions. Criteria presented in the referenced reports remain applicable to development of the site unless superseded herein.

Cross sections presented in our previous reports have been revised to illustrate the new proposed grades and several new cross sections were drawn for the same purpose. The cross sections are enclosed as Plates 2.1 through 2.24. However, cross section G2 is not included since there is no longer any proposed grading along this section. As such, there is no Plate 2.2 included with this report, the cross section plates skip from Plate 2.1 to Plate 2.3. The locations of cross sections are shown on the enclosed Geologic Map (Plate 1.2). The new cross sections include: G20.1 and G21 through G24.

TENTATIVE TRACT MAP MODIFICATIONS

The townhome site, formerly known as the apartment site, i.e. Parcel 161, has been expanded to both the east and west via proposed retaining walls. On the west side a maximum seven foot tall retaining wall is proposed. On the east side two retaining walls surrounded by slopes are proposed. The maximum wall height there is ten feet. This is the maximum height of any proposed retaining wall on the site.

Former Lots 69 through 84 located at the northern limit of the central canyon was eliminated. This area is now to remain native. A new perimeter cut slope that crosses the alluvial portion of the canyon was added to accommodate this plan change. It attains a maximum height of approximately 35 feet.

Perimeter slopes about the lots in the central canyon were revised. These are the slopes that rebuild the areas affected by removals of landslides Qls1 and Qls2, and the fine-grained bed removal illustrated in cross sections G3, G4, and G19. The revisions generally lower the proposed grade.

A fire district access road was added that runs northward up the western canyon beyond the residential area. Various 2:1 (horizontal:vertical) gradient sliver cut and fill slopes are proposed along the road alignment to a maximum height of approximately 40 feet.

Minor revisions were made to the configurations of the various proposed debris basins and detention ponds. An approximately 75 foot tall 2:1 cut slope was added to the east side of the eastern detention pond located in the southeastern portion of the subject site.

Proposed contours were provided for the central ridge buttress area illustrated in cross section G1. This configuration requires buttressing to mitigate the presence of shallow dipping fine-grained beds within the bedrock. This new buttress expands the limits of grading (see Plate 1.2). The buttress design is discussed below in the "SLOPE STABILITY" section of this report.

Residential lots were generally renumbered and realigned. Proposed pad grades in the southern portion of the canyons are typically within 5 feet of their previous elevations, while pads in the northern part of the canyons are typically 10 to 20 feet lower. Pads located along the central ridgeline are roughly the same grade. An eight-foot-tall retaining wall was added to

the north side of Lot 64. Inter-lot walls throughout the subject site were reconfigured and attain a maximum height of 10 feet between Lots 63 and 70.

Minor revisions were made to the contours for the proposed slope at the southwest entrance to the site.

SLOPE STABILITY

Relevant new slopes, and slopes significantly affected by modifications to the tentative tract map are discussed individually in the following sections. Slope stability analyses were performed on slopes that might affect project feasibility or limits of grading. Analyses were performed using Spencer's Method as coded in the computer software Slide, v.7.036 (Rocscience, 1998-2018). Spencer's Method is a limit-equilibrium method of analyses which satisfies both moment and force equilibrium. A search of postulated failure surfaces was performed in order to determine the critical failure surface. The results of the analyses are provided as a factor of safety. The factor of safety is defined as the quotient of available shear strength divided by the shear strength mobilized. The minimum computed factor of safety for the static permanent case is in excess of 1.5, for the pseudostatic case it is in excess of 1.1, considering a pseudostatic coefficient of 0.20, and for the temporary case it is in excess of 1.25. Shear strengths, unit weights, and tension crack heights used are consistent with our previous reports. The results are presented and discussed in the following sections. The computer output is presented in Appendix A.

Fire District Access Road

Enhancement of the dirt access road is proposed along the west side, and farther north, along the axis of the west canyon north of the subject site. The canyon is bounded by bedrock slopes that ascend on the order of 60 to 80 feet at a gradient from 1:1 to 1.5:1 (horizontal:vertical) before rounding to flatter gradients as they approach the ridgeline. Several 2:1 gradient slopes are proposed to create space for the road alignment. The proposed slopes modify the natural slopes and range in height to a maximum of approximately 40 feet tall, although they are predominantly sliver cuts and fills which should be rebuilt as typical stability fills per the enclosed detail (see Plate B.1). At the grading plan stage it may be desirable to

adjust the proposed road alignment and/or methods of achieving the grade changes to eliminate the sliver cut and fill slopes and attendant stability fills.

The sliver cuts and fills are not of sufficient magnitude to materially impact the gross stability of the existing slopes (e.g. see cross section G17-G17'), or to alter conclusions regarding project feasibility.

Cross Section G1-G1'

Cross section G1-G1' (Plate 2.1) illustrates the proposed slope at the south end of the central ridge. This slope attains a maximum height of approximately 100 feet at a gradient of 2:1 (horizontal:vertical) between benches. Geologic structure and stratigraphy for this area, and slope stability analyses, were discussed in our previous reports (Geolabs 2007, 2008, 2010c, 2016a). Additional slope stability analyses were performed for this report considering the previous model and shear strengths (Geolabs 2016a) updated with current proposed grades.

There are three relevant fine-grained layers that were encountered in nearby borings and incorporated into the model. The depth range of each layer in each boring is indicated in the table below.

Fine-grained Layer	BA-26 (CTE)	B-14	BA-22 (CTE)	B-105 (PSE)
Upper	Not encountered	Not encountered	Not encountered	13 to 27 feet
Middle	11 to 22 feet	14 to 26 feet	14 to 26 feet	45 to 57 feet
Lower	36 to 48 feet	38 to 49 feet	40 to 50 feet	71 to 81 feet

Slope stability analyses considering proposed grades with along-bedding failures through these layers obtained inadequate factors of safety for both static and pseudostatic conditions. A buttress was designed to partially remove these layers such that adequate factors of safety may be obtained. The upper layer should be removed to an elevation of 1030 feet, the middle layer to an elevation of 1055 feet, and the lower layer to an elevation of 1080 feet. The removal is illustrated on the cross section (see Plate 2.1) and in the output from the slope stability analyses (see Appendix A). This buttress provides the slope adequate static and pseudostatic factors of safety considering along-bedding failures through each of the fine-grained layers as indicated in the table below.

Fine-grained Layer	Removal Elevation	Static Factor of Safety	Pseudostatic Factor of Safety	Location in Appendix A
Upper	1030 feet	1.754	1.175	PLATE A.1 to A.25
Middle	1055 feet	1.776	1.108	PLATE A.26 to A.49
Lower	1080 feet	1.754	1.116	PLATE A.50 to A.74

For the temporary condition exposed during construction, the portion of the backcut between the top of slope and the removal of the lower clay bed was found to be the most critical. A 2.5:1 (horizontal:vertical) gradient for this portion of the slope was found to provide an adequate factor of safety for the temporary condition of 1.417. Rotational analyses of the buttress configuration were not performed as a taller buttress was evaluated in a previous report with identical fill strengths and found to have adequate factors of safety (see GWV, 2007).

This slope and buttress configuration expands the limits of grading approximately 150 feet along the ridgeline. The anticipated limits of grading of slope stabilization have been revised on the enclosed Geologic Map (see Plate 1.2) to reflect the current buttress design.

Tall Retaining Walls

There are many retaining walls proposed at the subject site. Most are single walls that range in height from 1 to 10 feet. One set of walls located on the east end of the townhome site are stacked: each of the stacked walls varies in height to a maximum of 10 feet. Wall types and plans are not available at this time. To demonstrate feasibility the most critical wall configuration was selected for slope stability analyses.

The most critical wall configuration is located near the east side of the townhome site and consists of a 2:1 fill slope broken by two retaining walls, the upper wall attains a maximum height of 10 feet, and the lower a maximum height of 6 feet. The slope and walls are illustrated in cross section G20.1-G20.1' (see Plate 2.20.1). The walls will support compacted fill.

Rotational slope stability analyses were performed using Spencer's method for computing the factor of safety. Walls were simulated in the analysis by triangular pressure distributions assuming the retaining wall was designed to resist a standard equivalent fluid pressure of 30 pounds per cubic foot (pcf) for level backfill cases, and 43 pcf for 2:1 sloping

backfill (GWV, 2007). The surcharge from the proposed residential structures was simulated as a 500 pound per square foot (psf) distributed load setback seven feet from the top of slope. Preliminary analyses indicated relatively deep failure surfaces that go below both walls and exit near the toe of the slope had inadequate factors of safety.

To demonstrate feasibility, a series of geotextiles were input into the model to achieve adequate factors of safety. The geotextiles were assigned a tensile strength of 3120 lb/ft, equivalent to Mirafi Miragrid 10XT geogrid at 5% strain (see fact sheet on Plate 3). The earth material around the geogrids was assigned an assumed Mohr-Coulomb type shear strength with zero cohesion and a friction angle of 30 degrees. This type of select material is commonly used in the reinforced zone of mechanically stabilized earth walls. Considering the addition of geotextiles adequate static and pseudostatic factors of safety of 1.661 and 1.133 were obtained respectively (see Appendix A Plates A.75 to A.90).

Cross Section G21-G21'

Cross section G21-G21' (see Plate 2.21) was drawn through the proposed southeastern detention pond to illustrate changes to the northern ascending fill slope. Taller fill slopes have been evaluated for the subject site and have demonstrated adequate factors of safety, therefore additional slope stability analyses for this slope are not warranted.

Cross Section G22-G22'

Cross section G22-G22' (see Plate 2.22) was drawn through the proposed cut slope on the east side of the southeast detention pond. It attains a maximum height of 75 feet at a gradient of2:1 (horizontal:vertical) with the natural slope ascending an additional ten feet to the ridge crest.

Information on geologic structure and stratigraphy is available from nearby borings B-5 and B-10 (BYA), fault trench FT-2 (BYA), and field mapping by this office and that documented by Construction Testing and Engineering (CTE) during grading of Tract 5686 (CTE 2005, 2006, 2007).

Exposures of bedrock in the various exploratory excavations and during grading indicate the bedrock underlying this slope consists of interbedded sedimentary rocks of the Sespe

formation. These rocks are mostly sandstones with minor conglomerates interbedded with siltstones and claystones that are typically reddish in color.

Bedding attitudes measured in borings, the fault trench, and outcrop indicate bedding dips toward the south-southwest, with dips ranging from approximately 30 to 60 degrees. Field mapping by CTE indicates that the surface trace of Fault 2 passes through the proposed cut slope. This feature dips steeply toward the south with a near vertical orientation near the surface and is considered not active (BYA 2003, CTE 2004c).

The proposed cut slope gradient is nearly parallel to the strike of local bedding, and bedding is moderately dipping (steeper than the cut slope gradient) therefore out-of-slope along-bedding failures are not anticipated. Slope stability analyses considering rotational failures through similar bedrock materials have been performed on taller and steeper slopes within the subject site and were found to have adequate static and pseudostatic factors of safety (see discussion of cross section G2 in response to comment 20, Geolabs 2008); therefore, slope stability analyses of this slope are unwarranted.

Cross Section G23-G23'

Cross section G23-G23' (see Plate 2.23) was drawn through the proposed retaining wall on the west side of the townhome site. The wall attains a maximum height of seven feet at the corner and tapers to zero at each end. The wall will support compacted fill. The feasibility of taller retaining walls was evaluated in cross section G20.1-G20.1'. This cross section was drawn solely for illustration, no slope stability analyses were performed.

Cross Section G24-G24'

Cross section G24-G24' (see Plate 2.24) was drawn through the proposed cut slope at the north end of the central canyon behind Lots 52 to 55. This slope is anticipated to expose alluvium in the slope face and should be rebuilt as a typical stability fill per the enclosed detail (see Plate B.1). Removals of alluvium, landslide debris, or other unsuitable materials should be performed within a 1:1 projection from the edge of the building pads as illustrated in the cross section.

CODE UPDATES

During the course of this tentative tract approval process, applicable building codes experience triennial code adoption cycles. Prior to the design of the improvement plans, our office should be contacted to update geotechnical design criteria that may have been impacted by these code adoption cycles.

CLOSURE

This geotechnical report has been prepared in accordance with generally accepted engineering practices at this time and location. No other warranties either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

Thank you for this opportunity to be of service. Please do not hesitate to call if you have any questions regarding this report.

Respectfully submitted;
GEOLABS-WESTLAKE VILLAGE,

Ryan M. Prose
C.E.G. 2625

Ronald Z. Shmerling
C.E.G. 1047
R.C.E. 35444

RMP: RZS: af

Enclosures:

Reference List	Plates R1 & R2
Site Location Map	Plate 1.1
Geologic Map	Plate 1.2
Cross Sections	Plates 2.1 to 2.24
Geotextile Fact Sheet	Plate 3
Slope Stability Analyses	Appendix A
Typical Details	Appendix B

XC: (2) Addressee

REFERENCE LIST:

Al Atik, L, and Sitar, N. (2010). "Seismic Earth Pressures on Cantilever Retaining Structures." *J. Geotech. Geoenviron. Eng*., 136(10), 1324-1333.

Bing Yen & Associates, Inc. (BYA), February 21, 2003, Report of Feasibility-Level, Geotechnical Study, Proposed Simi Valley Town Center, Simi Valley, California, Vol. I and II, Project No. 49.25035.0074.

Bray, J.B., Travasarou, T., Zupan, J. (2010). "Seismic Displacement Design of Earth Retaining Structures." *Proc., 2010 Earth Retention Conference 3*, ASCE, Bellevue, WA., 638-655.

Construction Testing & Engineering, Inc. (CTE), May 17, 2004a; Grading Plan Design Level Geotechnical Investigation, Proposed Simi Valley Town Center, Simi Valley, California, Vol. I, II and III, CTE Job No. 30-0530.

…, June 3, 2004b; Addendum 1 Grading Plan Design Level Geotechnical Investigation, Proposed Simi Valley Town Center Project (Remedial Grading for Future Residential on Unocal Site), Ventura County, California, CTE Job No. 30-0530.

…, July 27, 2004c; Addendum 2 Grading Plan Design Level Geotechnical Investigation, Proposed Simi Valley Town Center, Simi Valley, California, Vol. I and II, CTE Job No. 30-0530.

…, August 25, 2004d; Addendum 3, Grading Plan Design Level Geotechnical Investigation, Proposed Simi Valley Town Center, Simi Valley, California, Vol. I and II, CTE Job No. 30-0530.

…, September 26, 2005; As-Graded Report, Mass Grading of Unocal Project Site, Ventura County, California, CTE Job No. 30-0599.

…, October 15, 2006; Addendum 1 to As-Graded Report, Mass Grading of Unocal Project Site, Ventura County, California, CTE Job No. 30-0599.

…, February 8, 2007; Addendum 2 to As-Graded Report, Mass Grading of Unocal Project Site, Ventura County, California, CTE Job No. 30-0599.

Geolabs-Westlake Village, October 6 2005; Tentative Tract Map North Canyon Ranch City of Simi Valley, California.

…, January 10, 2007; Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

…, June 30, 2008; Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

REFERENCE LIST:

…, January 29, 2010a; Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

…, March 19, 2010b; Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

…, November 24, 2010c; Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

…, February 15, 2012a; Evaluation of Geotechnical Feasibility, Proposed Apartment Construction, Portion of TT 5658, City of Simi Valley, California.

…, September 5, 2012b; Estimated Limits of Grading for Geotechnical Mitigation, Tentative Tract 5658, City of Simi Valley, California.

…, March 24, 2016a; Update Geotechnical Report, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, California.

…, July 29, 2016b; Response #5 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

Kramer, S.L. (1996). *Geotechnical Earthquake Engineering.* Prentice Hall, Upper Saddle River, New Jersey.

Lew, M., Sitar, N., Al Atik, L. (2010). "Seismic Earth Pressures: Fact or Fiction." *Proc., 2010 Earth Retention Conference 3*, ASCE, Bellevue, WA., 656-673.

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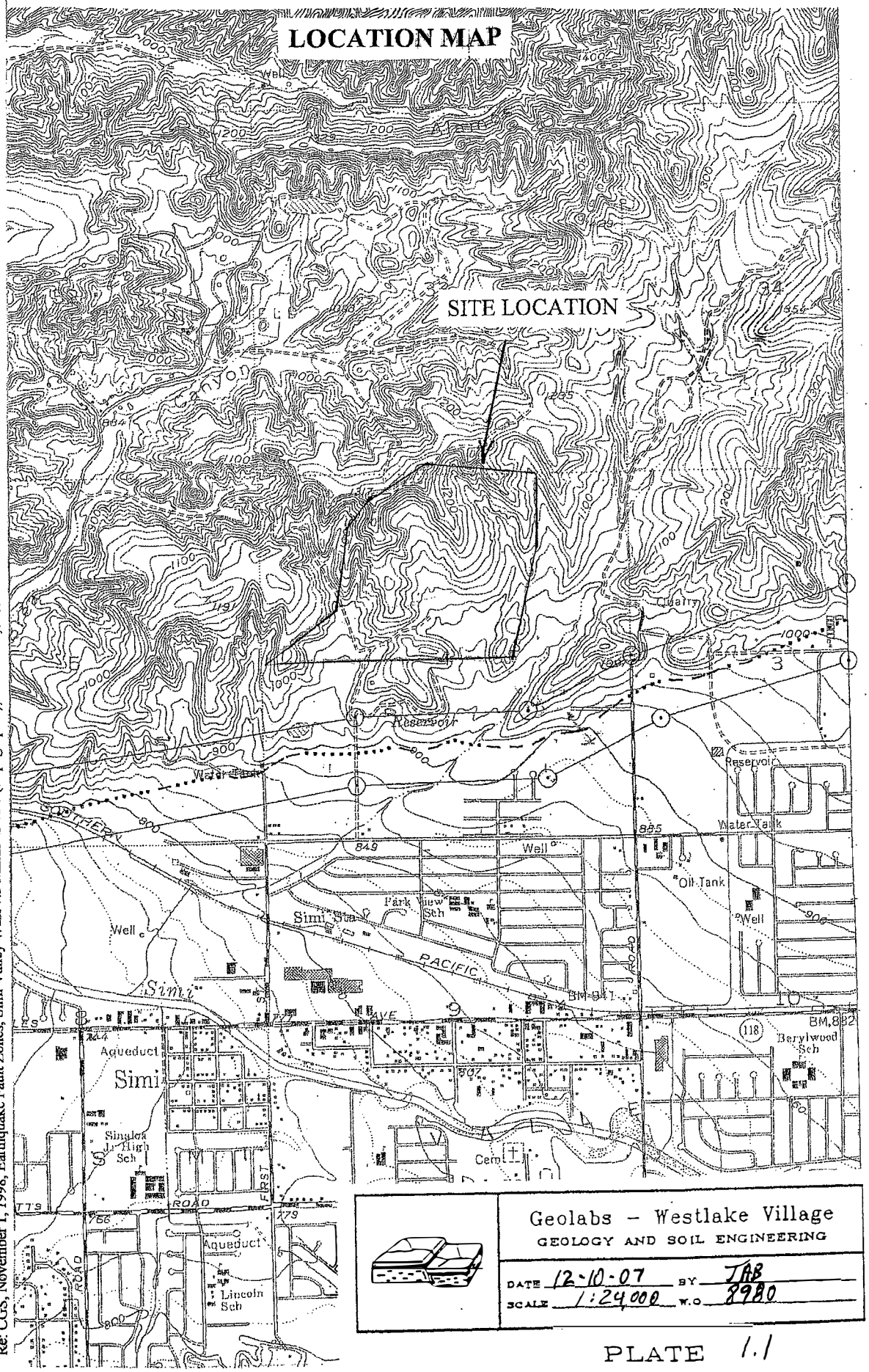
<http://earthquake.usgs.gov/designmaps/us/application.php>

LOCATION MAP



Re: CGS, November 1, 1998, Earthquake Fault Zones, Simi Valley West 7.5 Minute Series (Topographic), Scale 1:24,000.

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 12-10-07 BY JAB
SCALE 1:24,000 W.O 2980

PLATE 1.1

GEOLOGIC MAP - Tentative Tract 5658A

City of Simi Valley, CA

EXPLANATION

Lithologies:

af	Artificial Fill
Qal	Alluvium
Qls	Landslide Debris (circled where buried)
Ts	Sespe Formation

Attitudes:

- Strike and Dip of Bedding
- Approximate Strike and Dip of Bedding
- Strike and Dip of Contact
- Strike and Dip of Joint / Fracture
- Strike and Dip of Shear / Fault
- Strike and Dip of Landslide Rupture Surface

Exploratory Excavations:

- B-10 — Bucket Boring by BYA
- BA-29 (CTE) — Bucket Boring by CTE
- B-18 (CTE) — Hollow Stem Boring by CTE
- B-105 (PSE) — Bucket Boring by PSE
- HS-104 (PSE) — Hollow Stem Boring by PSE
- B-26 — Bucket Boring by GWV
- H-9 — Hollow Stem Boring by GWV
- TP-54 (CTE) TP-2 (CTE) — Approximate Location of Exploratory Trench by CTE
- CPT 2 (PSE) — Cone Penetration Test by PSE
- T-20 T-8 — Approximate Location of Exploratory Trench by GWV

- Anticipated Limit of Grading for Slope Stabilization
- Inferred axial trace of anticline (large arrowhead indicates direction of plunge)
- Fault - (dashed where inferred, dotted where concealed)
- Contact - (dashed where inferred, dotted where concealed)
- G24 G24' — Cross Section
- Existing Subdrain

N (Grid North)

100 50 25 0 100 200 300

1"=100'

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SCALE 1"=100' W.O. 9980

PLATE 1.2

P:\9980 Unocal\Geo 2016.dwg (Layout: 2-oct-2016 Rep. Plate 1)

G1

G1'

ELEVATION

1300

1200

1100

1000

Anticline Axis

Intersection G16-G16'

Intersection G18-G18'

Intersection G15-G15'

Intersection G9-G9'

B-13

BA-26 (CTE)
(Proj. 50ft. ~S70W)

B-14
(Proj. 170ft. NE)

BA-22 (CTE)
(Proj. 420ft. E)

B-105 (PSE)
(Proj. 90ft. SW)

Fault 1 (BYA)
CTE, 2005 BB-1
X-Sect.

Proposed
Grade

T-6

Static
1.751

Pseudo
1.116

Pseudo
1.109

Static
1.778

Limits of
Buttress Fill

Pseudo
1.175

Static
1.754

T-2 (CTE)
Projected 90' SW

EXISTING GRADE

Proposed
Grade

Ts

Ts

Sheared Claystone

Zone of Dislocation

N2W

40ft. Displacement
(CTE BB-1 X-sect.)

Revised 9/14/2018

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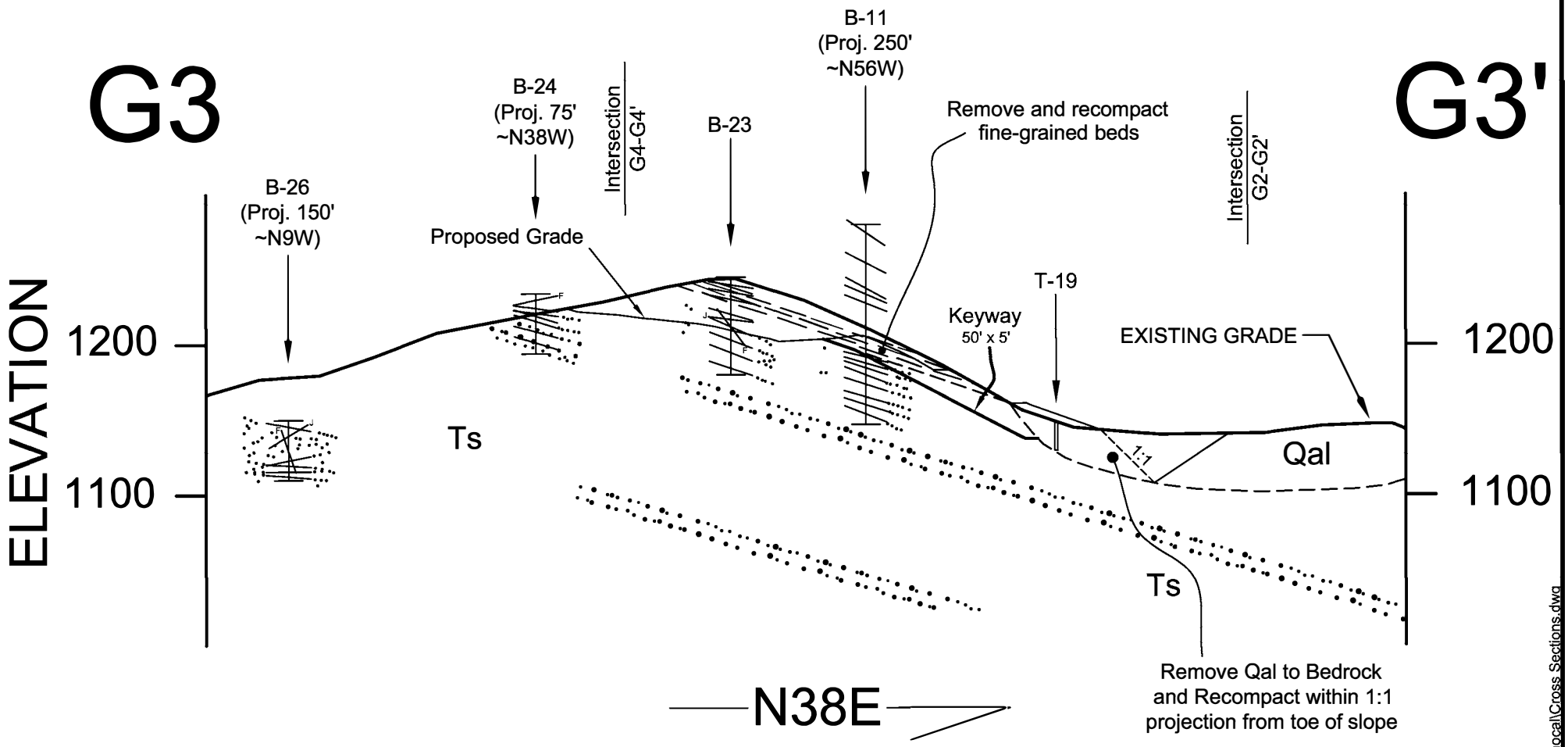
DATE 11/24 /2010 BY TC/JN
SCALE 1"=100' W.O. 8980

PLATE 2.1



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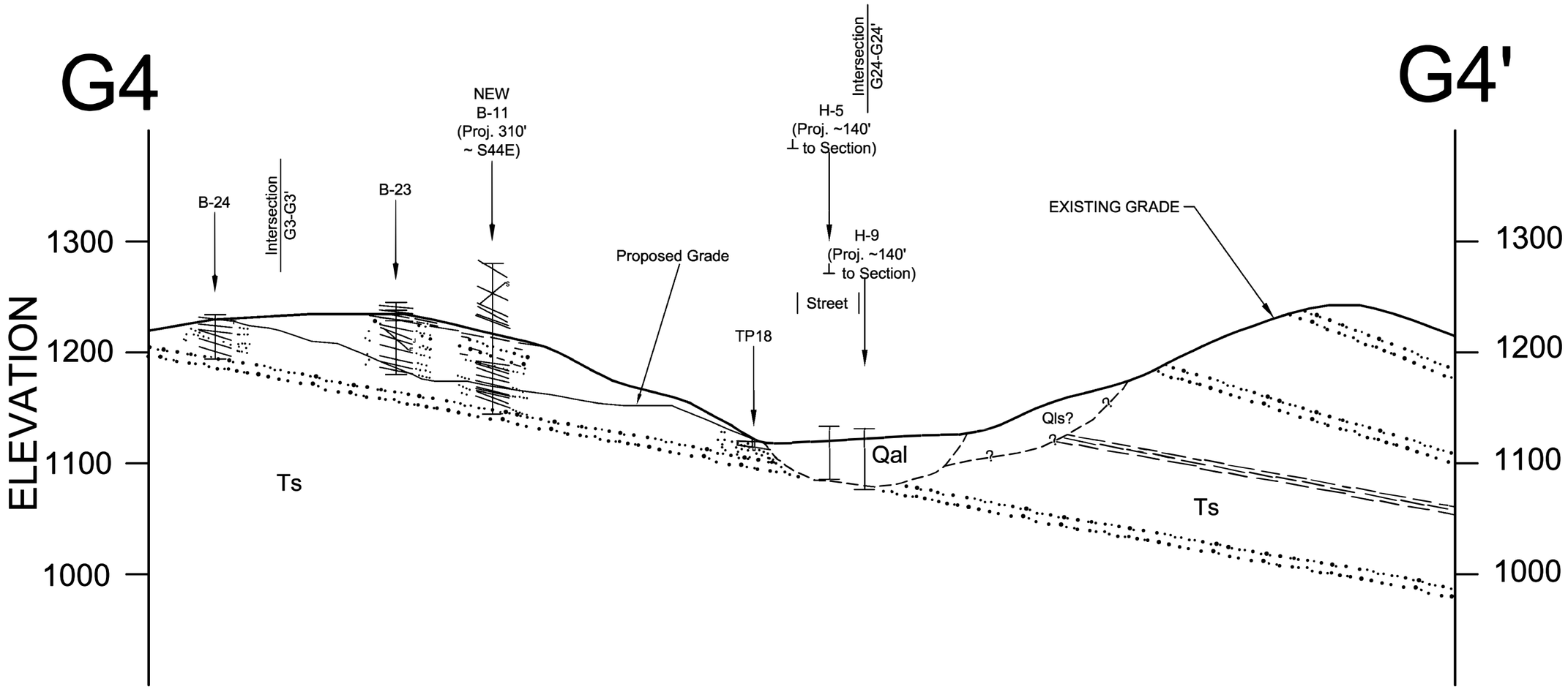
	Geolabs – Westlake Village GEOLOGY AND SOIL ENGINEERING
	DATE 9/14/2018 BY RMP SCALE 1"=100' W.O. 8980
	PLATE 2.3

G4

G4'



N66E

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PLATE 2.4

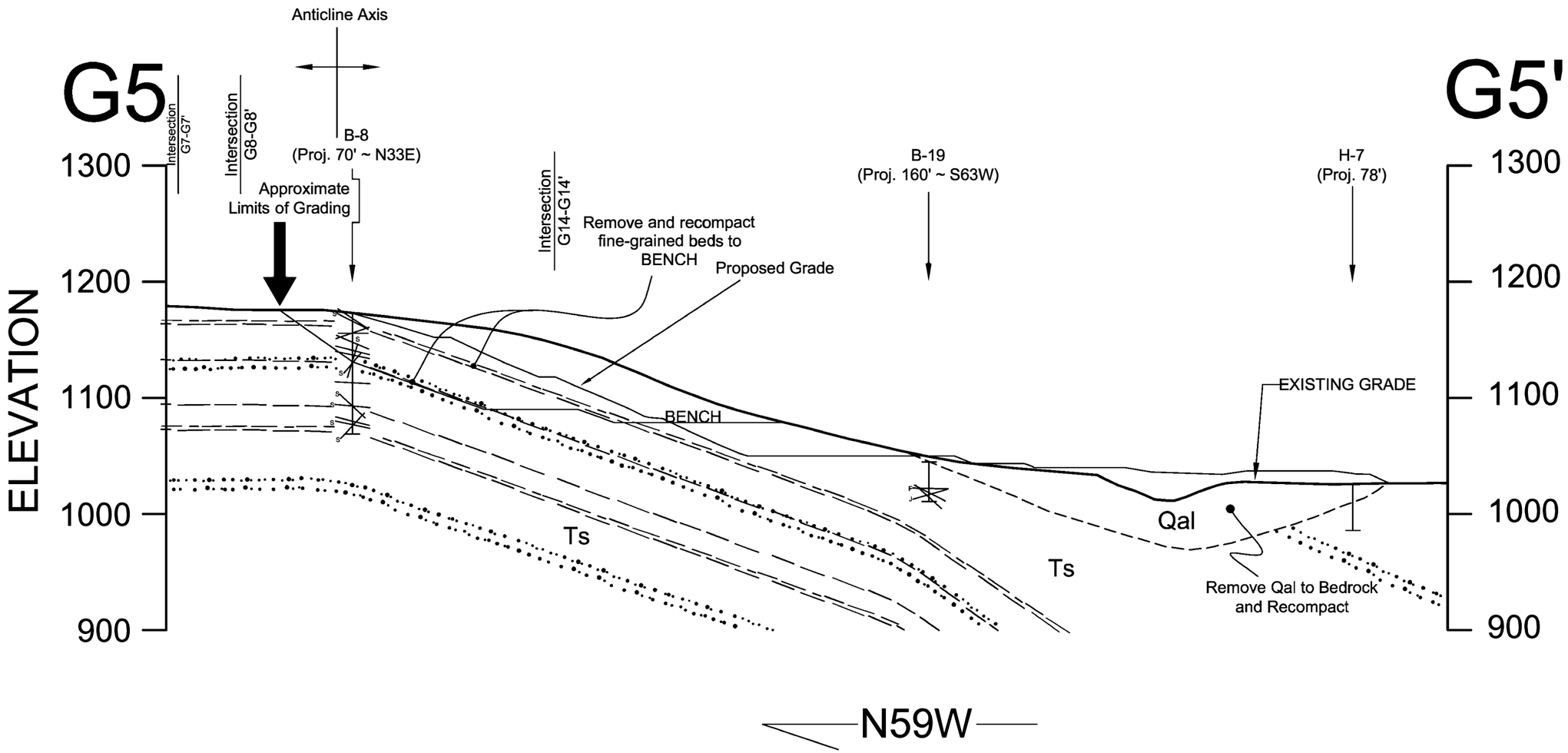

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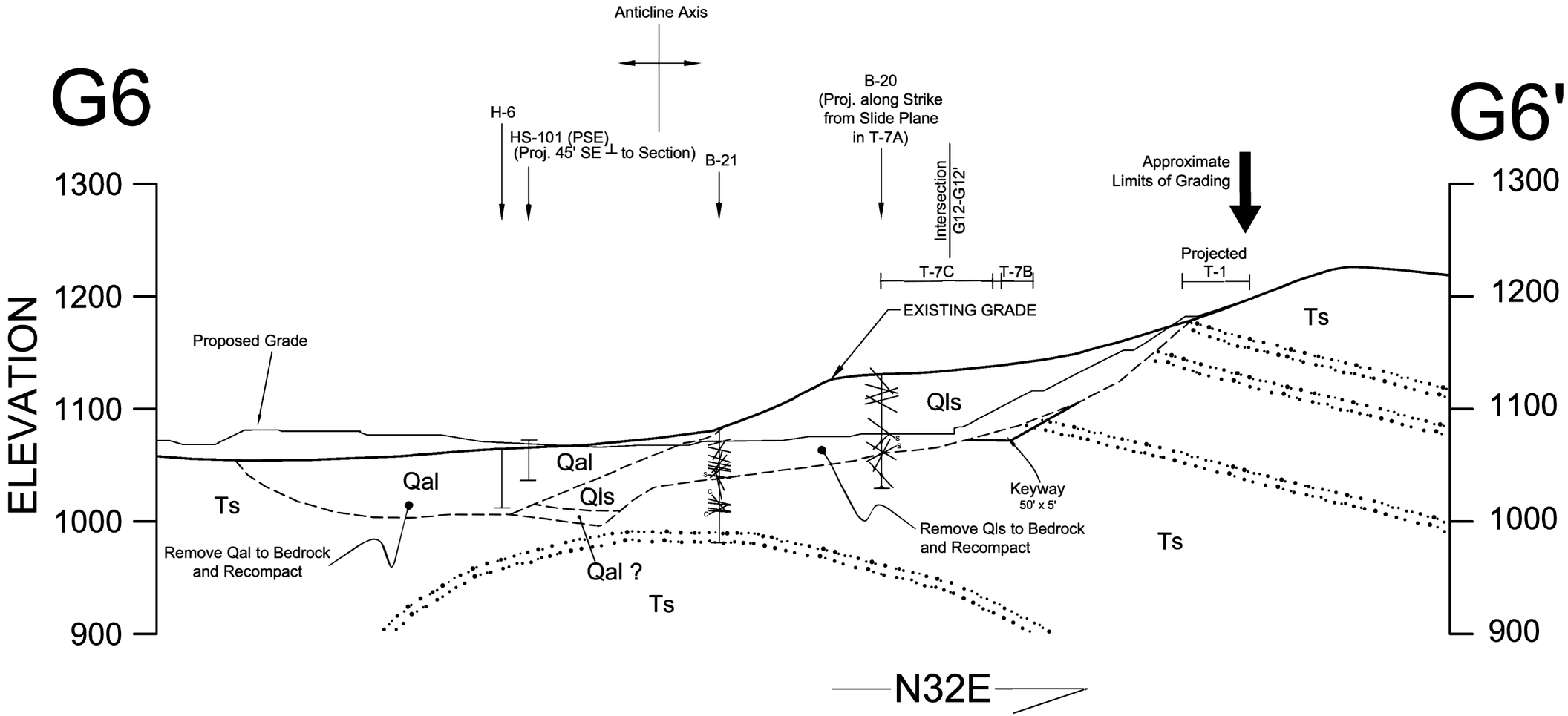
PLATE 2.5

G6



G6'

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SCALE 1"=100' W.O. 898.0

PLATE 2.6

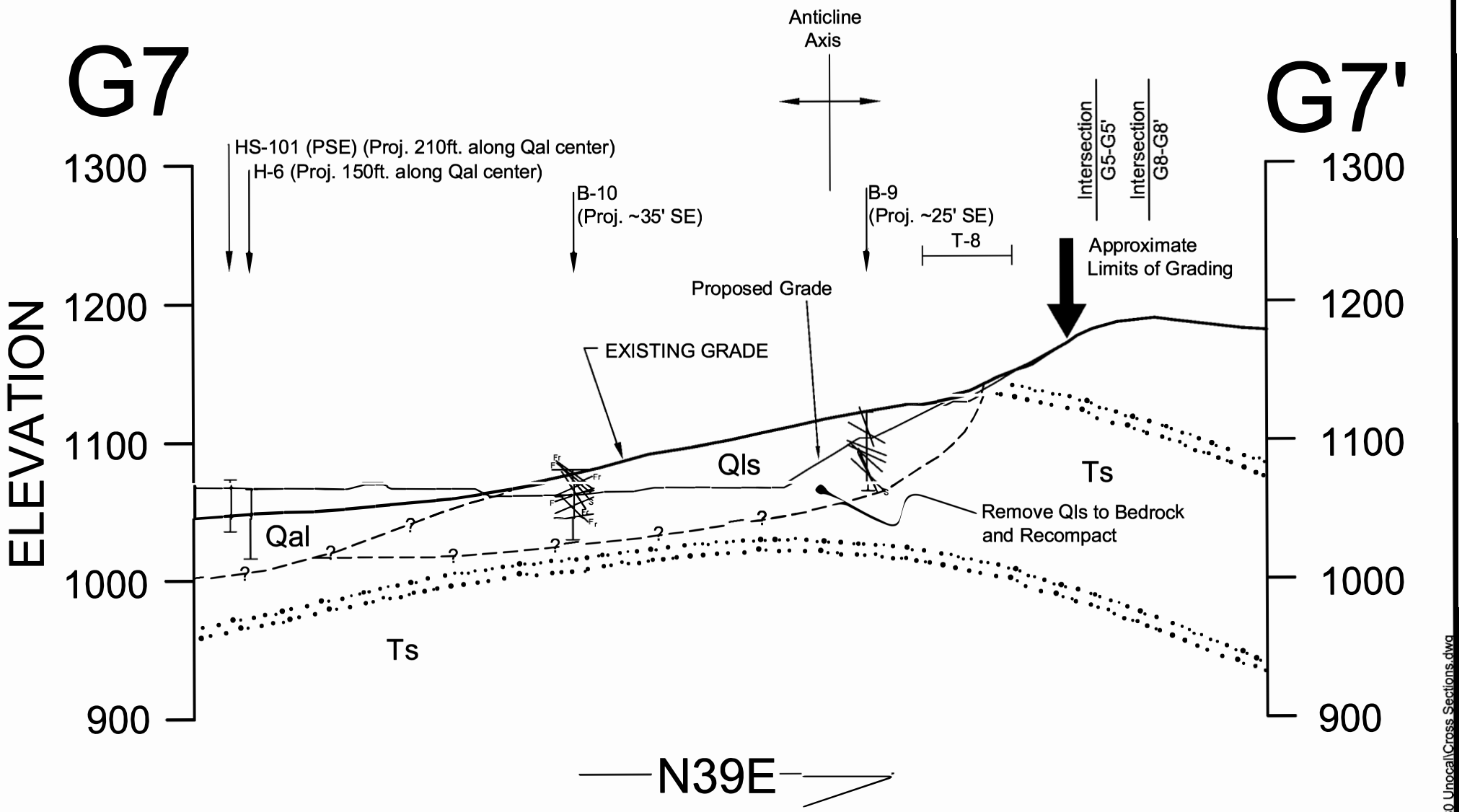

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PLATE 2.7

G8

G8'

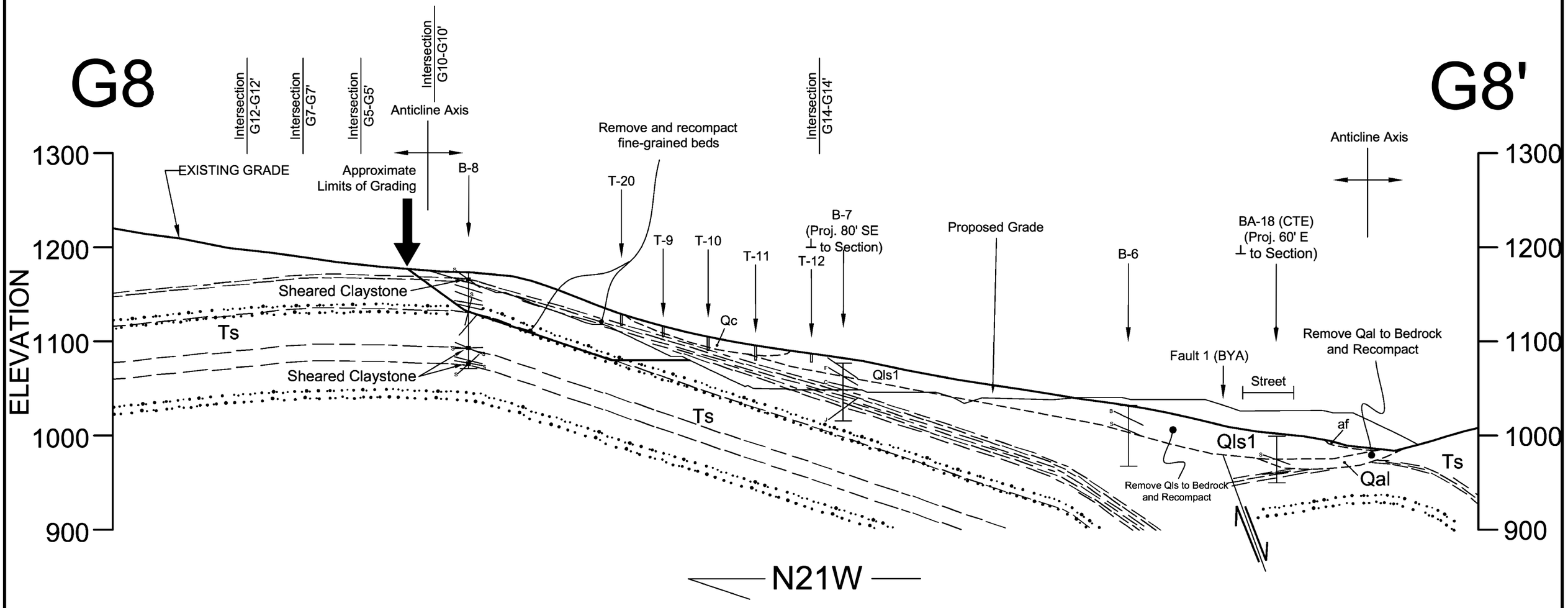

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PLATE 2.8

P:\8980 Unocal\Cross Sections.dwg

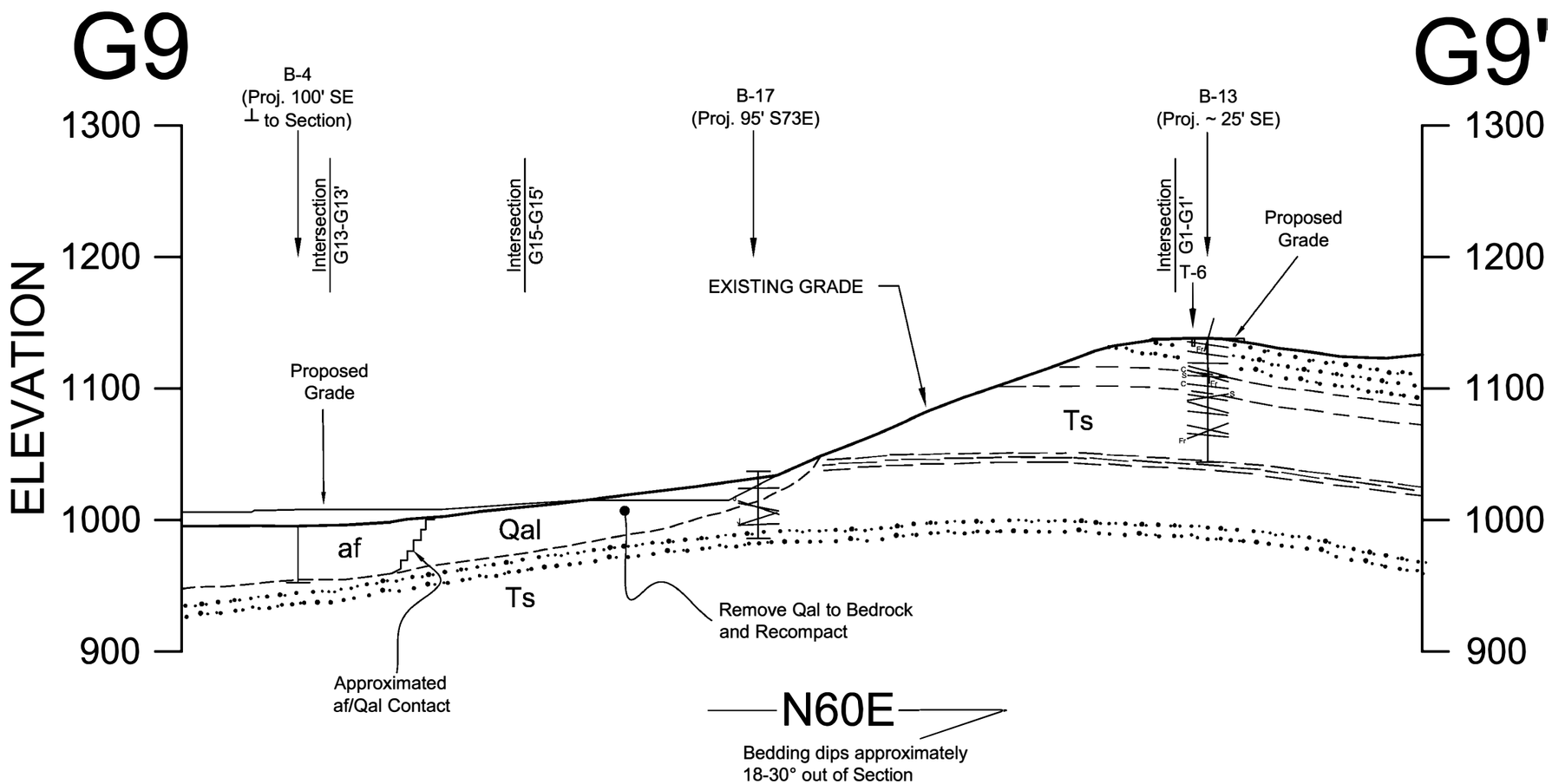

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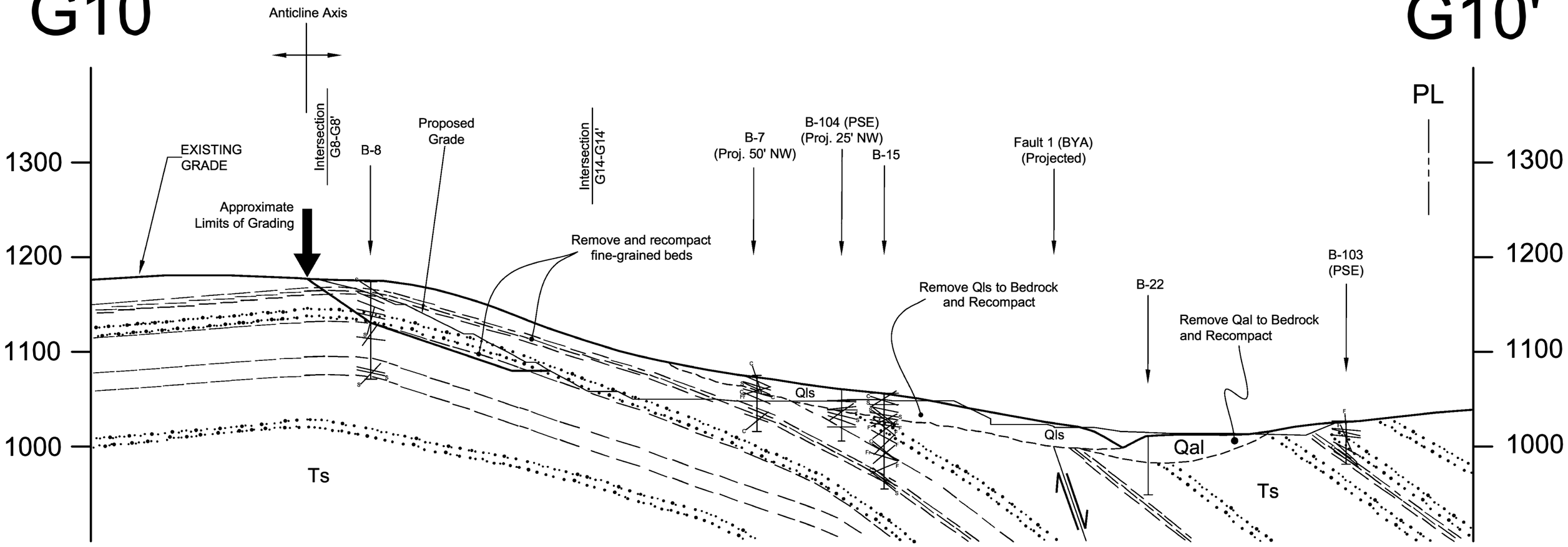
PLATE 2.9

G10



G10'

N40W

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GEOLOGY AND SOIL ENGINEERING

DATE 9/14/2018 BY RMP
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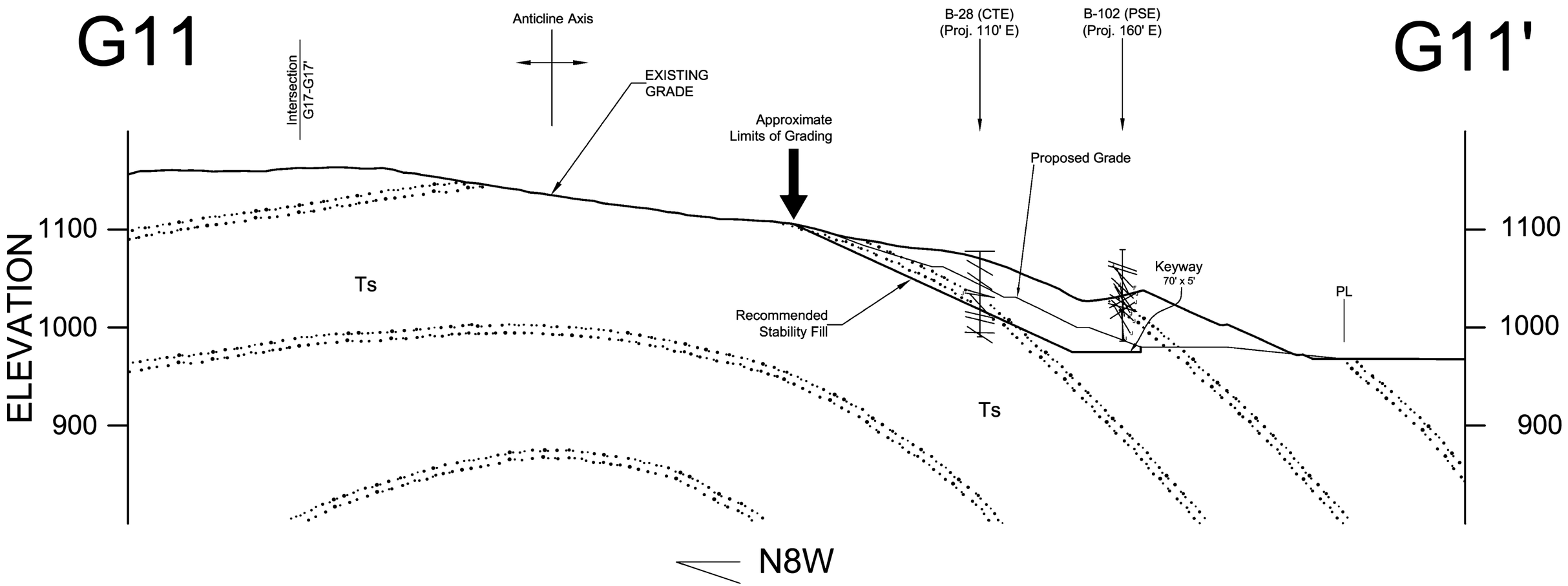
PLATE 2.10

G11



G11'

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GEOLOGY AND SOIL ENGINEERING

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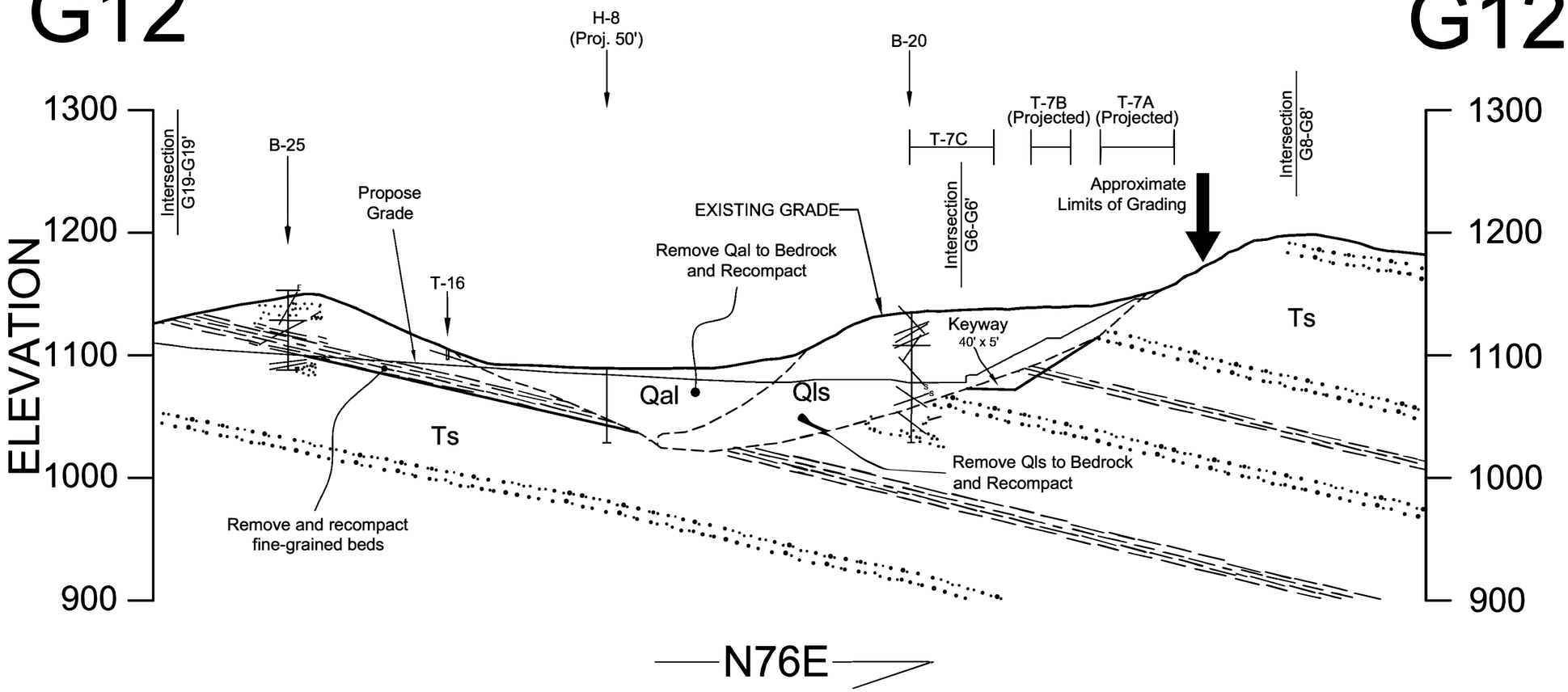
PLATE 2.11

G12



G12'

P:\8980 Unocal\Cross Sections.dwg

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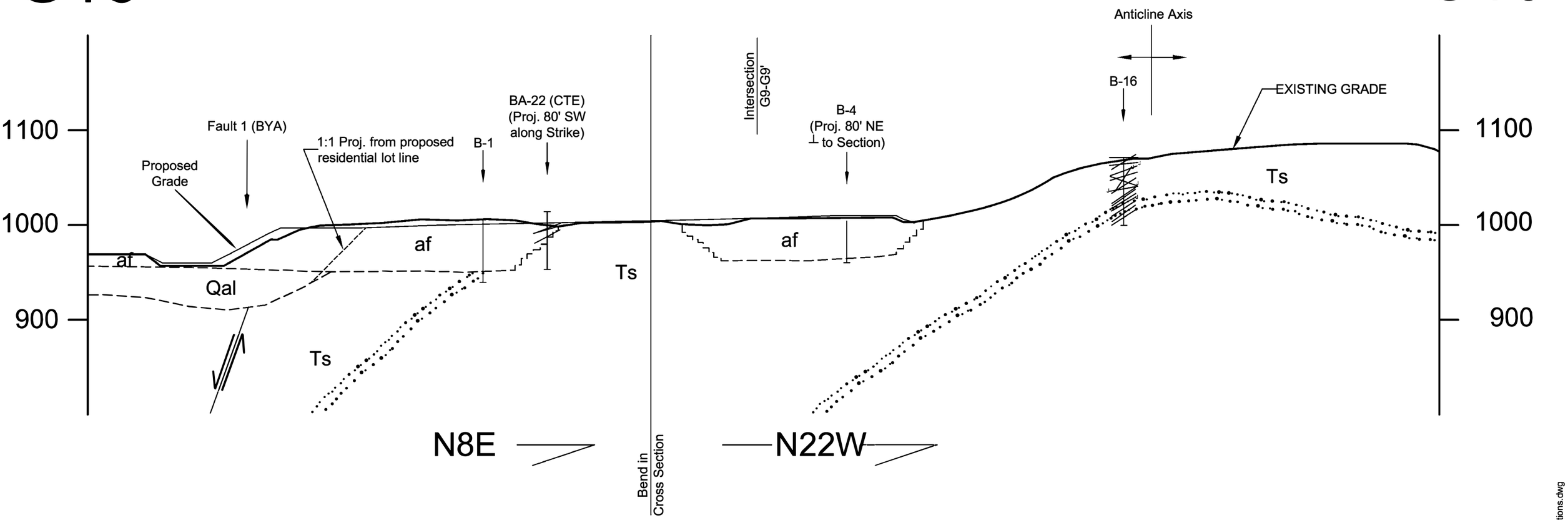
DATE 9/14/2018 BY RMP
SCALE 1"=100' W.O. 898.0

PLATE 2.12

G13

G13'



P:\8980 Unocal\Cross Sections.dwg

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GEOLOGY AND SOIL ENGINEERING

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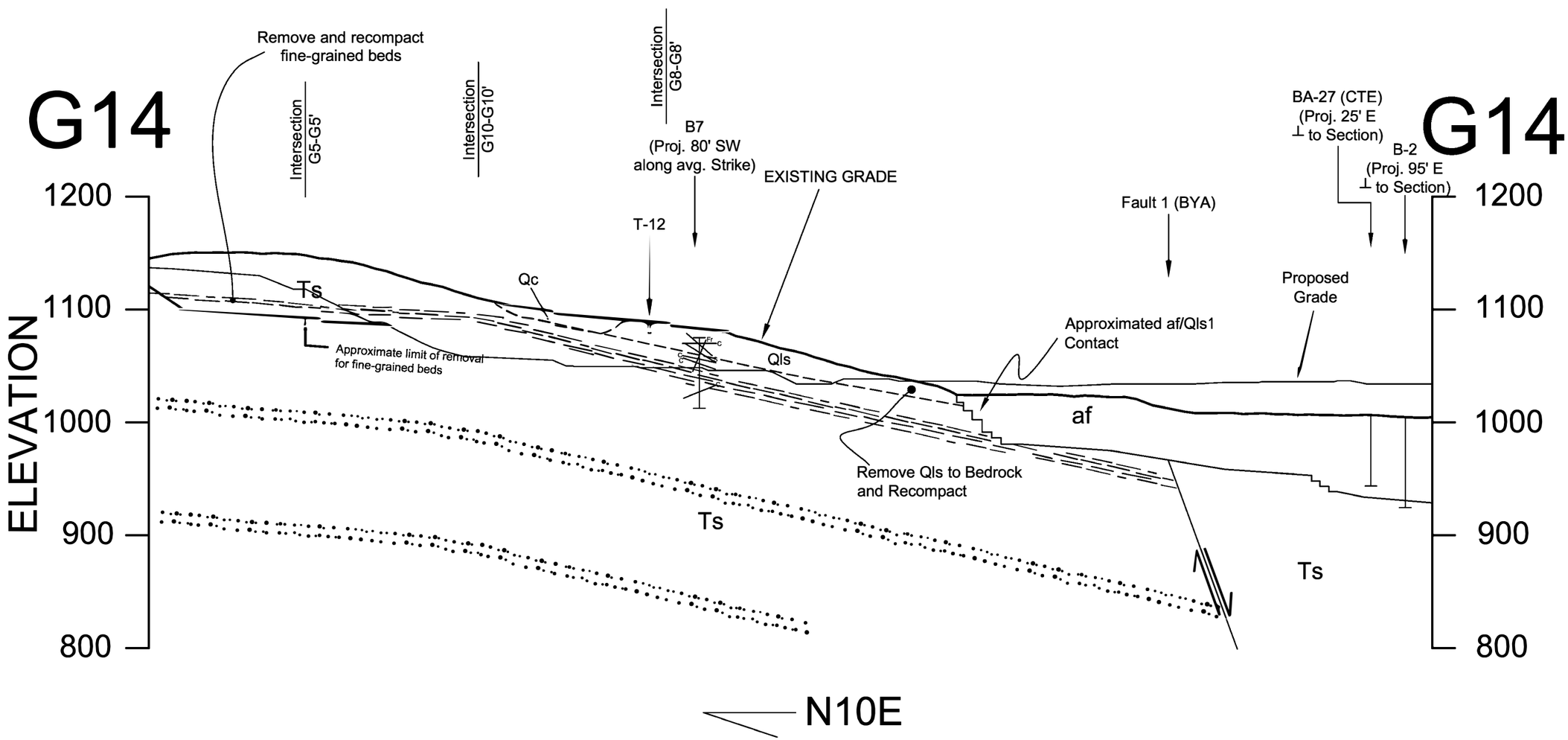
SCALE 1"=100' W.O. 8980

PLATE 2.13

G14

G14'



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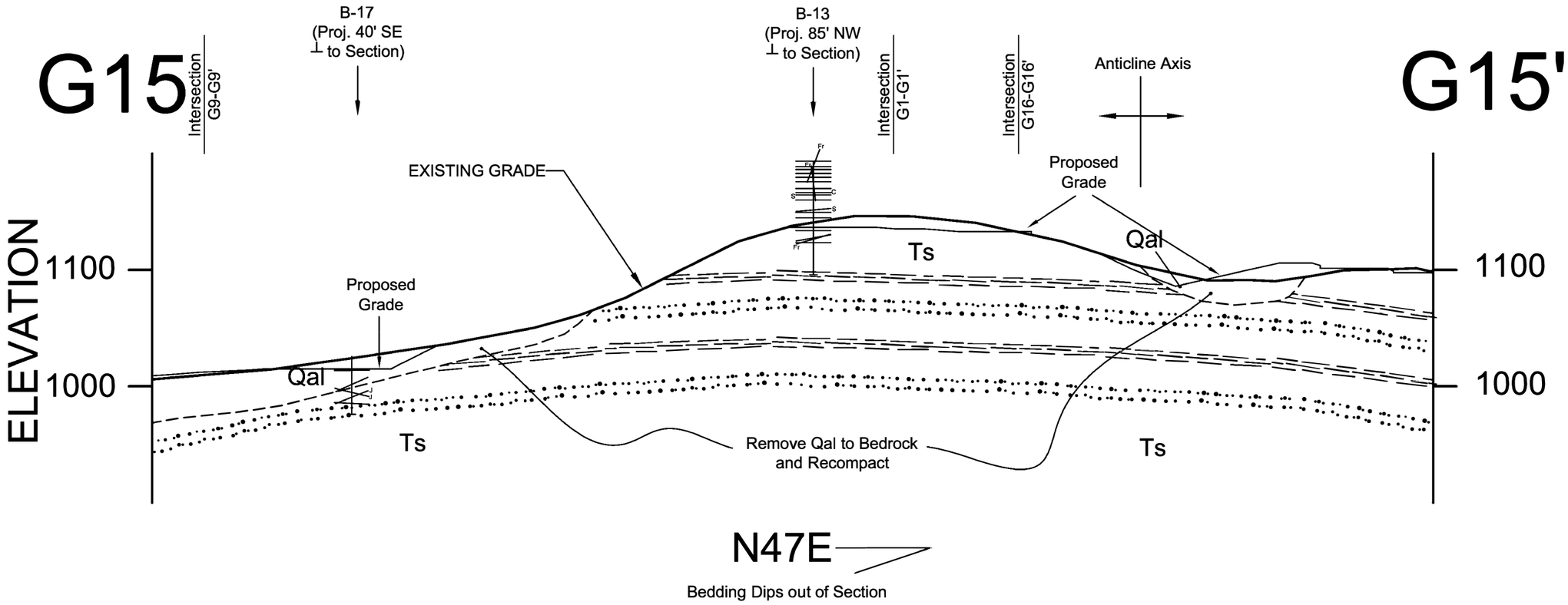
SCALE 1"=100' W.O. 8980

PLATE 2.14



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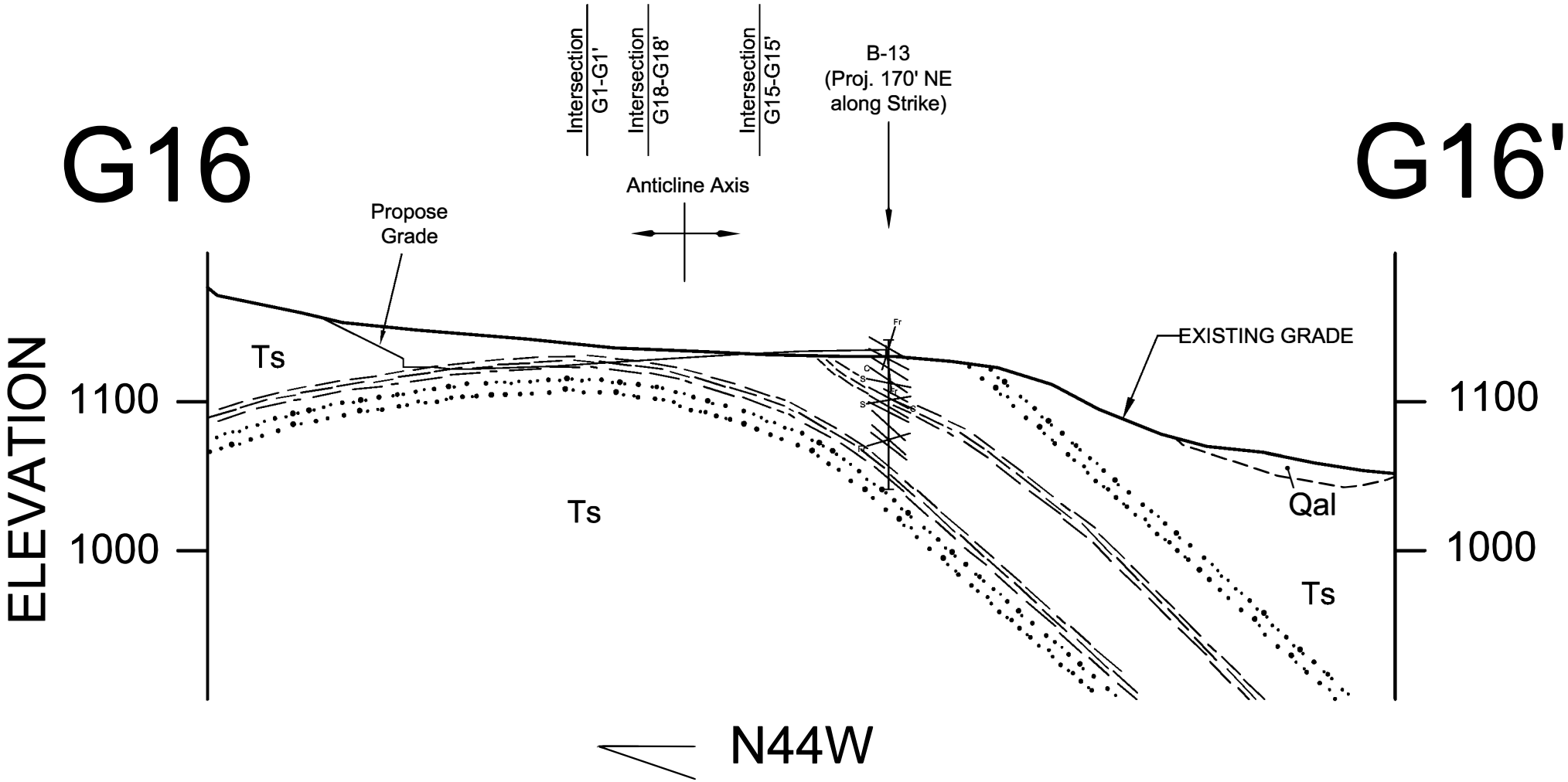
SCALE 1"=100' W.O. 8980

PLATE 2.15



	Geolabs – Westlake Village
	GEOLOGY AND SOIL ENGINEERING
DATE 9/14/2018	BY RMP
SCALE 1"=100'	W.O. 8980

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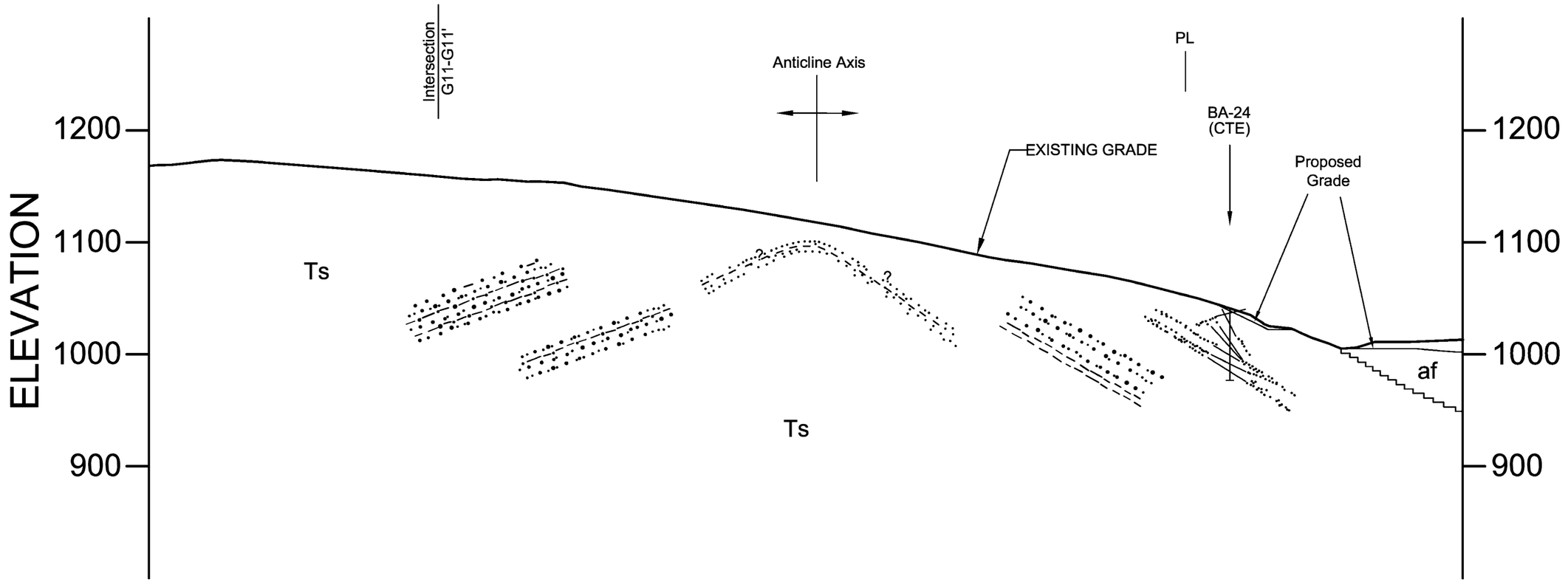
PLATE 2.16

G17

G17'



N53W

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DATE 9/14/2018 B.K. RMP
SCALE 1"=100' W.O. 8980

PLATE 2.17

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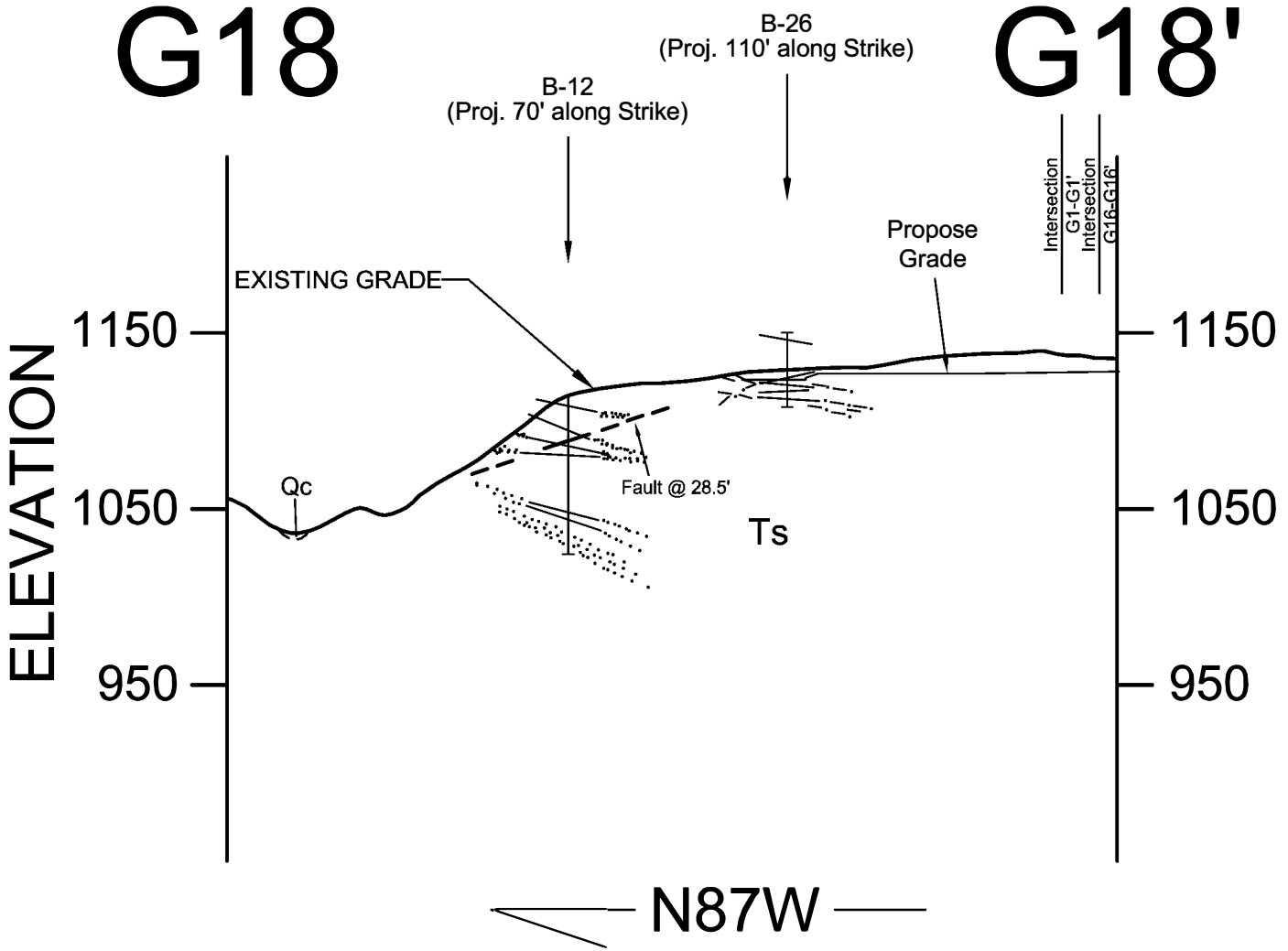

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DATE 9/14/2018 BY RMP
SCALE 1"=100' W.O. 8980

PLATE 2.18

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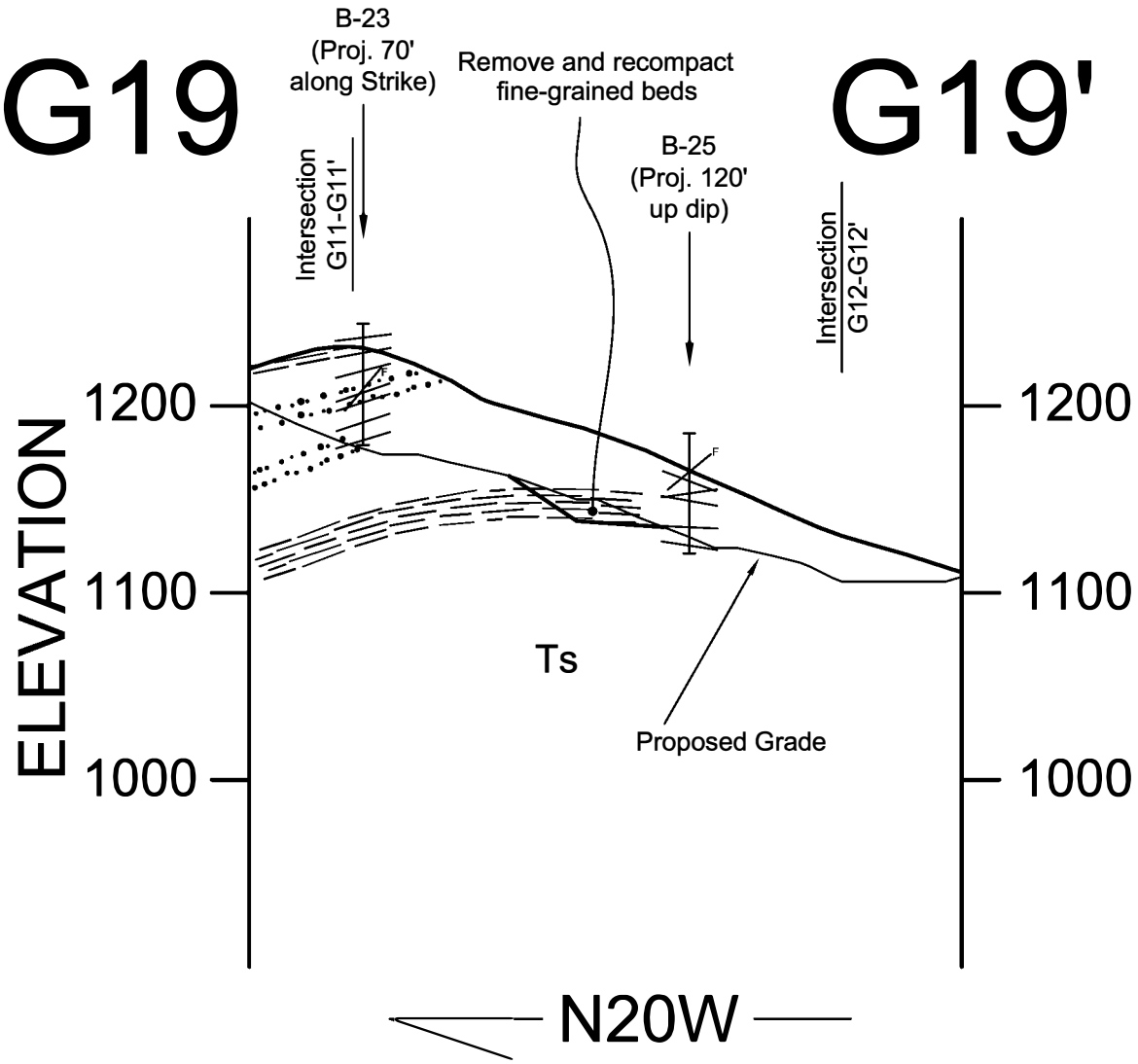

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GEOLOGY AND SOIL ENGINEERING

DATE 9/14/2018 BY RMP
SCALE 1"=100' W.O. 8980

PLATE 2.19

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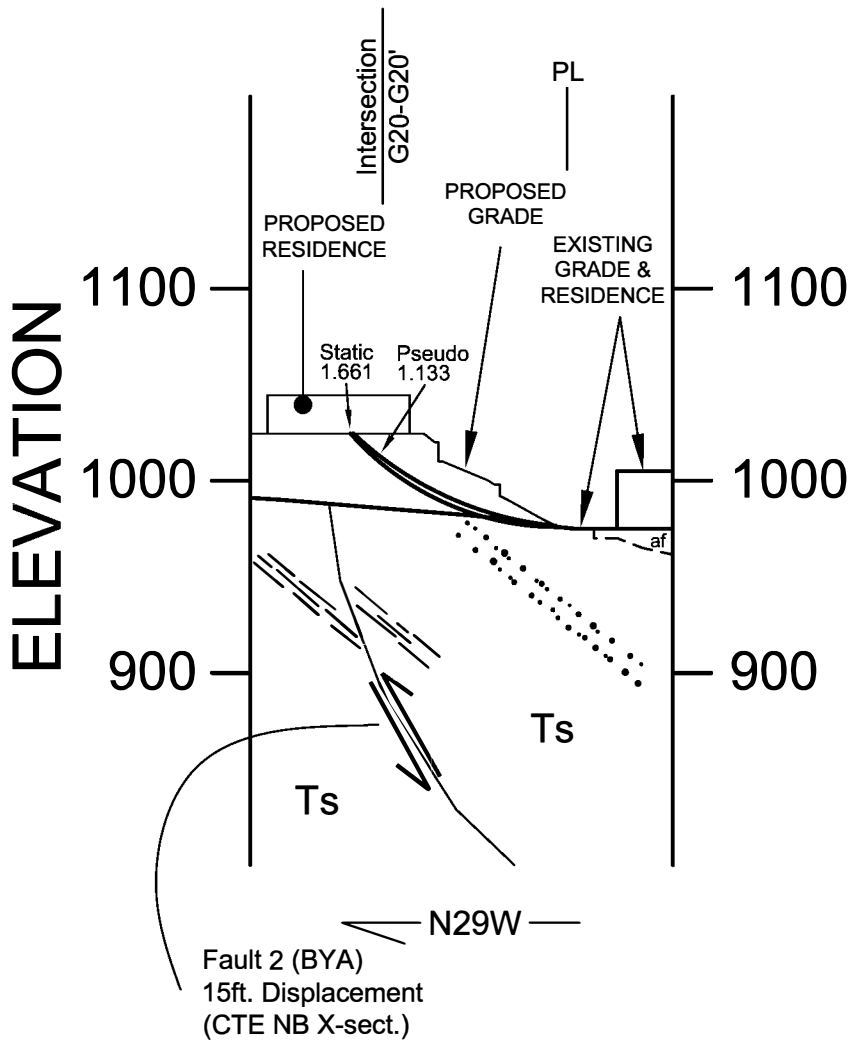
G20.1 G20.1'



	Geolabs – Westlake Village GEOLOGY AND SOIL ENGINEERING
DATE 9/14/2018 BY RMP SCALE 1"=100' W.O. 8980	
PLATE 2.20.1	

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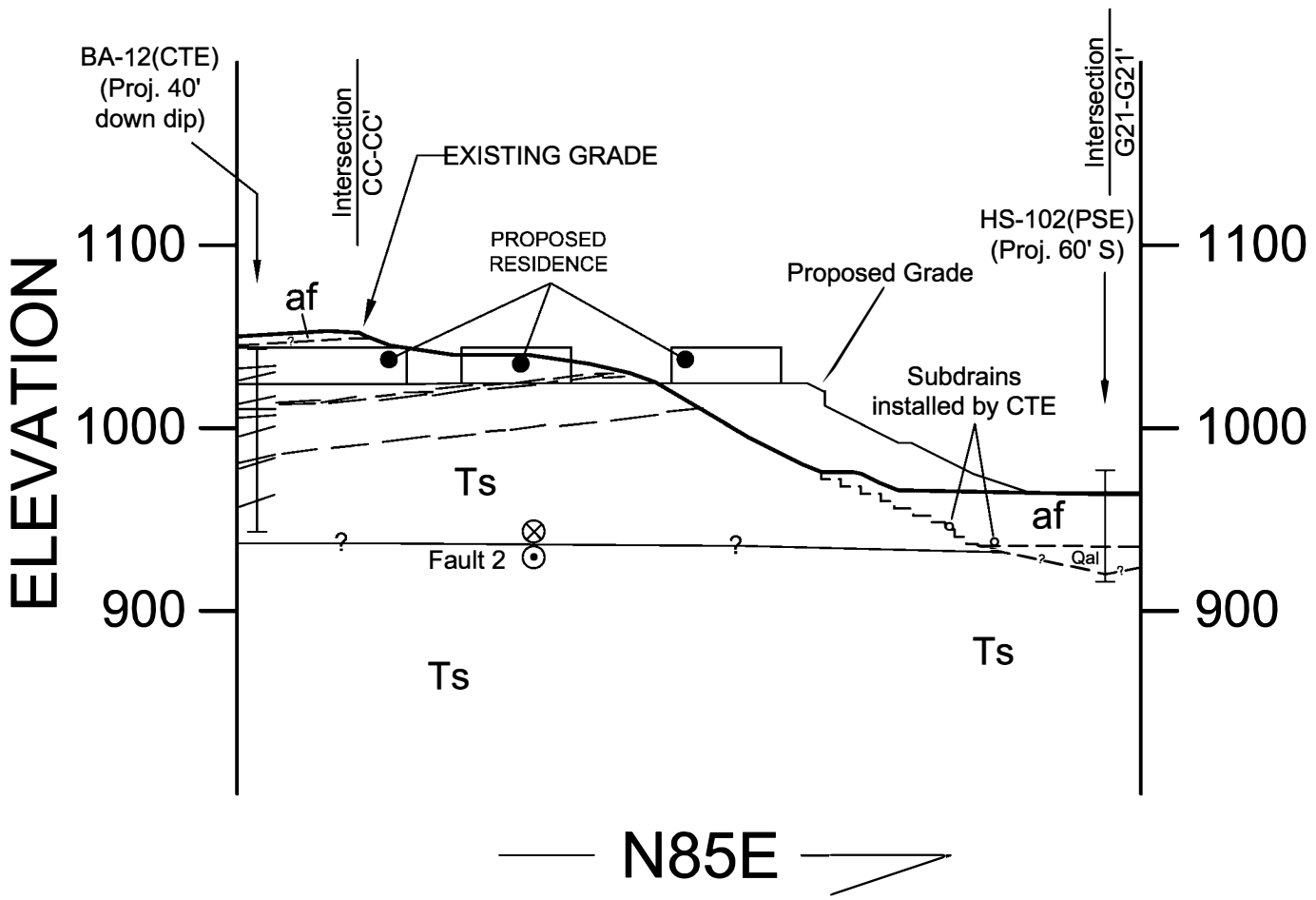
G20 G20'



Geolabs – Westlake Village GEOLOGY AND SOIL ENGINEERING	
DATE 9/14/2018 BY RMP	
SCALE 1"=100' W.O. 8980	
PLATE 2.20	

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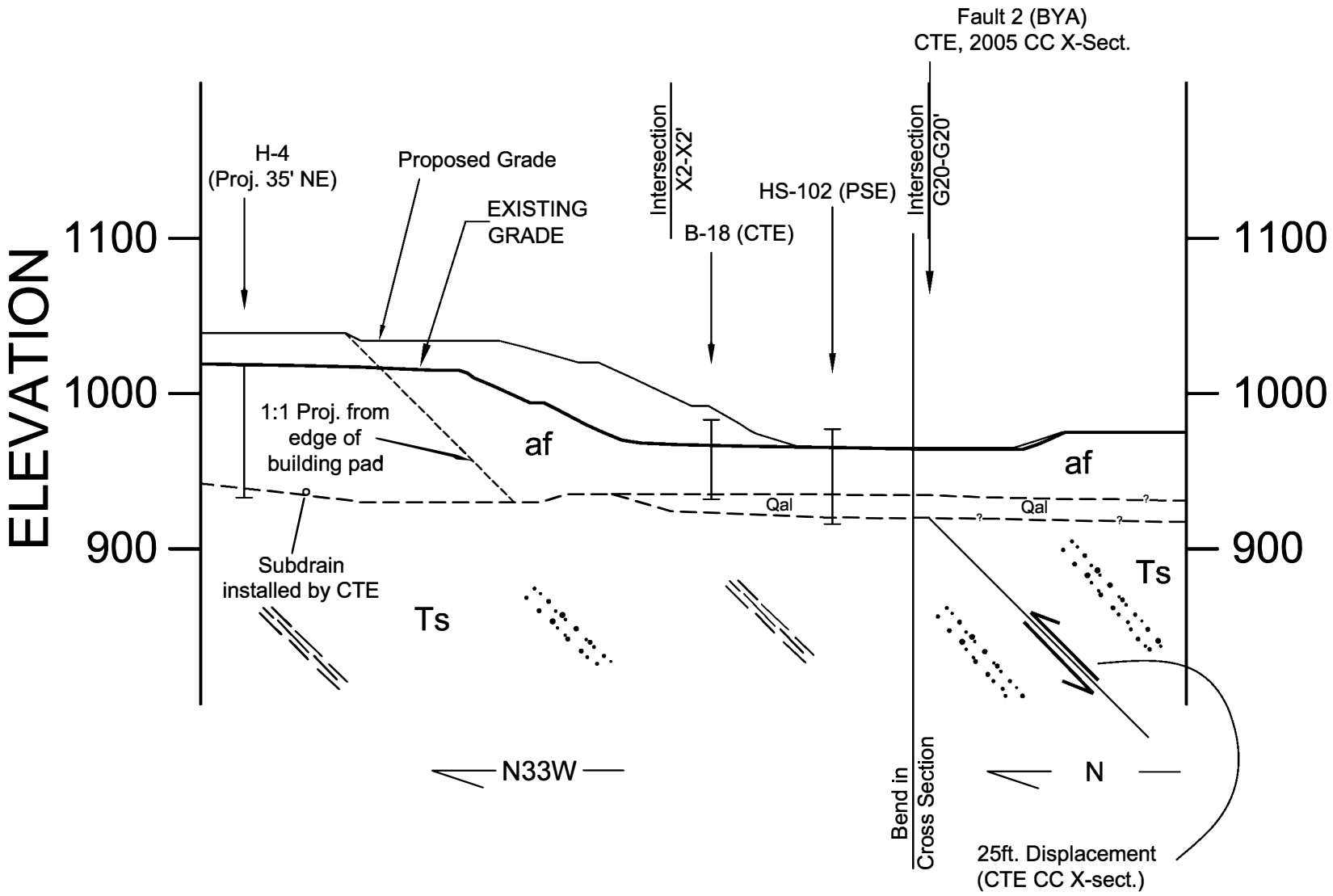
G21

G21'



	Geolabs – Westlake Village GEOLOGY AND SOIL ENGINEERING
DATE 9/14/2018 BY RMP SCALE 1"=100' W.O. 8980	
PLATE 2.21	

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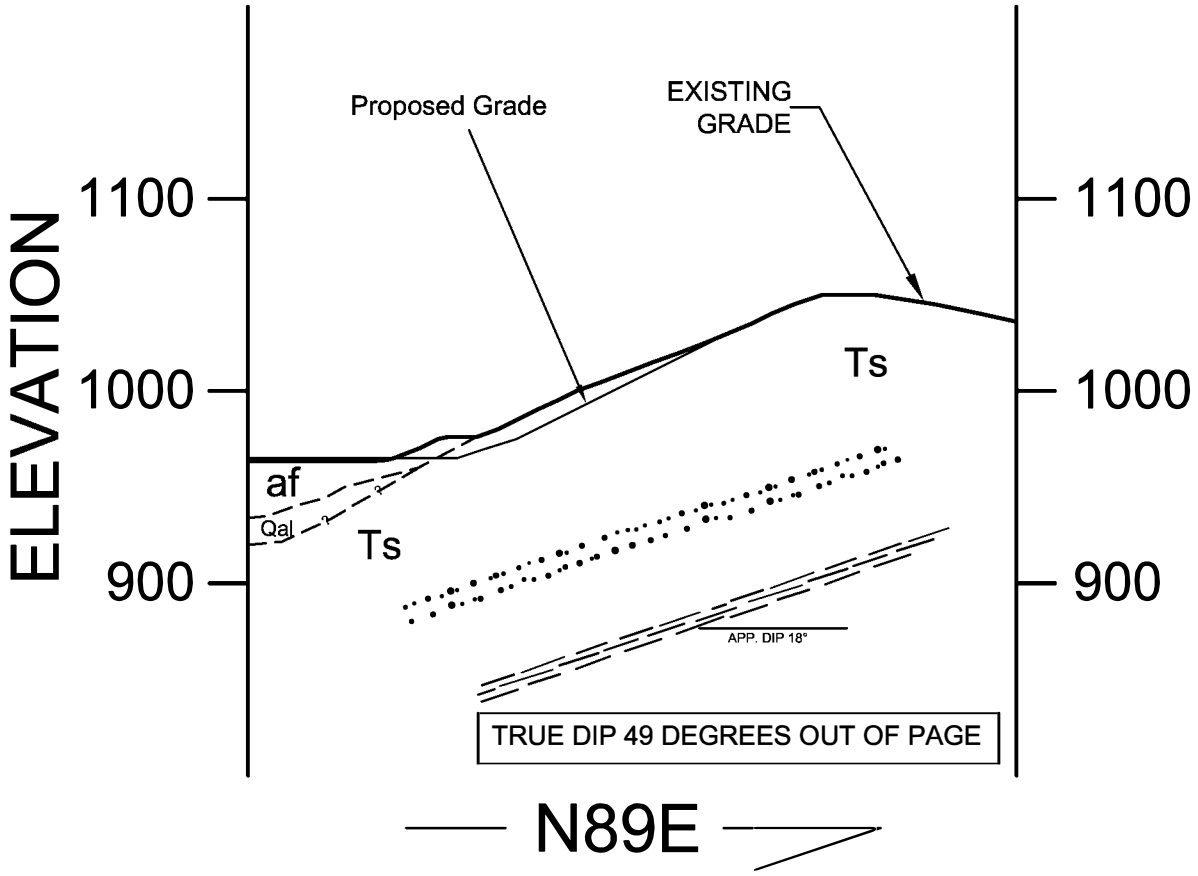
G22 G22'



Geolabs – Westlake Village
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DATE 9/14/2018 BY RMP
SCALE 1"=100' W.O. 8980

PLATE 2.22

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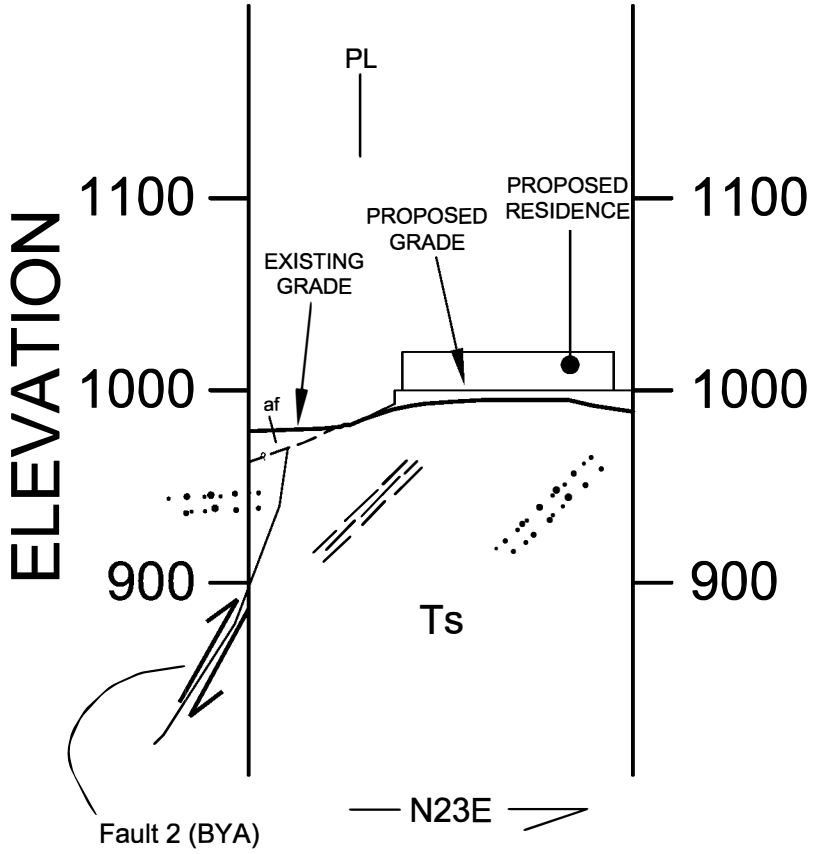
G23 G23'



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DATE 9/14/2018 BY RMP
SCALE 1"=100' W.O. 8980

PLATE 2.23

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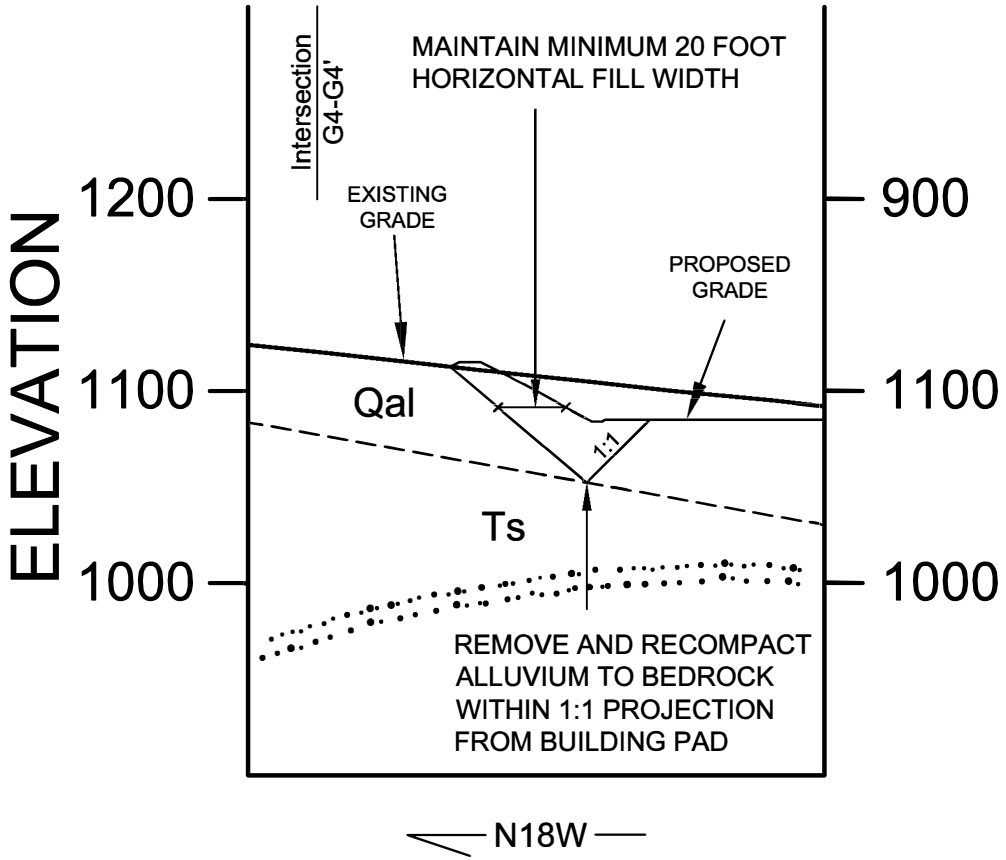
G24 G24'



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DATE 9/14/2018 BY RMP
SCALE 1"=100' W.O. 8980

PLATE 2.24

P:\8980 Unocal\Cross Sections.dwg

Miragrid® 10XT

Miragrid® 10XT geogrid is composed of high molecular weight, high tenacity polyester multifilament yarns woven in tension and finished with a PVC coating. Miragrid® 10XT geogrid is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.

Miragrid® 10XT geogrid is used as soil reinforcement in MSE structures such as; segmental retaining walls, precast modular block walls, wire faced walls, geosynthetic wrapped faced walls and steepened slopes. Miragrid® 10XT is also used in MSE stabilized platforms for voids bridging, embankments on soft soils, landfill veneer stability, reducing differential settlement and for foundation seismic stability.

TenCate Geosynthetics Americas is accredited Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

Mechanical Properties	Test Method	Unit	Machine Direction Value
Tensile Strength @ Ultimate (MARV[1])	ASTM D6637 (Method B)	lbs/ft (kN/m)	9500 (138.6)
Tensile Strength @ 5% strain (MARV[1])	ASTM D6637 (Method B)	lbs/ft (kN/m)	3120 (45.5)
Creep Rupture Strength[2]	ASTM D5262/D6992	lbs/ft (kN/m)	6552 (95.6)
Long Term Design Strength[3]		lbs/ft (kN/m)	5672 (82.8)

[1] Minimum Average Roll Values (MARV) shown above are based on QC Testing per a defined lot not to exceed 12 months. Testing Frequency follows ASTM D4354, Table 1.
[2] 75-year design life based on NTPEP Report REGEO-2011-01-001 and REGEO-2015-01-002.
[3] Long Term Design Strength for sand, silt, clay. RF_{CR} = 1.45; RF_{ID} = 1.05; RF_{D} = 1.1
(Installation damage reduction factor for other soils available upon request).

Physical Properties	Unit	Roll Characteristic
Mass/Unit Area (ASTM D5261)	oz/yd² (g/m²)	13.4 (454)
Roll Dimensions[4] (width x length)	ft (m)	12 x 200 (3.6 x 61) 12 X 1000 (3.6 x 305)
Roll Area	yd² (m²)	267 (220) 1333 (1114)
Estimated Roll Weight	lbs (kg)	255 (116) 1235 (559)

[4] Special order roll lengths are available upon request.

Miragrid® 10XT and Tensile Strength direction are continuously printed in white on the edge of the roll.

Disclaimer: TenCate assumes no liability for the accuracy or completeness of this information or for the ultimate use by the purchaser. TenCate disclaims any and all express, implied, or statutory standards, warranties or guarantees, including without limitation any implied warranty as to merchantability or fitness for a particular purpose or arising from a course of dealing or usage of trade as to any equipment, materials, or information furnished herewith. This document should not be construed as engineering advice.

GAI-LAP-25-97

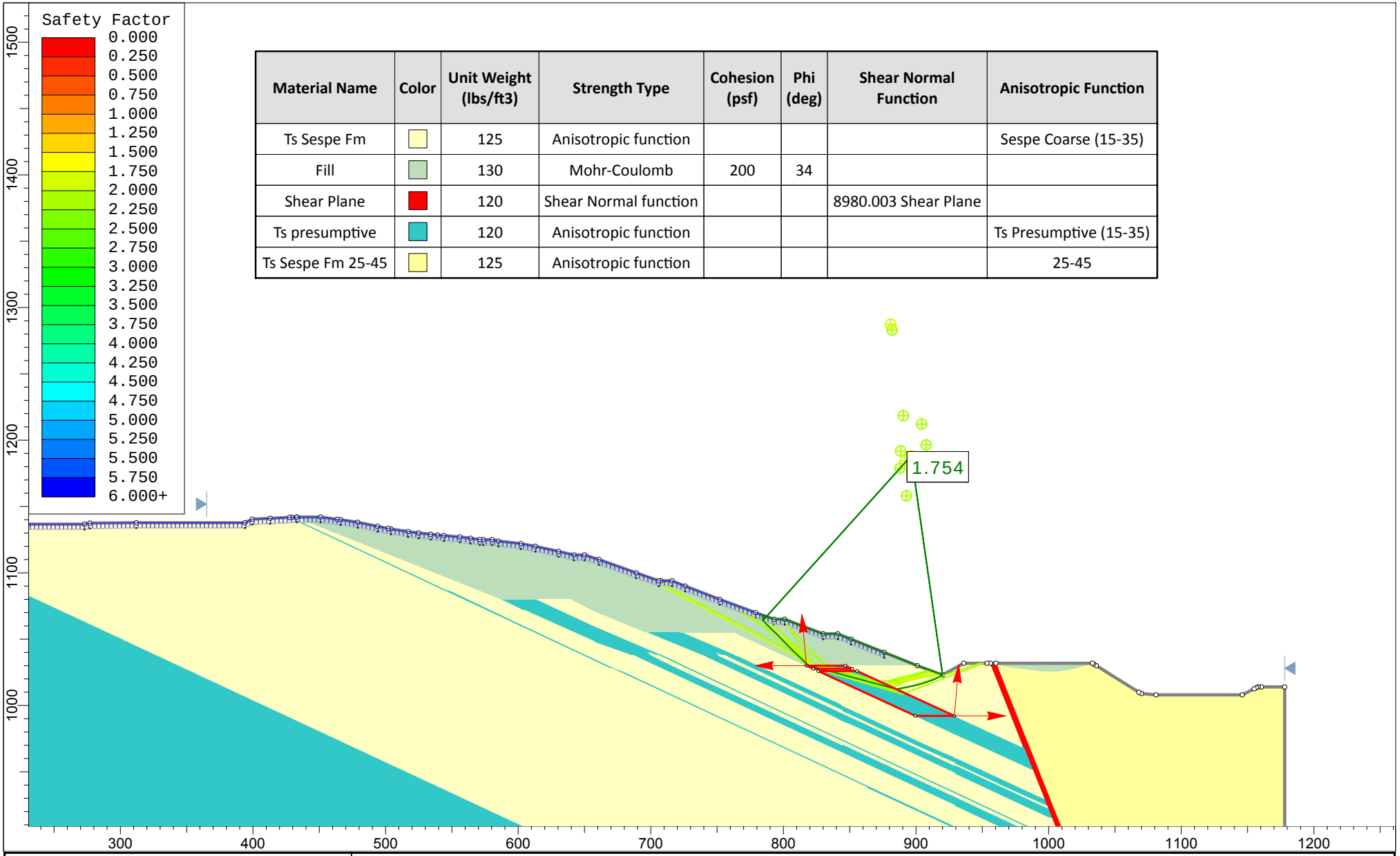
APPENDIX A

Slope Stability Analyses

September 14, 2018
W.O. 8980

See Attached CD for This Appendix

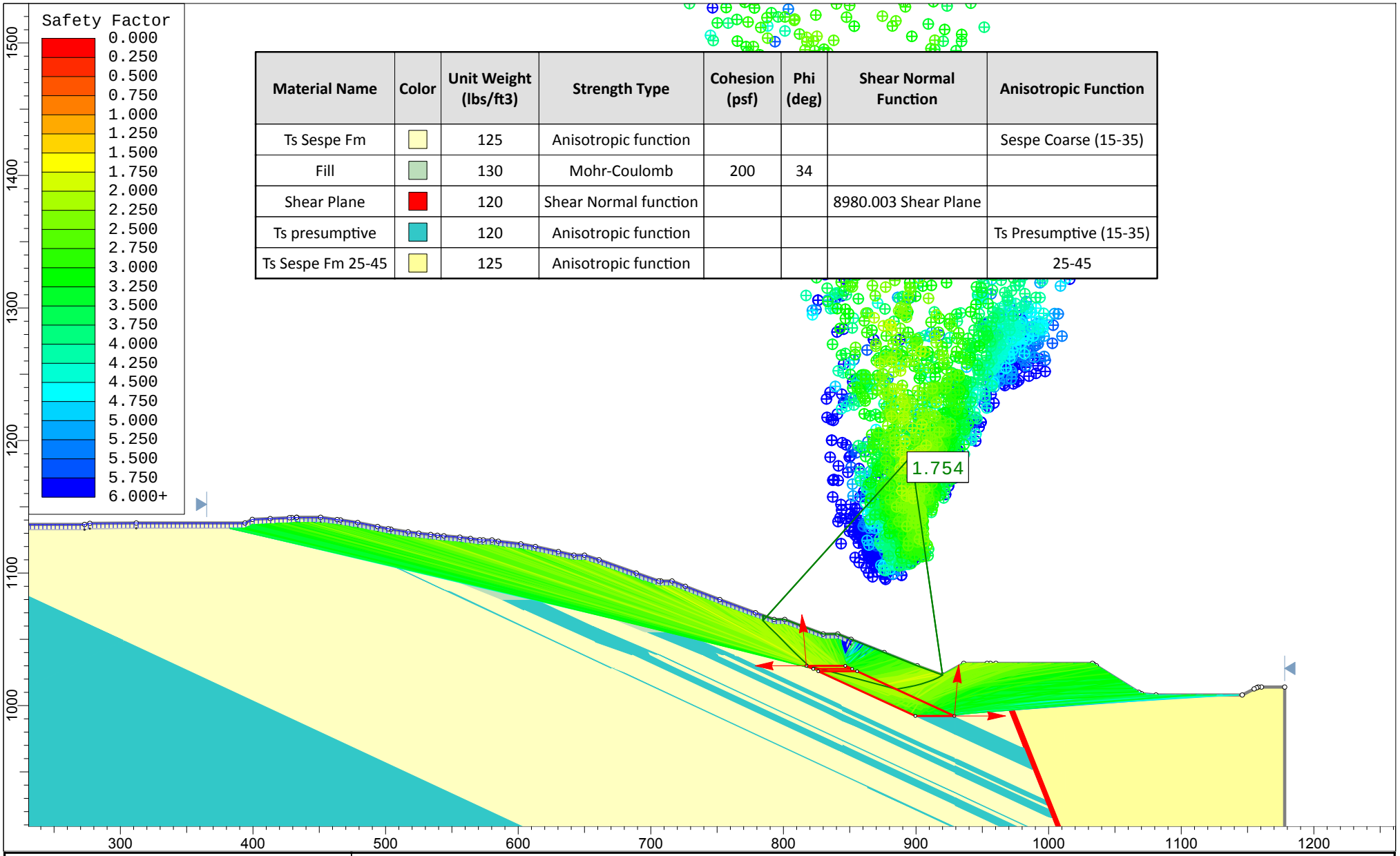
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45



Project	North Canyon Ranch		
Analysis Description	G1-G1' static upper fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1 B-105at21.slim

SLIDEINTERPRET 7.036

PLATE A.1



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

Project	North Canyon Ranch		
Analysis Description	G1-G1' static upper fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1 B-105at21.slim

SLIDEINTERPRET 7.036

PLATE A.2

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	2018 Update - G1 B-105at21.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G1-G1' static upper fine-grained layer
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	50
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle):	95
Left Projection Angle (End Angle):	180
Right Projection Angle (Start Angle):	0
Right Projection Angle (End Angle):	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Tension Crack

Water level: filled with water

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Ts presumptive	Ts Sespe Fm 25-45
Color					
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Anisotropic function	Anisotropic function
Unit Weight [lbs/ft3]	125	130	120	120	125
Cohesion [psf]		200			
Friction Angle [deg]		34			
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	32
-15	90	250	35

Name: Ts Presumptive (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	8.5
-15	90	250	35

Name: 25-45

Angle From	Angle To	c	phi
-90	-45	250	35
-45	-25	200	32
-25	90	250	35

Global Minimums

Method: spencer

FS	1.754170
Axis Location:	896.426, 1188.181
Left Slip Surface Endpoint:	784.552, 1064.017
Right Slip Surface Endpoint:	920.000, 1023.000
Left Slope Intercept:	784.552 1068.017
Right Slope Intercept:	920.000 1023.000
Resisting Moment:	2.8542e+007 lb-ft
Driving Moment:	1.6271e+007 lb-ft
Resisting Horizontal Force:	149086 lb
Driving Horizontal Force:	84989.8 lb
Total Slice Area:	2836.74 ft2
Surface Horizontal Width:	135.448 ft
Surface Average Height:	20.9434 ft

Global Minimum Coordinates

Method: spencer

X	Y
784.552	1064.02
788.595	1059.88
793.44	1055.18
798.1	1050.58
803.125	1045.36
807.976	1040.46
813.338	1035.32
819.078	1030.01
823.201	1028.9
827.325	1027.8
831.448	1026.69
835.572	1025.59
839.695	1024.48
843.819	1023.38
847.942	1022.27
852.066	1021.17
856.189	1020.06
860.313	1018.96
864.436	1017.85
868.56	1016.75
872.683	1015.64
876.807	1014.54
880.93	1013.43
885.054	1012.33
892.33	1013.59
899.248	1015.08
903.696	1016.24
908.941	1017.85
912.904	1019.3
916.769	1021.01
920	1023

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2549
Number of Invalid Surfaces: 2452

Error Codes:

Error Code -108 reported for 1608 surfaces
Error Code -111 reported for 125 surfaces
Error Code -112 reported for 718 surfaces
Error Code -124 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-124 = A slice has a width less than the minimum acceptable value.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.75417

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.02128	1228.27	-45.6917	Fill	200	34	229.755	403.03	301.005	0	301.005	536.376	536.376
2	2.02128	1582.69	-45.6917	Fill	200	34	287.262	503.907	450.56	0	450.56	744.844	744.844
3	2.42242	2342.76	-44.114	Fill	200	34	339.854	596.162	587.336	0	587.336	916.838	916.838
4	2.42242	2814.42	-44.114	Fill	200	34	389.736	683.663	717.058	0	717.058	1094.92	1094.92
5	2.33005	3323.29	-44.6226	Fill	200	34	454.6	797.446	885.749	0	885.749	1334.4	1334.4
6	2.33005	4019.84	-44.6226	Fill	200	34	530.654	930.858	1083.54	0	1083.54	1607.25	1607.25

7	2.51248	5136.72	-46.1137	Fill	200	34	600.111	1052.7	1264.17	0	1264.17	1888.08	1888.08
8	2.51248	5877.03	-46.1137	Fill	200	34	673.528	1181.48	1455.11	0	1455.11	2155.34	2155.34
9	2.42578	6175.81	-45.2304	Fill	200	34	733.595	1286.85	1611.33	0	1611.33	2350.85	2350.85
10	2.42578	6652.74	-45.2304	Fill	200	34	783.197	1373.86	1740.32	0	1740.32	2529.84	2529.84
11	2.68083	7884.71	-43.8422	Fill	200	34	848.549	1488.5	1910.29	0	1910.29	2725.22	2725.22
12	2.68083	8422.64	-43.8422	Fill	200	34	900.147	1579.01	2044.47	0	2044.47	2908.96	2908.96
13	2.86997	9597.04	-42.7604	Fill	200	34	965.425	1693.52	2214.23	0	2214.23	3106.99	3106.99
14	2.86997	10185.4	-42.7604	Fill	200	34	1018.91	1787.34	2353.33	0	2353.33	3295.54	3295.54
15	4.12348	14916.1	-15	Ts presumptive	200	8.5	403.533	707.866	3398.22	0	3398.22	3506.34	3506.34
16	2.06174	7352.25	-15	Ts presumptive	200	8.5	399.419	700.649	3349.92	0	3349.92	3456.95	3456.95
17	2.06174	7281.71	-15	Ts presumptive	200	8.5	396.676	695.838	3317.73	0	3317.73	3424.02	3424.02
18	2.06174	7211.16	-15	Ts presumptive	200	8.5	393.933	691.026	3285.53	0	3285.53	3391.09	3391.09
19	2.06174	7191.75	-15	Ts presumptive	200	8.5	393.179	689.702	3276.67	0	3276.67	3382.03	3382.03
20	2.06174	7319.25	-15	Ts presumptive	200	8.5	398.136	698.398	3334.86	0	3334.86	3441.54	3441.54
21	2.06174	7455.93	-15	Ts presumptive	200	8.5	403.45	707.72	3397.23	0	3397.23	3505.34	3505.34
22	2.06174	7592.62	-15	Ts presumptive	200	8.5	408.764	717.042	3459.61	0	3459.61	3569.14	3569.14
23	2.06174	7729.29	-15	Ts presumptive	200	8.5	414.078	726.364	3521.98	0	3521.98	3632.93	3632.93
24	4.12349	15662	-15	Ts presumptive	200	8.5	418.033	733.301	3568.4	0	3568.4	3680.41	3680.41
25	4.12349	15370.8	-15	Ts presumptive	200	8.5	412.372	723.37	3501.94	0	3501.94	3612.44	3612.44
26	2.06174	7568.93	-15	Ts presumptive	200	8.5	407.843	715.426	3448.8	0	3448.8	3558.08	3558.08
27	2.06174	7494.35	-15	Ts presumptive	200	8.5	404.944	710.34	3414.76	0	3414.76	3523.27	3523.27
28	2.06174	7419.77	-15	Ts presumptive	200	8.5	402.044	705.253	3380.73	0	3380.73	3488.46	3488.46
29	2.06174	7345.19	-15	Ts presumptive	200	8.5	399.144	700.167	3346.7	0	3346.7	3453.65	3453.65
30	4.12348	14466.6	-15	Ts presumptive	200	8.5	394.795	692.537	3295.64	0	3295.64	3401.42	3401.42
31	2.06174	7121.45	-15	Ts presumptive	200	8.5	390.446	684.908	3244.59	0	3244.59	3349.21	3349.21
32	2.06174	7046.87	-15	Ts presumptive	200	8.5	387.546	679.821	3210.56	0	3210.56	3314.4	3314.4
33	4.12348	13870	-15	Ts presumptive	200	8.5	383.196	672.191	3159.52	0	3159.52	3262.19	3262.19
34	2.06174	6823.13	-15	Ts presumptive	200	8.5	378.847	664.562	3108.45	0	3108.45	3209.97	3209.97
35	2.06174	6748.55	-15	Ts presumptive	200	8.5	375.947	659.475	3074.42	0	3074.42	3175.16	3175.16
36	4.12348	13273.4	-15	Ts presumptive	200	8.5	371.598	651.846	3023.37	0	3023.37	3122.94	3122.94
37	4.12348	12975	-15	Ts presumptive	200	8.5	365.799	641.673	2955.3	0	2955.3	3053.31	3053.31
38	2.06174	6375.65	-15	Ts presumptive	200	8.5	361.449	634.043	2904.25	0	2904.25	3001.1	3001.1
39	2.06174	6301.07	-15	Ts presumptive	200	8.5	358.549	628.956	2870.22	0	2870.22	2966.29	2966.29
40	3.63812	10565.7	9.81022	Ts Sespe Fm	250	35	1608.99	2822.44	3673.84	0	3673.84	3395.62	3395.62
41	3.63812	9591.33	9.81022	Ts Sespe Fm	250	35	1476.31	2589.69	3341.43	0	3341.43	3086.16	3086.16
42	3.45887	8183.14	12.1802	Ts Sespe Fm	250	35	1386.29	2431.79	3115.93	0	3115.93	2816.71	2816.71
43	3.45887	7238.24	12.1802	Ts Sespe Fm	250	35	1246.34	2186.29	2765.31	0	2765.31	2496.3	2496.3
44	2.22399	4141.99	14.5708	Ts Sespe Fm	250	35	1167.45	2047.91	2567.69	0	2567.69	2264.22	2264.22
45	2.22399	3744.36	14.5708	Ts Sespe Fm	250	35	1072.54	1881.42	2329.91	0	2329.91	2051.12	2051.12
46	2.62248	3895.37	17.1313	Ts Sespe Fm	250	35	1005.2	1763.3	2161.22	0	2161.22	1851.38	1851.38
47	2.62248	3313.67	17.1313	Ts Sespe Fm	250	35	882.583	1548.2	1854.02	0	1854.02	1581.97	1581.97
48	3.96336	3848.38	20.0492	Ts Sespe Fm	250	35	755.047	1324.48	1534.52	0	1534.52	1258.97	1258.97
49	3.86548	2292.74	23.9256	Ts Sespe Fm	250	35	572.476	1004.22	1077.14	0	1077.14	823.146	823.146
50	3.23062	641.175	31.5713	Ts Sespe Fm	250	35	380.234	666.995	595.532	0	595.532	361.873	361.873

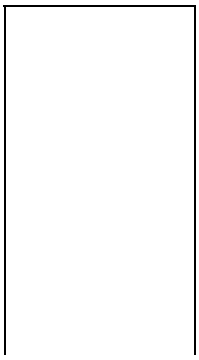
Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.75417

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	784.552	1064.02	499.2	0	0
2	786.574	1061.95	658.084	144.109	12.3518
3	788.595	1059.88	1010.41	221.262	12.3518
4	791.017	1057.53	1566.58	343.052	12.3517
5	793.44	1055.18	2306.58	505.1	12.3518
6	795.77	1052.88	3284.17	719.174	12.3518
7	798.1	1050.58	4539.38	994.042	12.3518
8	800.612	1047.97	6333.77	1386.98	12.3518
9	803.125	1045.36	8442.44	1848.74	12.3518
10	805.551	1042.91	10603.2	2321.9	12.3517
11	807.976	1040.46	12959	2837.79	12.3518
12	810.657	1037.89	15602.5	3416.66	12.3517
13	813.338	1035.32	18453	4040.88	12.3518
14	816.208	1032.66	21558.7	4720.97	12.3518
15	819.078	1030.01	24880.1	5448.29	12.3518
16	823.201	1028.9	26970.7	5906.1	12.3518
17	825.263	1028.35	27997.9	6131.03	12.3518
18	827.325	1027.8	29012.9	6353.3	12.3518
19	829.387	1027.25	30015.8	6572.91	12.3518
20	831.448	1026.69	31015.3	6791.79	12.3518
21	833.51	1026.14	32036.8	7015.47	12.3518
22	835.572	1025.59	33081.7	7244.3	12.3518
23	837.634	1025.04	34150.2	7478.27	12.3518
24	839.695	1024.48	35242.2	7717.39	12.3517
25	843.819	1023.38	37461.1	8203.3	12.3518
26	847.942	1022.27	39629.9	8678.23	12.3518
27	850.004	1021.72	40694.3	8911.32	12.3518
28	852.066	1021.17	41745.9	9141.59	12.3518
29	854.128	1020.62	42784.6	9369.06	12.3518
30	856.189	1020.06	43810.5	9593.72	12.3518
31	860.313	1018.96	45823.9	10034.6	12.3518
32	862.374	1018.41	46811.4	10250.8	12.3517
33	864.436	1017.85	47786	10464.3	12.3518
34	868.56	1016.75	49696.8	10882.7	12.3518
35	870.621	1016.2	50632.9	11087.7	12.3518
36	872.683	1015.64	51556.3	11289.9	12.3518
37	876.807	1014.54	53364.5	11685.9	12.3518
38	880.93	1013.43	55121.4	12070.6	12.3518
39	882.992	1012.88	55980.6	12258.7	12.3517
40	885.054	1012.33	56827	12444.1	12.3518
41	888.692	1012.96	48662.1	10656.1	12.3517
42	892.33	1013.59	41189.1	9019.67	12.3518
43	895.789	1014.33	34067.8	7460.24	12.3518
44	899.248	1015.08	27692.4	6064.13	12.3518
45	901.472	1015.66	23611.6	5170.51	12.3518
46	903.696	1016.24	19879.4	4353.22	12.3517
47	906.318	1017.04	15496.2	3393.39	12.3518
48	908.941	1017.85	11682.9	2558.35	12.3518
49	912.904	1019.3	6470.89	1417.01	12.3518
50	916.769	1021.01	2410.68	527.895	12.3518
51	920	1023	0	0	0

List Of Coordinates

Tension Crack



X	Y
0.000130068	1118
86.0001	1124
110	1126
121	1128
125	1130
129	1131
202	1131
204	1132
205	1132.6
273	1132.6
277	1133.5
312	1133.7
394	1133.7
399.525	1136.46
413	1137
433	1138
451	1138
466	1136
479	1134
494	1131
504	1129
517	1127
525	1126
534	1125
544	1124
556	1123
564	1122
571	1121
573.656	1120.99
580.212	1120.96
585	1120
602	1118
613	1116
630.294	1112.12
642	1109.5
650	1109.5
661	1106
689	1096
706	1090
716	1090
726	1086
752	1076
779	1066
793	1061
801	1061
814	1056
830	1050
841	1050
851	1046
876	1036

Block Search Window

X	Y
817.317	1030
822.48	1027.62
851.811	1027.62
846.645	1030

Block Search Window

X	Y
855.555	1025.9
826.221	1025.9
899.52	992.146
928.899	992.146

External Boundary

X	Y
1160.49	1014

1158	1014
1156.8	1013.4
1155.01	1012.5
1146	1008
1081	1008
1070	1009
1068	1010
1036	1030
1033.93	1031.24
1033	1031.8
960.208	1031.8
956.089	1031.8
953.583	1031.8
936	1031.8
920	1023
901	1030
876	1040
851	1050
841	1054
830	1054
814	1060
801	1065
793	1065
779	1070
752	1080
726	1090
716	1094
707.58	1094
706	1094
689	1100
661	1110
650	1113.5
642	1113.5
630.293	1116.12
613	1120
602	1122
585	1124
580.212	1124.96
573.656	1124.99
571	1125
564	1126
556	1127
544	1128
539.043	1128.5
534	1129
525	1130
517	1131
504	1133
501.957	1133.41
494	1135
479	1138
466	1140
463.523	1140.33
451	1142
433	1142
432.795	1141.99
429.314	1141.82
427.474	1141.73
413	1141
399.525	1140.46
394	1137.7
312	1137.7
277	1137.5
273	1136.6
205	1136.6
204	1136
202	1135
129	1135
125	1134
122.669	1132.83
121	1132
110	1130
86	1128

-5.09388e-010	1122
0	900
621.968	900
945.141	900
947.285	900
982.096	900
994.963	900
1000.9	900
1003.04	900
1008.38	900
1012.69	900
1178	900
1178	1014

Material Boundary

X	Y
956.089	1031.8
981.281	968.062
987.83	951.612
996.884	928.872
998.726	924.245
999.704	921.789
1002.51	914.75
1008.38	900

Material Boundary

X	Y
960.208	1031.8
960.738	1030.47
1012.69	900

Material Boundary

X	Y
571	1125
604.158	1109.04
657.327	1083.24
723.17	1055
763.505	1037.7
844.427	999.964
929.444	960.32
996.884	928.872

Material Boundary

X	Y
539.043	1128.5
604.158	1098.04
630.036	1085
639.956	1080
657.327	1071.24
696.814	1055
738.624	1037.8
844.413	988.47
929.445	948.819
1002.51	914.75

Material Boundary

X	Y
501.957	1133.41
604.158	1084.04
612.829	1080
657.327	1059.24
707.253	1037.93
844.396	973.978
929.447	934.318
1003.04	900

Material Boundary

X	Y
699.102	1037.96
697.276	1041.18
705.089	1037.94
844.395	972.979
929.447	933.318
1000.9	900

Material Boundary

X	Y
429.314	1141.82
546.601	1086.99
672.661	1028.06
947.285	900

Material Boundary

X	Y
427.474	1141.73
544.512	1086.99
670.516	1028.06
862.999	938.303
878.66	931.001
945.141	900

Material Boundary

X	Y
751.027	1037.75
747.332	1040.67
755.354	1037.73
844.422	996.198
929.445	956.552
998.726	924.245

Material Boundary

X	Y
751.027	1037.75
844.42	994.199
929.445	954.552
999.704	921.789

Material Boundary

X	Y
699.102	1037.96
844.391	970.213
929.447	930.55
994.963	900

Material Boundary

X	Y
463.523	1140.33
587.774	1080
604.158	1072.04
657.327	1048.24
686.12	1038.02
844.384	964.216
929.448	924.55
982.096	900

Material Boundary

X	Y
122.669	1132.83
302.157	1049.13
621.968	900

Material Boundary

X	Y
630.293	1116.12
763.028	1055
817.317	1030
929.442	978.367
987.83	951.612

Material Boundary

X	Y
707.58	1094
766.203	1067.02
846.645	1030
929.441	991.896
981.281	968.062

Material Boundary

X	Y
956.089	1031.8
960.738	1030.47
974	1028
994	1025.5
1005	1025
1012	1026
1018	1027
1032	1031
1033.93	1031.24

Material Boundary

X	Y
1156.8	1013.4
1160.49	1014

Material Boundary

X	Y
587.774	1080
612.829	1080
639.956	1080

Material Boundary

X	Y
696.814	1055
723.17	1055
763.028	1055

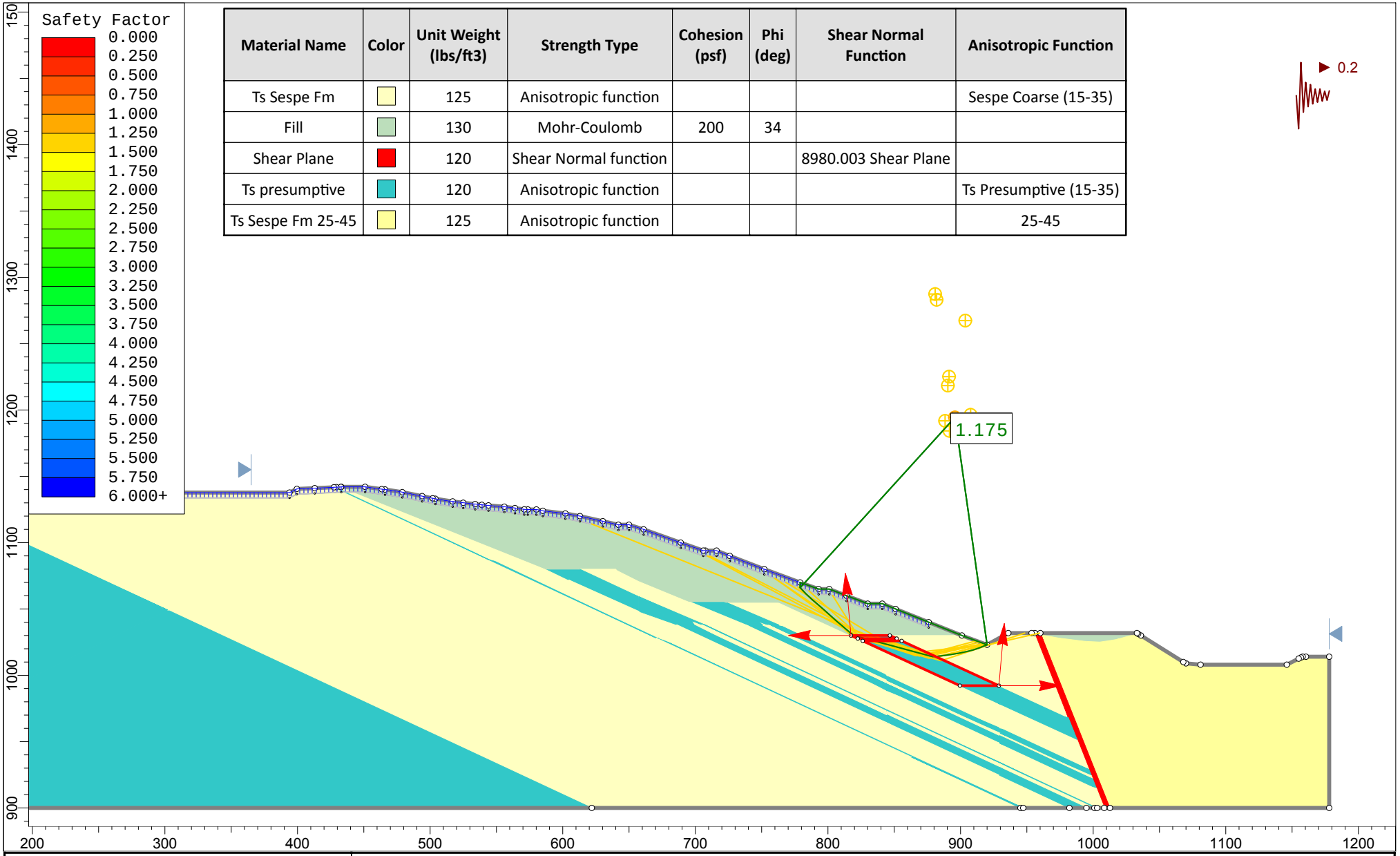
Material Boundary

X	Y
817.317	1030
846.645	1030
901	1030

Material Boundary

X	Y
432.795	1141.99
587.774	1080

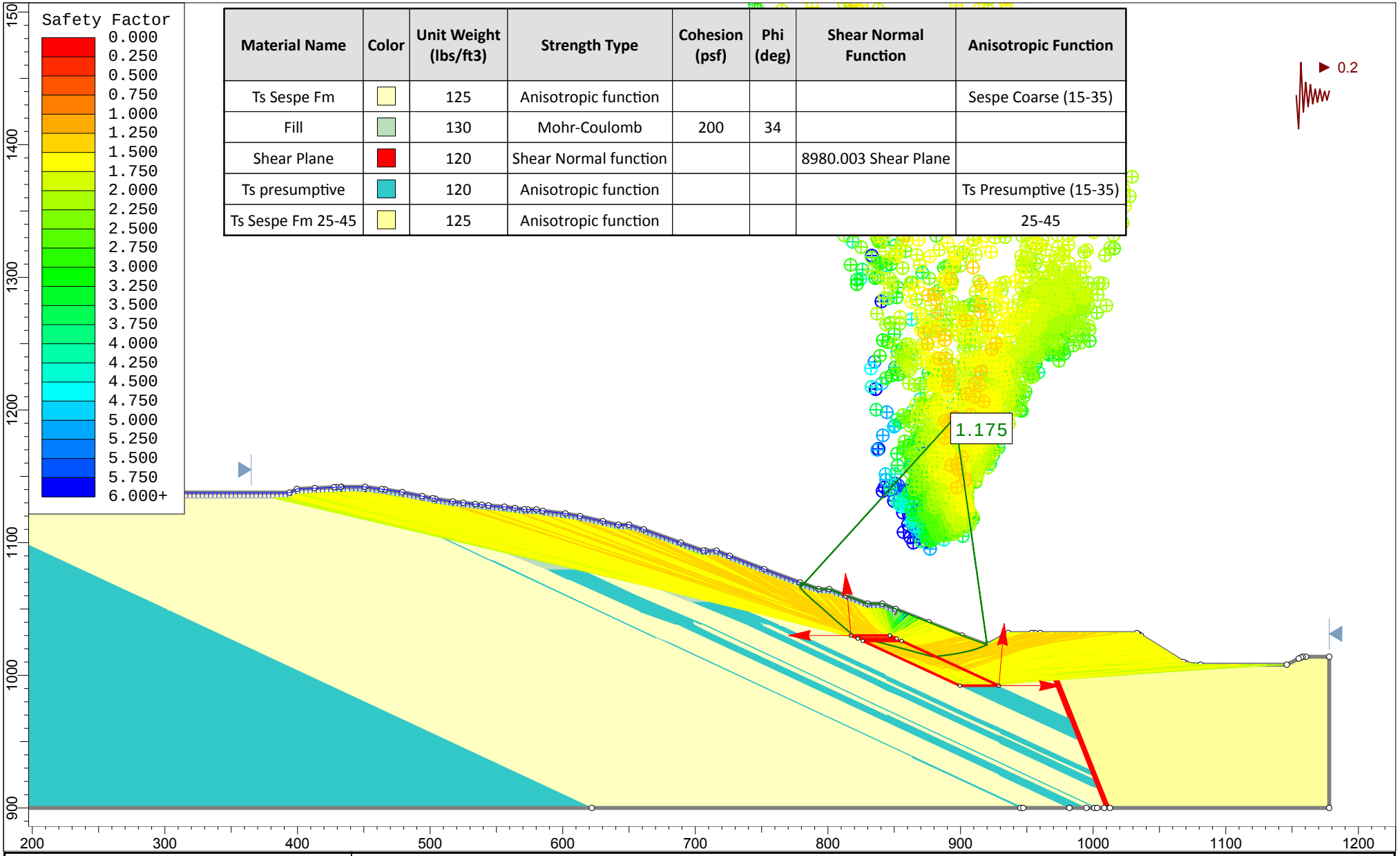
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45



SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G1-G1' pseudostatic upper fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1p B-105at21.slim

PLATE A.13



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

Project	North Canyon Ranch		
Analysis Description	G1-G1' pseudostatic upper fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1p B-105at21.slim

SLIDEINTERPRET 7.036

PLATE A.14

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	2018 Update - G1p B-105at21.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G1-G1' pseudostatic upper fine-grained layer
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	50
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle):	95
Left Projection Angle (End Angle):	180
Right Projection Angle (Start Angle):	0
Right Projection Angle (End Angle):	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Loading

Seismic Load Coefficient (Horizontal): 0.2

Tension Crack

Water level: filled with water

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Ts presumptive	Ts Sespe Fm 25-45
Color					
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Anisotropic function	Anisotropic function
Unit Weight [lbs/ft3]	125	130	120	120	125
Cohesion [psf]		200			
Friction Angle [deg]		34			
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	32
-15	90	250	35

Name: Ts Presumptive (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	8.5
-15	90	250	35

Name: 25-45

Angle From	Angle To	c	phi
-90	-45	250	35
-45	-25	200	32
-25	90	250	35

Global Minimums

Method: spencer

FS	1.175050
Axis Location:	895.746, 1194.393
Left Slip Surface Endpoint:	779.075, 1065.973
Right Slip Surface Endpoint:	920.000, 1023.000
Left Slope Intercept:	779.075 1069.973
Right Slope Intercept:	920.000 1023.000
Resisting Moment:	3.26239e+007 lb-ft
Driving Moment:	2.77637e+007 lb-ft
Resisting Horizontal Force:	169031 lb
Driving Horizontal Force:	143850 lb
Total Slice Area:	2868.65 ft2
Surface Horizontal Width:	140.925 ft
Surface Average Height:	20.3558 ft

Global Minimum Coordinates

Method: spencer

X	Y
779.075	1065.97
780.583	1064.37
783.426	1061.4
788.136	1057.01
794.569	1051.48
798.904	1047.65
802.358	1044.5
805.954	1041.3
810.233	1037.6
815.934	1032.81
819.333	1030.01
826.54	1028.08
833.747	1026.15
840.954	1024.21
848.161	1022.28
855.89	1020.21
863.619	1018.14
871.348	1016.07
879.077	1014
885.611	1014.66
892.817	1015.6
899.157	1016.68
904.8	1017.88
909.431	1019.08
913.714	1020.42
920	1023

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2381
Number of Invalid Surfaces: 2620

Error Codes:

Error Code -108 reported for 1298 surfaces
Error Code -111 reported for 154 surfaces
Error Code -112 reported for 1167 surfaces
Error Code -124 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-124 = A slice has a width less than the minimum acceptable value.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.17505

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.50798	888.146	-46.6882	Fill	200	34	269.6	316.793	173.153	0	173.153	459.128	459.128
2	2.84314	2232.09	-46.2648	Fill	200	34	368.82	433.382	346.004	0	346.004	731.477	731.477
3	2.35487	2355.73	-43.0137	Fill	200	34	456.839	536.809	499.341	0	499.341	925.555	925.555
4	2.35487	2770.84	-43.0137	Fill	200	34	513.299	603.152	597.698	0	597.698	1076.59	1076.59
5	3.21687	4406.35	-40.6695	Fill	200	34	597.116	701.641	743.714	0	743.714	1256.76	1256.76
6	3.21687	5138.94	-40.6695	Fill	200	34	673.199	791.042	876.257	0	876.257	1454.68	1454.68
7	2.16745	4079.33	-41.4736	Fill	200	34	758.285	891.023	1024.48	0	1024.48	1694.73	1694.73
8	2.16745	4619.15	-41.4736	Fill	200	34	840.309	987.405	1167.38	0	1167.38	1910.13	1910.13
9	3.45361	8449.95	-42.3146	Fill	200	34	931.027	1094	1325.41	0	1325.41	2173.02	2173.02
10	3.59597	9762.42	-41.6921	Fill	200	34	1028.76	1208.84	1495.66	0	1495.66	2411.99	2411.99
11	2.13974	6205.28	-40.8804	Fill	200	34	1104.46	1297.8	1627.55	0	1627.55	2583.6	2583.6
12	2.13974	6491.58	-40.8804	Fill	200	34	1149	1350.13	1705.13	0	1705.13	2699.74	2699.74
13	2.85038	9078.94	-40.0443	Fill	200	34	1216.25	1429.16	1822.31	0	1822.31	2844.47	2844.47
14	2.85038	9562.71	-40.0443	Fill	200	34	1273.59	1496.53	1922.18	0	1922.18	2992.53	2992.53
15	3.39907	12032.6	-39.4648	Fill	200	34	1349.08	1585.24	2053.7	0	2053.7	3164.41	3164.41
16	2.4023	8694.35	-15	Ts presumptive	200	8.5	566.094	665.189	3112.65	0	3112.65	3264.34	3264.34
17	2.4023	8598.57	-15	Ts presumptive	200	8.5	561.753	660.088	3078.52	0	3078.52	3229.04	3229.04
18	2.4023	8502.79	-15	Ts presumptive	200	8.5	557.411	654.986	3044.38	0	3044.38	3193.74	3193.74
19	3.60346	12575.1	-15	Ts presumptive	200	8.5	552	648.628	3001.85	0	3001.85	3149.75	3149.75
20	3.60346	12700.8	-15	Ts presumptive	200	8.5	555.798	653.091	3031.71	0	3031.71	3180.63	3180.63
21	3.60346	13118.3	-15	Ts presumptive	200	8.5	568.416	667.917	3130.91	0	3130.91	3283.22	3283.22
22	3.60346	13535.9	-15	Ts presumptive	200	8.5	581.032	682.742	3230.09	0	3230.09	3385.78	3385.78
23	2.4023	9111.51	-15	Ts presumptive	200	8.5	585.003	687.408	3261.33	0	3261.33	3418.08	3418.08
24	2.4023	8997.03	-15	Ts presumptive	200	8.5	579.814	681.311	3220.53	0	3220.53	3375.89	3375.89
25	2.4023	8885.14	-15	Ts presumptive	200	8.5	574.743	675.352	3180.65	0	3180.65	3334.65	3334.65
26	2.57634	9415.34	-15	Ts presumptive	200	8.5	569.946	669.715	3142.93	0	3142.93	3295.65	3295.65
27	2.57634	9298.89	-15	Ts presumptive	200	8.5	565.024	663.931	3104.24	0	3104.24	3255.63	3255.63
28	2.57634	9182.43	-15	Ts presumptive	200	8.5	560.102	658.148	3065.54	0	3065.54	3215.61	3215.61
29	2.57634	9065.97	-15	Ts presumptive	200	8.5	555.18	652.364	3026.84	0	3026.84	3175.6	3175.6
30	2.57634	8949.51	-15	Ts presumptive	200	8.5	550.257	646.58	2988.14	0	2988.14	3135.58	3135.58
31	2.57634	8833.06	-15	Ts presumptive	200	8.5	545.336	640.797	2949.44	0	2949.44	3095.56	3095.56
32	2.57634	8716.61	-15	Ts presumptive	200	8.5	540.414	635.013	2910.74	0	2910.74	3055.54	3055.54
33	2.57634	8600.15	-15	Ts presumptive	200	8.5	535.491	629.229	2872.04	0	2872.04	3015.52	3015.52
34	2.57634	8483.7	-15	Ts presumptive	200	8.5	530.569	623.445	2833.34	0	2833.34	2975.51	2975.51
35	3.86451	12507.2	-15	Ts presumptive	200	8.5	524.417	616.216	2784.97	0	2784.97	2925.49	2925.49
36	3.86451	12245.2	-15	Ts presumptive	200	8.5	517.033	607.54	2726.91	0	2726.91	2865.45	2865.45
37	1.91765	5897.74	5.73882	Ts presumptive	250	35	2759.41	3242.45	4273.67	0	4273.67	3996.35	3996.35
38	2.30805	6789.79	5.73882	Ts Sespe Fm	250	35	2652.35	3116.64	4093.98	0	4093.98	3827.43	3827.43
39	2.30805	6445.86	5.73882	Ts Sespe Fm	250	35	2533.02	2976.43	3893.75	0	3893.75	3639.19	3639.19
40	3.60338	9350.88	7.47459	Ts Sespe Fm	250	35	2476.25	2909.72	3798.46	0	3798.46	3473.57	3473.57
41	3.60338	8462.75	7.47459	Ts Sespe Fm	250	35	2270.17	2667.56	3452.64	0	3452.64	3154.79	3154.79
42	3.16958	6685.52	9.63683	Ts Sespe Fm	250	35	2187.33	2570.22	3313.61	0	3313.61	2942.21	2942.21
43	3.16958	5949.88	9.63683	Ts Sespe Fm	250	35	1981.84	2328.76	2968.78	0	2968.78	2632.26	2632.26
44	2.82192	4659.41	12.041	Ts Sespe Fm	250	35	1902.75	2235.83	2836.06	0	2836.06	2430.2	2430.2
45	2.82192	4070.26	12.041	Ts Sespe Fm	250	35	1704.75	2003.17	2503.79	0	2503.79	2140.16	2140.16
46	2.31547	2892.04	14.5099	Ts Sespe Fm	250	35	1637.21	1923.8	2390.44	0	2390.44	1966.72	1966.72
47	2.31547	2471.69	14.5099	Ts Sespe Fm	250	35	1451.21	1705.24	2078.31	0	2078.31	1702.73	1702.73
48	4.28314	3401.86	17.3879	Ts Sespe Fm	250	35	1287.15	1512.47	1802.99	0	1802.99	1399.92	1399.92
49	3.14279	1442.04	22.3052	Ts Sespe Fm	250	35	1100.65	1293.32	1490.01	0	1490.01	1038.48	1038.48
50	3.14279	480.681	22.3052	Ts Sespe Fm	250	35	672.818	790.595	772.05	0	772.05	496.036	496.036

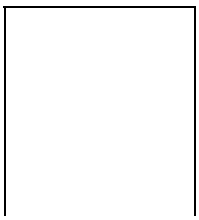
Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.17505

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	779.075	1065.97	499.2	0	0
2	780.583	1064.37	547.25	195.793	19.686
3	783.426	1061.4	973.218	348.195	19.686
4	785.781	1059.21	1465.62	524.366	19.6861
5	788.136	1057.01	2124.19	759.986	19.686
6	791.352	1054.24	3140.22	1123.5	19.6861
7	794.569	1051.48	4424.37	1582.94	19.6861
8	796.737	1049.56	5559.42	1989.03	19.686
9	798.904	1047.65	6898.4	2468.09	19.686
10	802.358	1044.5	9540.3	3413.3	19.686
11	805.954	1041.3	12584	4502.27	19.6861
12	808.094	1039.45	14476.4	5179.33	19.6861
13	810.233	1037.6	16474.5	5894.19	19.686
14	813.084	1035.2	19188.8	6865.32	19.6861
15	815.934	1032.81	22075.8	7898.21	19.686
16	819.333	1030.01	25644	9174.81	19.686
17	821.735	1029.36	28026.5	10027.2	19.686
18	824.138	1028.72	30378.3	10868.7	19.6861
19	826.54	1028.08	32699.5	11699.1	19.686
20	830.143	1027.11	36123.8	12924.3	19.6861
21	833.747	1026.15	39588.4	14163.8	19.686
22	837.35	1025.18	43186.9	15451.3	19.6861
23	840.954	1024.21	46919.1	16786.6	19.6861
24	843.356	1023.57	49435.4	17686.8	19.686
25	845.758	1022.93	51914.9	18574	19.6861
26	848.161	1022.28	54358.6	19448.2	19.686
27	850.737	1021.59	56943	20372.9	19.686
28	853.313	1020.9	59490	21284.1	19.686
29	855.89	1020.21	61999.7	22182.1	19.6861
30	858.466	1019.52	64472.1	23066.6	19.686
31	861.042	1018.83	66907.2	23937.8	19.686
32	863.619	1018.14	69304.9	24795.7	19.686
33	866.195	1017.45	71665.3	25640.2	19.686
34	868.771	1016.76	73988.4	26471.3	19.686
35	871.348	1016.07	76274.1	27289.1	19.686
36	875.212	1015.03	79632.8	28490.7	19.686
37	879.077	1014	82907.4	29662.3	19.686
38	880.994	1014.19	77971.8	27896.5	19.686
39	883.303	1014.42	72258.4	25852.4	19.686
40	885.611	1014.66	66798	23898.8	19.6861
41	889.214	1015.13	57949.6	20733	19.686
42	892.817	1015.6	49829.6	17827.9	19.6861
43	895.987	1016.14	42450.4	15187.8	19.6861
44	899.157	1016.68	35761	12794.5	19.6861
45	901.978	1017.28	29616.4	10596.1	19.6861
46	904.8	1017.88	24112.7	8626.97	19.686
47	907.116	1018.48	19467.8	6965.11	19.686
48	909.431	1019.08	15356.5	5494.18	19.686
49	913.714	1020.42	8105.51	2899.96	19.686
50	916.857	1021.71	3013.77	1078.26	19.6861
51	920	1023	0	0	0

List Of Coordinates

Tension Crack



X	Y
0.000130068	1118
86.0001	1124
110	1126
121	1128
125	1130
129	1131
202	1131
204	1132
205	1132.6
273	1132.6
277	1133.5
312	1133.7
394	1133.7
399.525	1136.46
413	1137
433	1138
451	1138
466	1136
479	1134
494	1131
504	1129
517	1127
525	1126
534	1125
544	1124
556	1123
564	1122
571	1121
573.656	1120.99
580.212	1120.96
585	1120
602	1118
613	1116
630.294	1112.12
642	1109.5
650	1109.5
661	1106
689	1096
706	1090
716	1090
726	1086
752	1076
779	1066
793	1061
801	1061
814	1056
830	1050
841	1050
851	1046
876	1036

Block Search Window

X	Y
817.317	1030
822.48	1027.62
851.811	1027.62
846.645	1030

Block Search Window

X	Y
855.555	1025.9
826.221	1025.9
899.52	992.146
928.899	992.146

External Boundary

X	Y
1160.49	1014

1158	1014
1156.8	1013.4
1155.01	1012.5
1146	1008
1081	1008
1070	1009
1068	1010
1036	1030
1033.93	1031.24
1033	1031.8
960.208	1031.8
956.089	1031.8
953.583	1031.8
936	1031.8
920	1023
901	1030
876	1040
851	1050
841	1054
830	1054
814	1060
801	1065
793	1065
779	1070
752	1080
726	1090
716	1094
707.58	1094
706	1094
689	1100
661	1110
650	1113.5
642	1113.5
630.293	1116.12
613	1120
602	1122
585	1124
580.212	1124.96
573.656	1124.99
571	1125
564	1126
556	1127
544	1128
539.043	1128.5
534	1129
525	1130
517	1131
504	1133
501.957	1133.41
494	1135
479	1138
466	1140
463.523	1140.33
451	1142
433	1142
432.795	1141.99
429.314	1141.82
427.474	1141.73
413	1141
399.525	1140.46
394	1137.7
312	1137.7
277	1137.5
273	1136.6
205	1136.6
204	1136
202	1135
129	1135
125	1134
122.669	1132.83
121	1132
110	1130
86	1128

-5.09388e-010	1122
0	900
621.968	900
945.141	900
947.285	900
982.096	900
994.963	900
1000.9	900
1003.04	900
1008.38	900
1012.69	900
1178	900
1178	1014

Material Boundary

X	Y
956.089	1031.8
981.281	968.062
987.83	951.612
996.884	928.872
998.726	924.245
999.704	921.789
1002.51	914.75
1008.38	900

Material Boundary

X	Y
960.208	1031.8
960.738	1030.47
1012.69	900

Material Boundary

X	Y
571	1125
604.158	1109.04
657.327	1083.24
723.17	1055
763.505	1037.7
844.427	999.964
929.444	960.32
996.884	928.872

Material Boundary

X	Y
539.043	1128.5
604.158	1098.04
630.036	1085
639.956	1080
657.327	1071.24
696.814	1055
738.624	1037.8
844.413	988.47
929.445	948.819
1002.51	914.75

Material Boundary

X	Y
501.957	1133.41
604.158	1084.04
612.829	1080
657.327	1059.24
707.253	1037.93
844.396	973.978
929.447	934.318
1003.04	900

Material Boundary

X	Y
699.102	1037.96
697.276	1041.18
705.089	1037.94
844.395	972.979
929.447	933.318
1000.9	900

Material Boundary

X	Y
429.314	1141.82
546.601	1086.99
672.661	1028.06
947.285	900

Material Boundary

X	Y
427.474	1141.73
544.512	1086.99
670.516	1028.06
862.999	938.303
878.66	931.001
945.141	900

Material Boundary

X	Y
751.027	1037.75
747.332	1040.67
755.354	1037.73
844.422	996.198
929.445	956.552
998.726	924.245

Material Boundary

X	Y
751.027	1037.75
844.42	994.199
929.445	954.552
999.704	921.789

Material Boundary

X	Y
699.102	1037.96
844.391	970.213
929.447	930.55
994.963	900

Material Boundary

X	Y
463.523	1140.33
587.774	1080
604.158	1072.04
657.327	1048.24
686.12	1038.02
844.384	964.216
929.448	924.55
982.096	900

Material Boundary

X	Y

X	Y
122.669	1132.83
302.157	1049.13
621.968	900

Material Boundary

X	Y
630.293	1116.12
763.028	1055
817.317	1030
929.442	978.367
987.83	951.612

Material Boundary

X	Y
707.58	1094
766.203	1067.02
846.645	1030
929.441	991.896
981.281	968.062

Material Boundary

X	Y
956.089	1031.8
960.738	1030.47
974	1028
994	1025.5
1005	1025
1012	1026
1018	1027
1032	1031
1033.93	1031.24

Material Boundary

X	Y
1156.8	1013.4
1160.49	1014

Material Boundary

X	Y
587.774	1080
612.829	1080
639.956	1080

Material Boundary

X	Y
696.814	1055
723.17	1055
763.028	1055

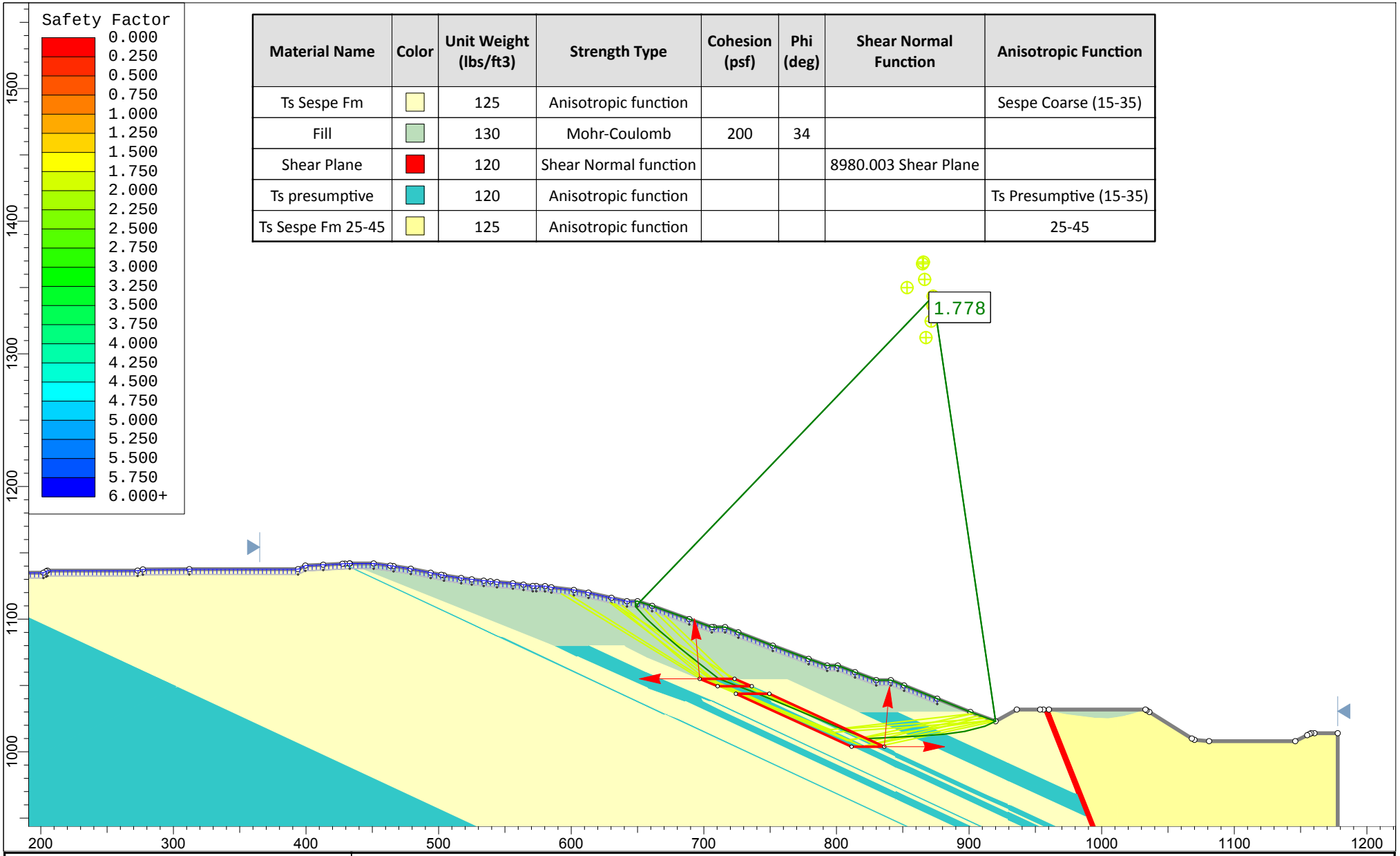
Material Boundary

X	Y
817.317	1030
846.645	1030
901	1030

Material Boundary

X	Y
432.795	1141.99
587.774	1080

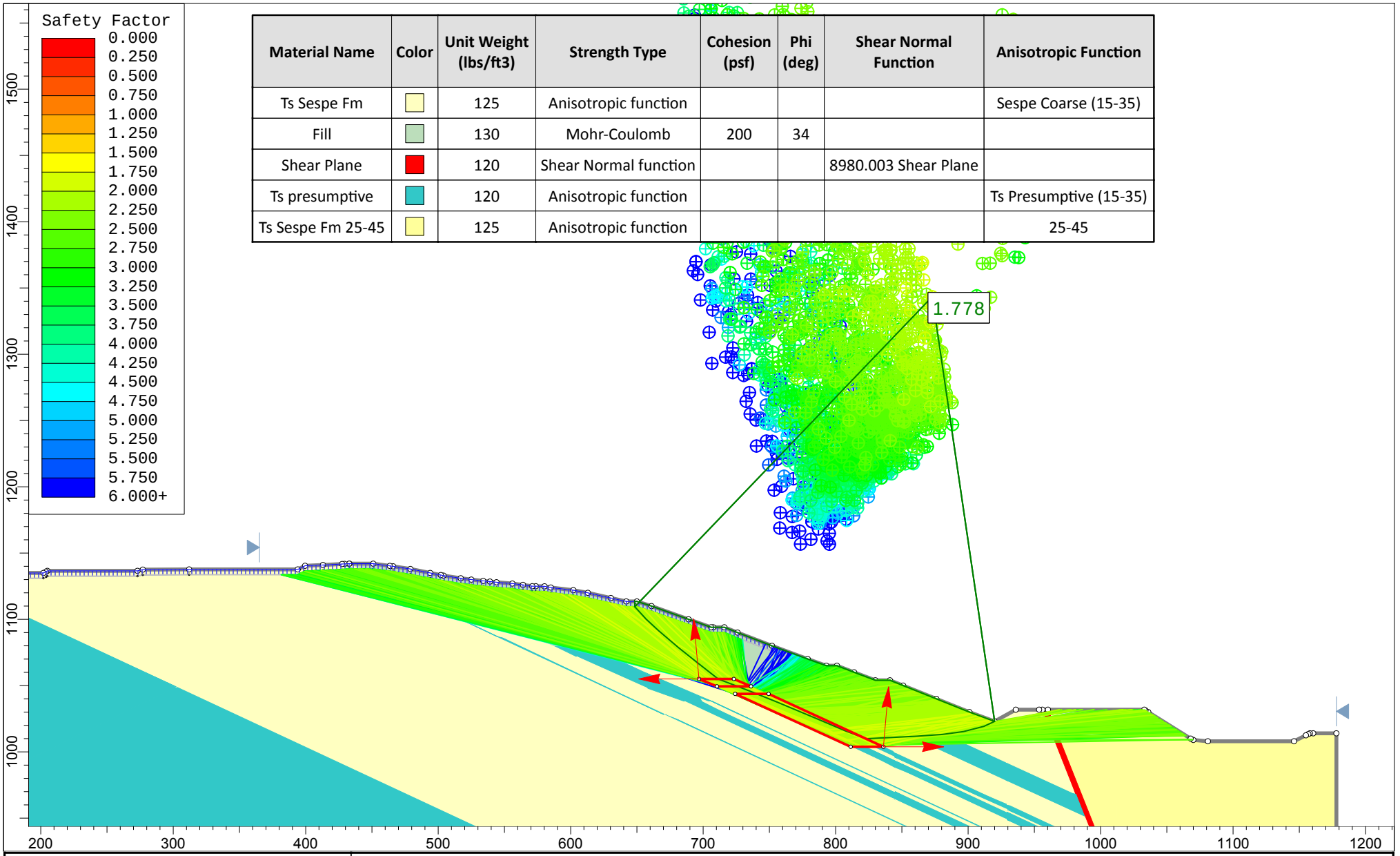
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45



Project	North Canyon Ranch		
Analysis Description	G1-G1' static middle fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1 B14at21.slim

SLIDEINTERPRET 7.036

PLATE A.26



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

rocscience

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G1-G1' static middle fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1 B14at21.slim

PLATE A.27

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	2018 Update - G1 B14at21.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G1-G1' static middle fine-grained layer
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	50
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle):	95
Left Projection Angle (End Angle):	180
Right Projection Angle (Start Angle):	0
Right Projection Angle (End Angle):	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Tension Crack

Water level: filled with water

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Ts presumptive	Ts Sespe Fm 25-45
Color					
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Anisotropic function	Anisotropic function
Unit Weight [lbs/ft3]	125	130	120	120	125
Cohesion [psf]		200			
Friction Angle [deg]		34			
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	32
-15	90	250	35

Name: Ts Presumptive (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	8.5
-15	90	250	35

Name: 25-45

Angle From	Angle To	c	phi
-90	-45	250	35
-45	-25	200	32
-25	90	250	35

Global Minimums

Method: spencer

FS	1.777670
Axis Location:	872.906, 1343.437
Left Slip Surface Endpoint:	648.439, 1109.500
Right Slip Surface Endpoint:	920.000, 1023.000
Left Slope Intercept:	648.439 1113.500
Right Slope Intercept:	920.000 1023.000
Resisting Moment:	1.81097e+008 lb-ft
Driving Moment:	1.01873e+008 lb-ft
Resisting Horizontal Force:	512010 lb
Driving Horizontal Force:	288023 lb
Total Slice Area:	8859.63 ft2
Surface Horizontal Width:	271.561 ft
Surface Average Height:	32.6248 ft

Global Minimum Coordinates

Method: spencer

X	Y
648.439	1109.5
656.882	1100.19
666.625	1091.16
681.586	1078.52
693.516	1068.97
702.411	1061.99
711.306	1055.02
725.498	1049.57
739.69	1044.12
753.067	1038.66
766.445	1033.21
779.663	1027.59
792.882	1021.98
807.118	1015.96
823.036	1009.94
835.883	1010.57
848.731	1011.19
861.578	1011.82
880.651	1013.17
896.599	1015.37
911.945	1019.29
920	1023

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2729
Number of Invalid Surfaces: 2272

Error Codes:

Error Code -108 reported for 1502 surfaces
Error Code -111 reported for 32 surfaces
Error Code -112 reported for 738 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

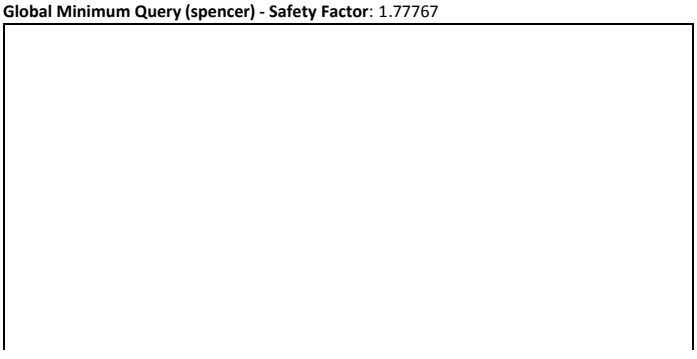
Global Minimum Query (spencer) - Safety Factor: 1.77767

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.22152	3326.84	-47.8105	Fill	200	34	269.009	478.209	412.461	0	412.461	709.246	709.246
2	4.22152	5196.08	-47.8105	Fill	200	34	380.852	677.03	707.226	0	707.226	1127.4	1127.4
3	4.87196	7983.09	-42.8107	Fill	200	34	509.815	906.283	1047.11	0	1047.11	1519.38	1519.38
4	4.87196	9782.46	-42.8107	Fill	200	34	603.668	1073.12	1294.46	0	1294.46	1853.67	1853.67
5	4.98669	11699.8	-40.1879	Fill	200	34	712.933	1267.36	1582.42	0	1582.42	2184.64	2184.64
6	4.98669	13275.9	-40.1879	Fill	200	34	796.155	1415.3	1801.76	0	1801.76	2474.28	2474.28
7	4.98669	14852.1	-40.1879	Fill	200	34	879.381	1563.25	2021.09	0	2021.09	2763.91	2763.91
8	5.96521	19735.4	-38.6892	Fill	200	34	984.536	1750.18	2298.24	0	2298.24	3086.7	3086.7
9	5.96521	21793.5	-38.6892	Fill	200	34	1077.18	1914.87	2542.4	0	2542.4	3405.06	3405.06
10	4.44739	17574.4	-38.096	Fill	200	34	1165.78	2072.37	2775.91	0	2775.91	3689.87	3689.87
11	4.44739	18682.7	-38.096	Fill	200	34	1233.22	2192.25	2953.62	0	2953.62	3920.45	3920.45
12	4.44739	19808	-38.096	Fill	200	34	1301.68	2313.95	3134.06	0	3134.06	4154.56	4154.56
13	4.44739	21528.3	-38.096	Fill	200	34	1406.34	2500.01	3409.91	0	3409.91	4512.47	4512.47
14	4.73069	24488.6	-21.0155	Ts presumptive	200	8.5	503.499	895.055	4650.72	0	4650.72	4844.15	4844.15
15	4.73069	24929.5	-21.0155	Ts presumptive	200	8.5	510.559	907.605	4734.7	0	4734.7	4930.84	4930.84

16	4.73069	24803.3	-21.0155	Ts presumptive	200	8.5	508.539	904.014	4710.66	0	4710.66	4906.03	4906.03
17	7.09603	37081.7	-21.0155	Ts presumptive	200	8.5	507.222	901.673	4695.01	0	4695.01	4889.87	4889.87
18	7.09603	36993.1	-21.0155	Ts presumptive	200	8.5	506.276	899.992	4683.76	0	4683.76	4878.26	4878.26
19	6.6888	34852.3	-22.1803	Ts presumptive	200	8.5	503.036	894.232	4645.22	0	4645.22	4850.3	4850.3
20	6.6888	34901.2	-22.1803	Ts presumptive	200	8.5	503.585	895.208	4651.75	0	4651.75	4857.06	4857.06
21	2.30897	12068.1	-22.1803	Ts presumptive	200	8.5	504.244	896.379	4659.59	0	4659.59	4865.16	4865.16
22	5.53432	28989.1	-22.1803	Ts presumptive	200	8.5	505.104	897.909	4669.83	0	4669.83	4875.75	4875.75
23	5.53432	29092.8	-22.1803	Ts presumptive	200	8.5	506.513	900.413	4686.57	0	4686.57	4893.07	4893.07
24	6.6092	34998.1	-23.0152	Ts presumptive	200	8.5	507.198	901.631	4694.73	0	4694.73	4910.18	4910.18
25	6.6092	35324.4	-23.0152	Ts presumptive	200	8.5	510.891	908.195	4738.65	0	4738.65	4955.67	4955.67
26	6.6092	35695	-23.0152	Ts presumptive	200	8.5	515.085	915.651	4788.53	0	4788.53	5007.33	5007.33
27	6.6092	36096	-23.0152	Ts presumptive	200	8.5	519.623	923.718	4842.51	0	4842.51	5063.24	5063.24
28	4.74559	26659.5	-22.9145	Ts presumptive	200	8.5	531.594	944.999	4984.9	0	4984.9	5209.61	5209.61
29	4.74559	27858.8	-22.9145	Ts presumptive	200	8.5	550.509	978.624	5209.89	0	5209.89	5442.6	5442.6
30	4.74559	28263.9	-22.9145	Ts presumptive	200	8.5	556.898	989.981	5285.88	0	5285.88	5521.29	5521.29
31	5.3057	31667.4	-20.7111	Ts presumptive	200	8.5	564.387	1003.29	5374.96	0	5374.96	5588.35	5588.35
32	5.3057	31675.8	-20.7111	Ts presumptive	200	8.5	564.507	1003.51	5376.39	0	5376.39	5589.82	5589.82
33	5.3057	31635.1	-20.7111	Ts presumptive	200	8.5	563.924	1002.47	5369.46	0	5369.46	5582.67	5582.67
34	6.42382	37065.7	2.78707	Ts Sespe Fm	250	35	2784.19	4949.37	6711.39	0	6711.39	6575.85	6575.85
35	6.42382	35551.5	2.78707	Ts Sespe Fm	250	35	2677	4758.82	6439.27	0	6439.27	6308.95	6308.95
36	6.42382	35153.9	2.78707	Ts Sespe Fm	250	35	2648.85	4708.78	6367.79	0	6367.79	6238.84	6238.84
37	6.42382	33347.7	2.78707	Ts Sespe Fm	250	35	2520.99	4481.49	6043.18	0	6043.18	5920.46	5920.46
38	4.26248	20790.3	2.78707	Ts Sespe Fm	250	35	2378.32	4227.87	5680.99	0	5680.99	5565.21	5565.21
39	4.26248	19735	2.78707	Ts Sespe Fm	250	35	2265.73	4027.72	5395.14	0	5395.14	5284.84	5284.84
40	4.32268	18959.6	2.78707	Ts presumptive	250	35	2154.85	3830.61	5113.64	0	5113.64	5008.74	5008.74
41	6.35767	25946	4.04985	Ts presumptive	250	35	2049.37	3643.11	4845.86	0	4845.86	4700.76	4700.76
42	6.35767	23593.7	4.04985	Ts presumptive	250	35	1878.27	3338.95	4411.47	0	4411.47	4278.49	4278.49
43	6.35767	21241.5	4.04985	Ts presumptive	250	35	1707.17	3034.79	3977.09	0	3977.09	3856.22	3856.22
44	1.97466	6103.07	7.84323	Ts presumptive	250	35	1674.46	2976.63	3894.03	0	3894.03	3663.37	3663.37
45	4.65761	13339.9	7.84323	Ts Sespe Fm	250	35	1564	2780.28	3613.62	0	3613.62	3398.18	3398.18
46	4.65761	11838.3	7.84323	Ts Sespe Fm	250	35	1406.84	2500.9	3214.63	0	3214.63	3020.84	3020.84
47	4.65761	10336.7	7.84323	Ts Sespe Fm	250	35	1249.69	2221.53	2815.64	0	2815.64	2643.49	2643.49
48	7.67283	13350.8	14.3592	Ts Sespe Fm	250	35	1117.48	1986.51	2480	0	2480	2193.92	2193.92
49	7.67283	8698.09	14.3592	Ts Sespe Fm	250	35	790.653	1405.52	1650.26	0	1650.26	1447.86	1447.86
50	8.05542	3359.84	24.7035	Ts Sespe Fm	250	35	482.191	857.176	867.137	0	867.137	645.319	645.319

Interslice Data

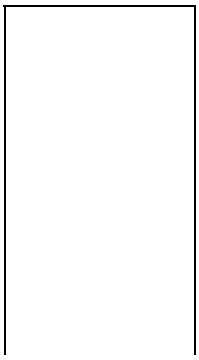
Global Minimum Query (spencer) - Safety Factor: 1.77767



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	648.439	1109.5	499.202	0	0
2	652.66	1104.84	1284.57	332.74	14.5221
3	656.882	1100.19	2970.63	769.474	14.522
4	661.754	1095.67	5212.6	1350.21	14.522
5	666.625	1091.16	8113.66	2101.66	14.522
6	671.612	1086.95	11224.1	2907.35	14.522
7	676.599	1082.73	14843.4	3844.85	14.522
8	681.586	1078.52	18971.6	4914.17	14.522
9	687.551	1073.74	24077.7	6236.8	14.522
10	693.516	1068.97	29797.7	7718.42	14.522
11	697.963	1065.48	34291.7	8882.51	14.522
12	702.411	1061.99	39105.6	10129.4	14.522
13	706.858	1058.51	44244	11460.4	14.522
14	711.306	1055.02	49878.8	12920	14.522
15	716.036	1053.2	55949.2	14492.4	14.522
16	720.767	1051.39	62138.7	16095.7	14.5221
17	725.498	1049.57	68294.2	17690.1	14.522
18	732.594	1046.84	77494	20073.1	14.522
19	739.69	1044.12	86669.9	22449.9	14.522
20	746.378	1041.39	95972.6	24859.6	14.522
21	753.067	1038.66	105289	27272.9	14.5221
22	755.376	1037.72	108511	28107.4	14.522
23	760.911	1035.46	116252	30112.6	14.5221
24	766.445	1033.21	124023	32125.5	14.5221
25	773.054	1030.4	133852	34671.3	14.522
26	779.663	1027.59	143779	37242.7	14.522
27	786.272	1024.79	153818	39843.2	14.522
28	792.882	1021.98	163980	42475.2	14.522
29	797.627	1019.97	171457	44412	14.522
30	802.373	1017.97	179295	46442.5	14.5221
31	807.118	1015.96	187256	48504.6	14.5221
32	812.424	1013.95	195044	50521.8	14.522
33	817.73	1011.95	202834	52539.7	14.522
34	823.036	1009.94	210613	54554.7	14.522
35	829.459	1010.26	190630	49378.3	14.522
36	835.883	1010.57	171419	44402.3	14.522
37	842.307	1010.88	152412	39479	14.522
38	848.731	1011.19	134328	34794.6	14.522
39	852.993	1011.4	123011	31863.4	14.5221
40	857.256	1011.61	112234	29071.8	14.5221
41	861.578	1011.82	101843	26380.3	14.5221
42	867.936	1012.27	86633	22440.3	14.522
43	874.294	1012.72	72705.8	18832.8	14.522
44	880.651	1013.17	60061.9	15557.7	14.522
45	882.626	1013.44	55696.2	14426.9	14.5221
46	887.284	1014.08	46093.2	11939.4	14.522
47	891.941	1014.72	37478.2	9707.89	14.522
48	896.599	1015.37	29851.1	7732.27	14.522
49	904.272	1017.33	16405.6	4249.51	14.522
50	911.945	1019.29	7097.57	1838.47	14.522
51	920	1023	0	0	0

List Of Coordinates

Tension Crack



X	Y
0.000130068	1118
86.0001	1124
110	1126
121	1128
125	1130
129	1131
202	1131
204	1132
205	1132.6
273	1132.6
277	1133.5
312	1133.7
394	1133.7
399.525	1136.46
413	1137
433	1138
451	1138
466	1136
479	1134
494	1131
504	1129
517	1127
525	1126
534	1125
544	1124
556	1123
564	1122
571	1121
573.656	1120.99
580.212	1120.96
585	1120
602	1118
613	1116
630.294	1112.12
642	1109.5
650	1109.5
661	1106
689	1096
706	1090
716	1090
726	1086
752	1076
779	1066
793	1061
801	1061
814	1056
830	1050
841	1050
851	1046
876	1036

Block Search Window

X	Y
710.375	1049.42
736.175	1049.42
723.17	1055
696.814	1055

Block Search Window

X	Y
724.184	1043.74
811.429	1003.85
836.09	1003.85
749.419	1043.74

External Boundary

X	Y
1160.49	1014

1158	1014
1156.8	1013.4
1155.01	1012.5
1146	1008
1081	1008
1070	1009
1068	1010
1036	1030
1033.93	1031.24
1033	1031.8
960.208	1031.8
956.089	1031.8
953.583	1031.8
936	1031.8
920	1023
901	1030
876	1040
851	1050
841	1054
830	1054
814	1060
801	1065
793	1065
779	1070
752	1080
726	1090
716	1094
707.58	1094
706	1094
689	1100
661	1110
650	1113.5
642	1113.5
630.293	1116.12
613	1120
602	1122
585	1124
580.212	1124.96
573.656	1124.99
571	1125
564	1126
556	1127
544	1128
539.043	1128.5
534	1129
525	1130
517	1131
504	1133
501.957	1133.41
494	1135
479	1138
466	1140
463.523	1140.33
451	1142
433	1142
432.795	1141.99
429.314	1141.82
427.474	1141.73
413	1141
399.525	1140.46
394	1137.7
312	1137.7
277	1137.5
273	1136.6
205	1136.6
204	1136
202	1135
129	1135
125	1134
122.669	1132.83
121	1132
110	1130
86	1128

-5.09388e-010	1122
0	900
621.968	900
945.141	900
947.285	900
982.096	900
994.963	900
1000.9	900
1003.04	900
1008.38	900
1012.69	900
1178	900
1178	1014

Material Boundary

X	Y
956.089	1031.8
981.281	968.062
987.83	951.612
996.884	928.872
998.726	924.245
999.704	921.789
1002.51	914.75
1008.38	900

Material Boundary

X	Y
960.208	1031.8
960.738	1030.47
1012.69	900

Material Boundary

X	Y
571	1125
604.158	1109.04
657.327	1083.24
723.17	1055
763.505	1037.7
844.427	999.964
929.444	960.32
996.884	928.872

Material Boundary

X	Y
539.043	1128.5
604.158	1098.04
630.036	1085
639.956	1080
657.327	1071.24
696.814	1055
738.624	1037.8
844.413	988.47
929.445	948.819
1002.51	914.75

Material Boundary

X	Y
501.957	1133.41
604.158	1084.04
612.829	1080
657.327	1059.24
707.253	1037.93
844.396	973.978
929.447	934.318
1003.04	900

Material Boundary

X	Y
699.102	1037.96
697.276	1041.18
705.089	1037.94
844.395	972.979
929.447	933.318
1000.9	900

Material Boundary

X	Y
429.314	1141.82
546.601	1086.99
672.661	1028.06
947.285	900

Material Boundary

X	Y
427.474	1141.73
544.512	1086.99
670.516	1028.06
862.999	938.303
878.66	931.001
945.141	900

Material Boundary

X	Y
751.027	1037.75
747.332	1040.67
755.354	1037.73
844.422	996.198
929.445	956.552
998.726	924.245

Material Boundary

X	Y
751.027	1037.75
844.42	994.199
929.445	954.552
999.704	921.789

Material Boundary

X	Y
699.102	1037.96
844.391	970.213
929.447	930.55
994.963	900

Material Boundary

X	Y
463.523	1140.33
587.774	1080
604.158	1072.04
657.327	1048.24
686.12	1038.02
844.384	964.216
929.448	924.55
982.096	900

Material Boundary

X	Y

X	Y
122.669	1132.83
302.157	1049.13
621.968	900

Material Boundary

X	Y
630.293	1116.12
763.028	1055
817.317	1030
929.442	978.367
987.83	951.612

Material Boundary

X	Y
707.58	1094
766.203	1067.02
846.645	1030
929.441	991.896
981.281	968.062

Material Boundary

X	Y
956.089	1031.8
960.738	1030.47
974	1028
994	1025.5
1005	1025
1012	1026
1018	1027
1032	1031
1033.93	1031.24

Material Boundary

X	Y
1156.8	1013.4
1160.49	1014

Material Boundary

X	Y
587.774	1080
612.829	1080
639.956	1080

Material Boundary

X	Y
696.814	1055
723.17	1055
763.028	1055

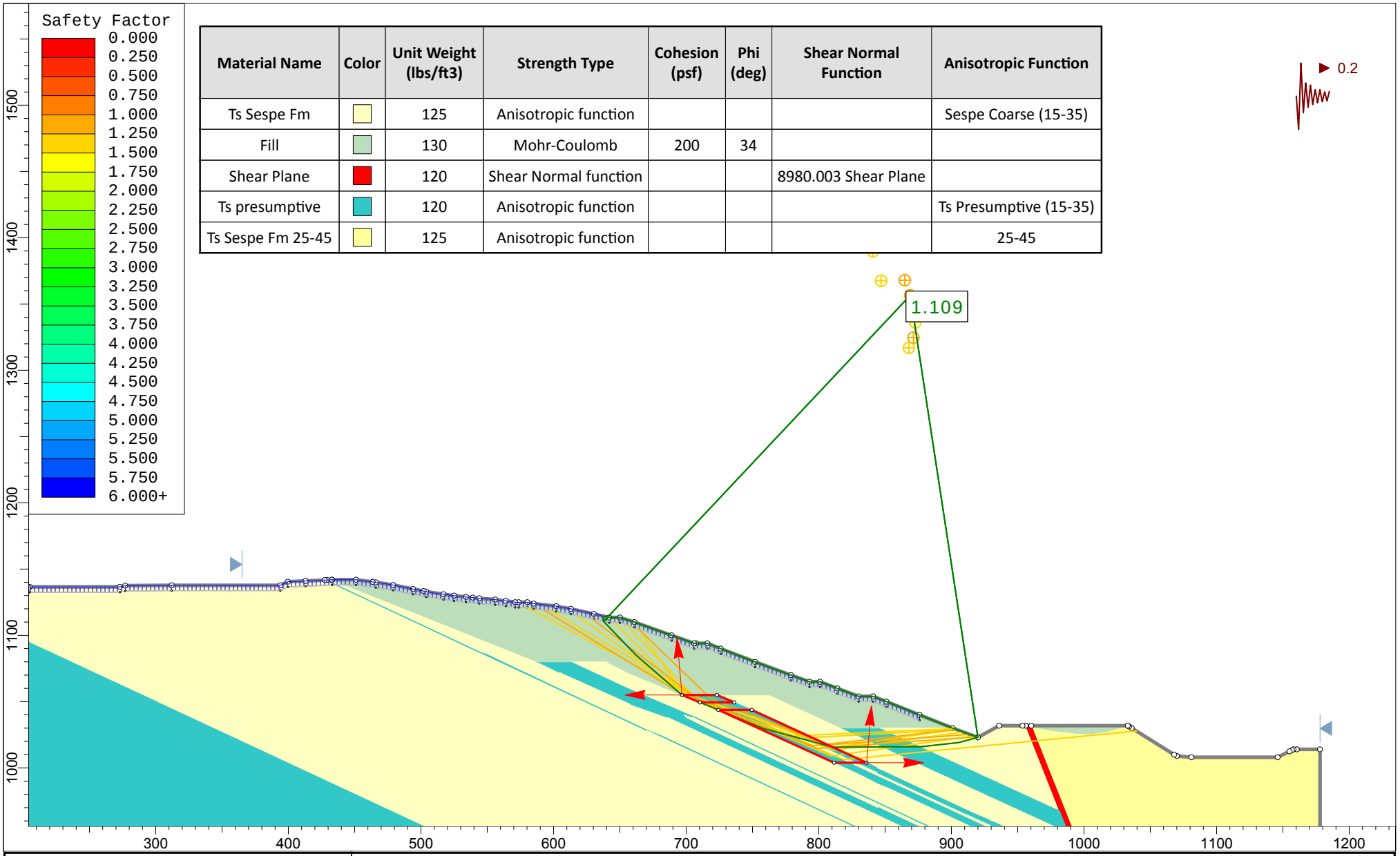
Material Boundary

X	Y
817.317	1030
846.645	1030
901	1030

Material Boundary

X	Y
432.795	1141.99
587.774	1080

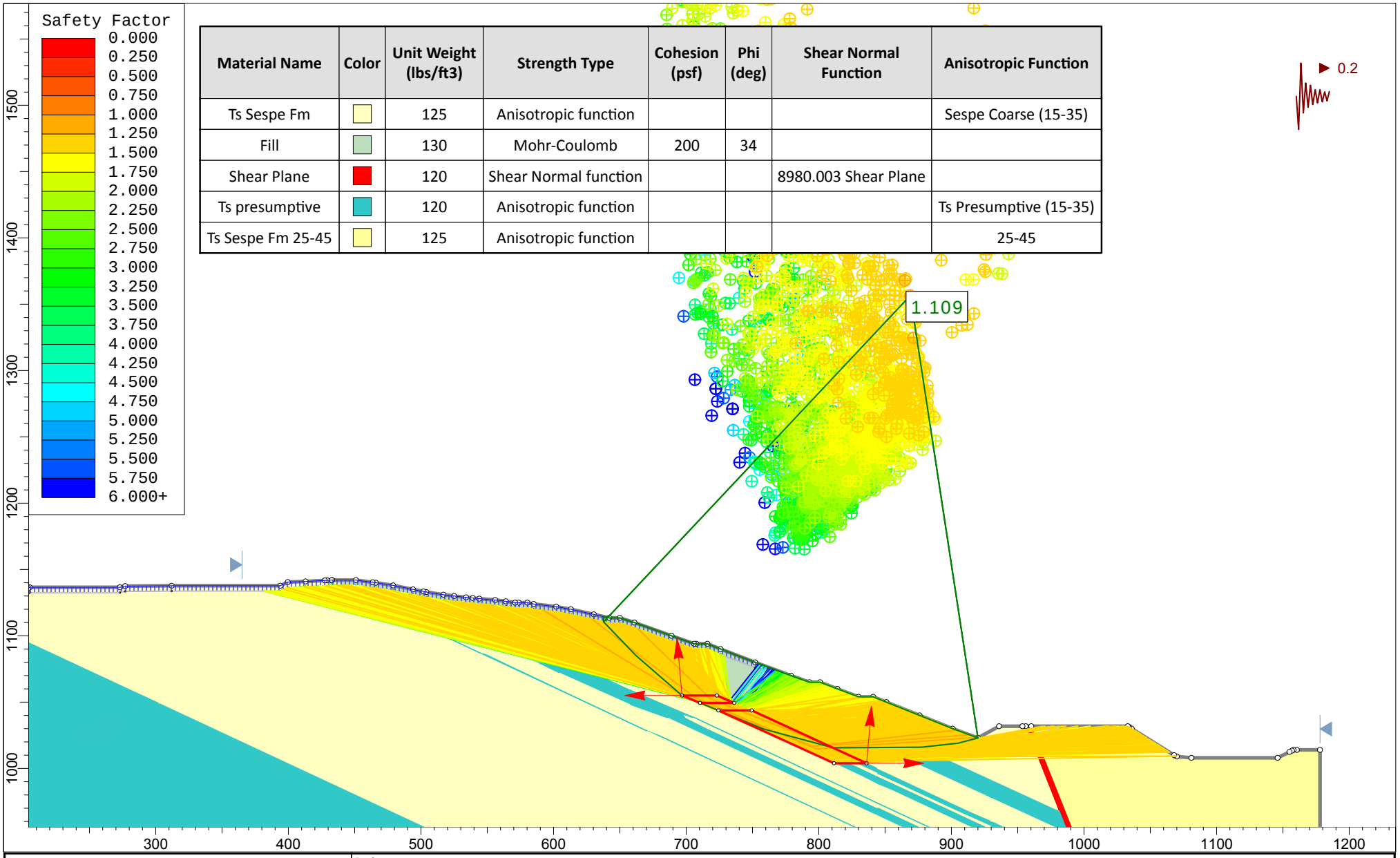
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45



Project	North Canyon Ranch		
Analysis Description	G1-G1' pseudostatic middle fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1p B14at21.slim

SLIDEINTERPRET 7.036

PLATE A.38



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

Project	North Canyon Ranch		
Analysis Description	G1-G1' pseudostatic middle fine-grained layer		
Drawn By: RMP	Scale: 1:1200	Company: GWV	
Date:		File Name: 2018 Update - G1p B14at21.slim	

SLIDEINTERPRET 7.036

PLATE A.39

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	2018 Update - G1p B14at21.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G1-G1' pseudostatic middle fine-grained layer
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	50
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle):	95
Left Projection Angle (End Angle):	180
Right Projection Angle (Start Angle):	0
Right Projection Angle (End Angle):	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Loading

Seismic Load Coefficient (Horizontal): 0.2

Tension Crack

Water level: filled with water

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Ts presumptive	Ts Sespe Fm 25-45
Color					
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Anisotropic function	Anisotropic function
Unit Weight [lbs/ft3]	125	130	120	120	125
Cohesion [psf]		200			
Friction Angle [deg]		34			
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	32
-15	90	250	35

Name: Ts Presumptive (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	8.5
-15	90	250	35

Name: 25-45

Angle From	Angle To	c	phi
-90	-45	250	35
-45	-25	200	32
-25	90	250	35

Global Minimums

Method: spencer

FS	1.109470
Axis Location:	868.968, 1356.457
Left Slip Surface Endpoint:	637.713, 1110.461
Right Slip Surface Endpoint:	920.000, 1023.000
Left Slope Intercept:	637.713 1114.461
Right Slope Intercept:	920.000 1023.000
Resisting Moment:	2.08545e+008 lb-ft
Driving Moment:	1.87969e+008 lb-ft
Resisting Horizontal Force:	574015 lb
Driving Horizontal Force:	517379 lb
Total Slice Area:	9658.91 ft2
Surface Horizontal Width:	282.287 ft
Surface Average Height:	34.2166 ft

Global Minimum Coordinates

Method: spencer

X	Y
637.713	1110.46
661.945	1085.21
696.743	1055.03
728.588	1041.93
758.505	1029.63
811.008	1015.56
877.322	1016.01
905.26	1019.07
920	1023

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2549
Number of Invalid Surfaces: 2452

Error Codes:

Error Code -108 reported for 1209 surfaces
Error Code -111 reported for 46 surfaces
Error Code -112 reported for 1197 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

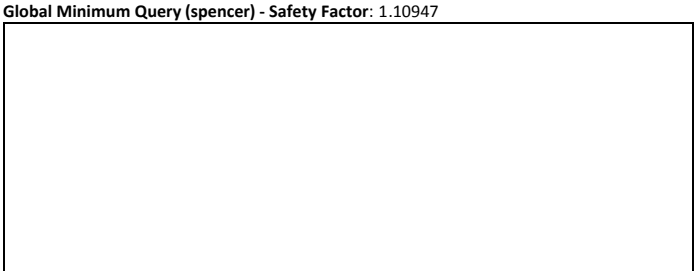
Global Minimum Query (spencer) - Safety Factor: 1.10947

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	6.05806	5146.58	-46.1748	Fill	200	34	395.685	439.001	354.334	0	354.334	766.588	766.588
2	6.05806	9849.6	-46.1748	Fill	200	34	649.863	721.004	772.42	0	772.42	1449.5	1449.5
3	6.05806	14103.6	-46.1748	Fill	200	34	870.489	965.781	1135.32	0	1135.32	2042.26	2042.26
4	6.05806	17554.7	-46.1748	Fill	200	34	1049.47	1164.36	1429.71	0	1429.71	2523.13	2523.13
5	5.79972	19549	-40.9393	Fill	200	34	1316.56	1460.68	1869.04	0	1869.04	3011.06	3011.06
6	5.79972	21780.3	-40.9393	Fill	200	34	1450.12	1608.86	2088.71	0	2088.71	3346.59	3346.59
7	5.79972	24011.7	-40.9393	Fill	200	34	1583.67	1757.03	2308.39	0	2308.39	3682.11	3682.11
8	5.79972	26243.1	-40.9393	Fill	200	34	1717.23	1905.21	2528.07	0	2528.07	4017.64	4017.64
9	5.79972	28475.4	-40.9393	Fill	200	34	1850.84	2053.45	2747.85	0	2747.85	4353.32	4353.32
10	5.79972	30721.1	-40.9393	Fill	200	34	1985.25	2202.58	2968.95	0	2968.95	4691.01	4691.01
11	5.3074	29193.3	-22.3611	Ts presumptive	200	8.5	772.657	857.24	4397.69	0	4397.69	4715.54	4715.54
12	5.3074	29333.7	-22.3611	Ts	200	8.5	775.512	860.407	4418.88	0	4418.88	4737.91	4737.91

				presumptive									
13	5.3074	30366.5	-22.3611	Ts presumptive	200	8.5	796.501	883.694	4574.71	0	4574.71	4902.37	4902.37
14	5.3074	31655.8	-22.3611	Ts presumptive	200	8.5	822.705	912.767	4769.22	0	4769.22	5107.66	5107.66
15	5.3074	31870.6	-22.3611	Ts presumptive	200	8.5	827.071	917.611	4801.65	0	4801.65	5141.89	5141.89
16	5.3074	31834.6	-22.3611	Ts presumptive	200	8.5	826.339	916.798	4796.21	0	4796.21	5136.15	5136.15
17	0.711243	4268.37	-22.3531	Ts presumptive	200	8.5	826.727	917.229	4799.09	0	4799.09	5139.05	5139.05
18	5.84115	35083	-22.3531	Ts presumptive	200	8.5	827.254	917.813	4802.99	0	4802.99	5143.17	5143.17
19	5.84115	35133.8	-22.3531	Ts presumptive	200	8.5	828.193	918.855	4809.97	0	4809.97	5150.54	5150.54
20	5.84115	35184.6	-22.3531	Ts presumptive	200	8.5	829.132	919.897	4816.94	0	4816.94	5157.89	5157.89
21	5.84115	35263.8	-22.3531	Ts presumptive	200	8.5	830.594	921.519	4827.8	0	4827.8	5169.35	5169.35
22	5.84115	35381.7	-22.3531	Ts presumptive	200	8.5	832.771	923.934	4843.95	0	4843.95	5186.4	5186.4
23	5.84242	35213.9	-15	Ts presumptive	200	8.5	875.779	971.651	5163.23	0	5163.23	5397.9	5397.9
24	5.84242	34800.3	-15	Ts presumptive	200	8.5	867.635	962.615	5102.77	0	5102.77	5335.25	5335.25
25	5.84242	34412.5	-15	Ts presumptive	200	8.5	860.001	954.145	5046.11	0	5046.11	5276.55	5276.55
26	5.84242	34031.9	-15	Ts presumptive	200	8.5	852.506	945.83	4990.46	0	4990.46	5218.89	5218.89
27	5.04138	29082.2	-15	Ts Sespe Fm	200	32	3077.69	3414.61	5144.45	0	5144.45	5969.11	5969.11
28	5.04138	28812	-15	Ts Sespe Fm	200	32	3050.86	3384.84	5096.8	0	5096.8	5914.27	5914.27
29	6.35015	36581.1	-15	Ts presumptive	200	8.5	845.111	937.625	4935.56	0	4935.56	5162.01	5162.01
30	6.35015	37704.9	-15	Ts presumptive	200	8.5	865.466	960.209	5086.67	0	5086.67	5318.57	5318.57
31	6.35015	37353.3	-15	Ts presumptive	200	8.5	859.099	953.145	5039.41	0	5039.41	5269.6	5269.6
32	6.18716	35211.9	0.388569	Ts Sespe Fm	250	35	4666.14	5176.94	7036.39	0	7036.39	7004.74	7004.74
33	6.18716	33311.1	0.388569	Ts Sespe Fm	250	35	4430.19	4915.16	6662.54	0	6662.54	6632.5	6632.5
34	6.18716	31324.3	0.388569	Ts Sespe Fm	250	35	4183.57	4641.54	6271.78	0	6271.78	6243.4	6243.4
35	6.18716	30145.2	0.388569	Ts Sespe Fm	250	35	4037.2	4479.15	6039.87	0	6039.87	6012.49	6012.49
36	6.18716	29997	0.388569	Ts Sespe Fm	250	35	4018.8	4458.74	6010.69	0	6010.69	5983.44	5983.44
37	6.18716	28603.2	0.388569	Ts Sespe Fm	250	35	3845.78	4266.78	5736.57	0	5736.57	5710.49	5710.49
38	5.78422	24925.9	0.388569	Ts presumptive	250	35	3604.87	3999.49	5354.82	0	5354.82	5330.38	5330.38
39	5.78422	23235.9	0.388569	Ts presumptive	250	35	3380.46	3750.52	4999.26	0	4999.26	4976.33	4976.33
40	5.78422	21545.9	0.388569	Ts presumptive	250	35	3156.07	3501.56	4643.7	0	4643.7	4622.29	4622.29
41	5.78422	19855.9	0.388569	Ts presumptive	250	35	2931.66	3252.59	4288.15	0	4288.15	4268.27	4268.27
42	5.78422	18165.9	0.388569	Ts presumptive	250	35	2707.27	3003.63	3932.59	0	3932.59	3914.23	3914.23
43	0.270594	808.358	0.388569	Ts Sespe Fm	250	35	2589.58	2873.06	3746.12	0	3746.12	3728.56	3728.56
44	5.58743	15626.1	6.25453	Ts Sespe Fm	250	35	2810.96	3118.68	4096.89	0	4096.89	3788.82	3788.82
45	5.58743	13575	6.25453	Ts Sespe Fm	250	35	2485.09	2757.13	3580.55	0	3580.55	3308.19	3308.19
46	5.58743	11523.9	6.25453	Ts Sespe Fm	250	35	2159.21	2395.58	3064.21	0	3064.21	2827.57	2827.57
47	5.58743	9472.79	6.25453	Ts Sespe Fm	250	35	1833.33	2034.03	2547.85	0	2547.85	2346.92	2346.92
48	5.58743	7475.63	6.25453	Ts Sespe Fm	250	35	1516.03	1681.99	2045.08	0	2045.08	1878.93	1878.93
49	7.37021	6467.73	14.9281	Ts Sespe Fm	250	35	1427.3	1583.55	1904.49	0	1904.49	1523.97	1523.97
50	7.37021	2155.91	14.9281	Ts Sespe Fm	250	35	745.74	827.376	824.579	0	824.579	625.761	625.761

Interslice Data

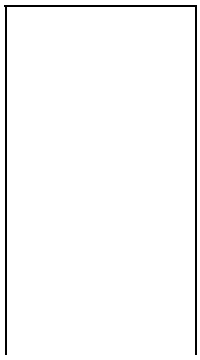
Global Minimum Query (spencer) - Safety Factor: 1.10947



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	637.713	1110.46	499.194	0	0
2	643.771	1104.15	1367.88	502.536	20.1725
3	649.829	1097.84	4276.19	1571	20.1725
4	655.887	1091.53	8989.26	3302.5	20.1725
5	661.945	1085.21	15166.4	5571.89	20.1725
6	667.745	1080.18	20843.4	7657.51	20.1725
7	673.545	1075.15	27297.2	10028.5	20.1724
8	679.344	1070.12	34527.8	12684.9	20.1724
9	685.144	1065.09	42535.4	15626.8	20.1725
10	690.944	1060.06	51320.1	18854.1	20.1724
11	696.743	1055.03	60886.7	22368.7	20.1724
12	702.051	1052.85	72226.2	26534.7	20.1725
13	707.358	1050.66	83624.9	30722.4	20.1725
14	712.666	1048.48	95458.9	35070	20.1725
15	717.973	1046.3	107836	39617.3	20.1726
16	723.28	1044.11	120305	44197.9	20.1724
17	728.588	1041.93	132758	48772.9	20.1724
18	729.299	1041.64	134427	49386.1	20.1724
19	735.14	1039.23	148148	54427	20.1725
20	740.981	1036.83	161890	59475.8	20.1725
21	746.823	1034.43	175654	64532.4	20.1725
22	752.664	1032.03	189452	69601.3	20.1724
23	758.505	1029.63	203299	74688.5	20.1724
24	764.347	1028.06	213308	78365.6	20.1724
25	770.19	1026.5	223187	81995.1	20.1725
26	776.032	1024.93	232944	85579.8	20.1725
27	781.875	1023.36	242582	89120.7	20.1725
28	786.916	1022.01	239832	88110.3	20.1725
29	791.957	1020.66	237099	87106.2	20.1725
30	798.307	1018.96	247447	90907.7	20.1724
31	804.658	1017.26	258147	94838.8	20.1725
32	811.008	1015.56	268737	98729.4	20.1725
33	817.195	1015.6	246614	90601.7	20.1725
34	823.382	1015.64	225586	82876.5	20.1725
35	829.569	1015.68	205703	75571.9	20.1725
36	835.756	1015.73	186500	68516.9	20.1725
37	841.944	1015.77	167382	61493.4	20.1725
38	848.131	1015.81	149067	54764.9	20.1725
39	853.915	1015.85	132991	48858.7	20.1725
40	859.699	1015.89	117889	43310.4	20.1725
41	865.483	1015.93	103761	38119.9	20.1724
42	871.268	1015.97	90606.1	33287.1	20.1725
43	877.052	1016.01	78425.5	28812.2	20.1725
44	877.322	1016.01	77879.6	28611.6	20.1724
45	882.91	1016.62	62789.8	23067.9	20.1725
46	888.497	1017.23	49426.9	18158.6	20.1725
47	894.085	1017.85	37790.8	13883.7	20.1725
48	899.672	1018.46	27881.5	10243.2	20.1725
49	905.26	1019.07	19653.5	7220.36	20.1725
50	912.63	1021.04	6685.32	2456.08	20.1725
51	920	1023	0	0	0

List Of Coordinates

Tension Crack



X	Y
0.000130068	1118
86.0001	1124
110	1126
121	1128
125	1130
129	1131
202	1131
204	1132
205	1132.6
273	1132.6
277	1133.5
312	1133.7
394	1133.7
399.525	1136.46
413	1137
433	1138
451	1138
466	1136
479	1134
494	1131
504	1129
517	1127
525	1126
534	1125
544	1124
556	1123
564	1122
571	1121
573.656	1120.99
580.212	1120.96
585	1120
602	1118
613	1116
630.294	1112.12
642	1109.5
650	1109.5
661	1106
689	1096
706	1090
716	1090
726	1086
752	1076
779	1066
793	1061
801	1061
814	1056
830	1050
841	1050
851	1046
876	1036

Block Search Window

X	Y
710.375	1049.42
736.175	1049.42
723.17	1055
696.814	1055

Block Search Window

X	Y
724.184	1043.74
811.429	1003.85
836.09	1003.85
749.419	1043.74

External Boundary

X	Y
1160.49	1014

1158	1014
1156.8	1013.4
1155.01	1012.5
1146	1008
1081	1008
1070	1009
1068	1010
1036	1030
1033.93	1031.24
1033	1031.8
960.208	1031.8
956.089	1031.8
953.583	1031.8
936	1031.8
920	1023
901	1030
876	1040
851	1050
841	1054
830	1054
814	1060
801	1065
793	1065
779	1070
752	1080
726	1090
716	1094
707.58	1094
706	1094
689	1100
661	1110
650	1113.5
642	1113.5
630.293	1116.12
613	1120
602	1122
585	1124
580.212	1124.96
573.656	1124.99
571	1125
564	1126
556	1127
544	1128
539.043	1128.5
534	1129
525	1130
517	1131
504	1133
501.957	1133.41
494	1135
479	1138
466	1140
463.523	1140.33
451	1142
433	1142
432.795	1141.99
429.314	1141.82
427.474	1141.73
413	1141
399.525	1140.46
394	1137.7
312	1137.7
277	1137.5
273	1136.6
205	1136.6
204	1136
202	1135
129	1135
125	1134
122.669	1132.83
121	1132
110	1130
86	1128

-5.09388e-010	1122
0	900
621.968	900
945.141	900
947.285	900
982.096	900
994.963	900
1000.9	900
1003.04	900
1008.38	900
1012.69	900
1178	900
1178	1014

Material Boundary

X	Y
956.089	1031.8
981.281	968.062
987.83	951.612
996.884	928.872
998.726	924.245
999.704	921.789
1002.51	914.75
1008.38	900

Material Boundary

X	Y
960.208	1031.8
960.738	1030.47
1012.69	900

Material Boundary

X	Y
571	1125
604.158	1109.04
657.327	1083.24
723.17	1055
763.505	1037.7
844.427	999.964
929.444	960.32
996.884	928.872

Material Boundary

X	Y
539.043	1128.5
604.158	1098.04
630.036	1085
639.956	1080
657.327	1071.24
696.814	1055
738.624	1037.8
844.413	988.47
929.445	948.819
1002.51	914.75

Material Boundary

X	Y
501.957	1133.41
604.158	1084.04
612.829	1080
657.327	1059.24
707.253	1037.93
844.396	973.978
929.447	934.318
1003.04	900

Material Boundary

X	Y
699.102	1037.96
697.276	1041.18
705.089	1037.94
844.395	972.979
929.447	933.318
1000.9	900

Material Boundary

X	Y
429.314	1141.82
546.601	1086.99
672.661	1028.06
947.285	900

Material Boundary

X	Y
427.474	1141.73
544.512	1086.99
670.516	1028.06
862.999	938.303
878.66	931.001
945.141	900

Material Boundary

X	Y
751.027	1037.75
747.332	1040.67
755.354	1037.73
844.422	996.198
929.445	956.552
998.726	924.245

Material Boundary

X	Y
751.027	1037.75
844.42	994.199
929.445	954.552
999.704	921.789

Material Boundary

X	Y
699.102	1037.96
844.391	970.213
929.447	930.55
994.963	900

Material Boundary

X	Y
463.523	1140.33
587.774	1080
604.158	1072.04
657.327	1048.24
686.12	1038.02
844.384	964.216
929.448	924.55
982.096	900

Material Boundary

X	Y
122.669	1132.83
302.157	1049.13
621.968	900

Material Boundary

X	Y
630.293	1116.12
763.028	1055
817.317	1030
929.442	978.367
987.83	951.612

Material Boundary

X	Y
707.58	1094
766.203	1067.02
846.645	1030
929.441	991.896
981.281	968.062

Material Boundary

X	Y
956.089	1031.8
960.738	1030.47
974	1028
994	1025.5
1005	1025
1012	1026
1018	1027
1032	1031
1033.93	1031.24

Material Boundary

X	Y
1156.8	1013.4
1160.49	1014

Material Boundary

X	Y
587.774	1080
612.829	1080
639.956	1080

Material Boundary

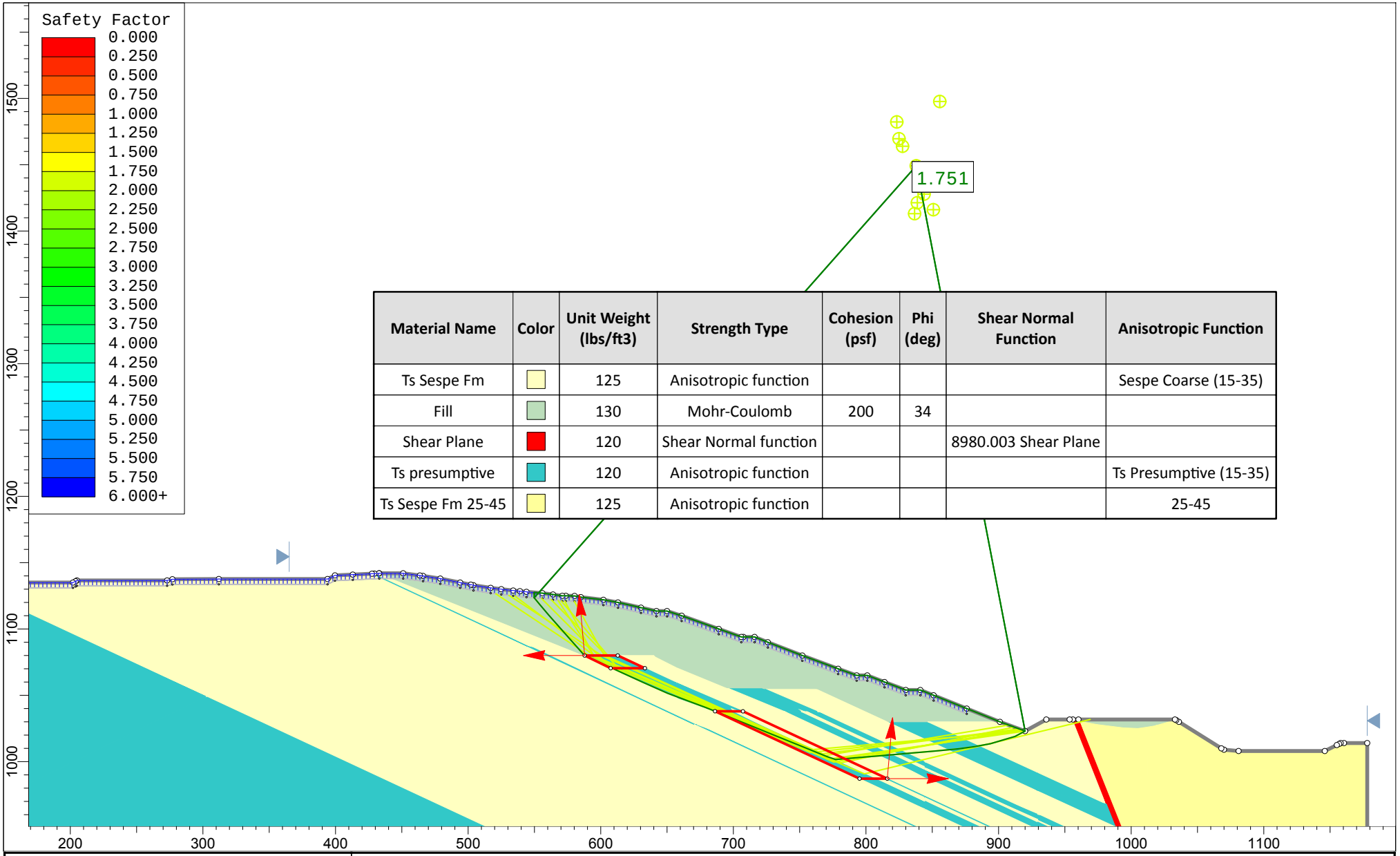
X	Y
696.814	1055
723.17	1055
763.028	1055

Material Boundary

X	Y
817.317	1030
846.645	1030
901	1030

Material Boundary

X	Y
432.795	1141.99
587.774	1080



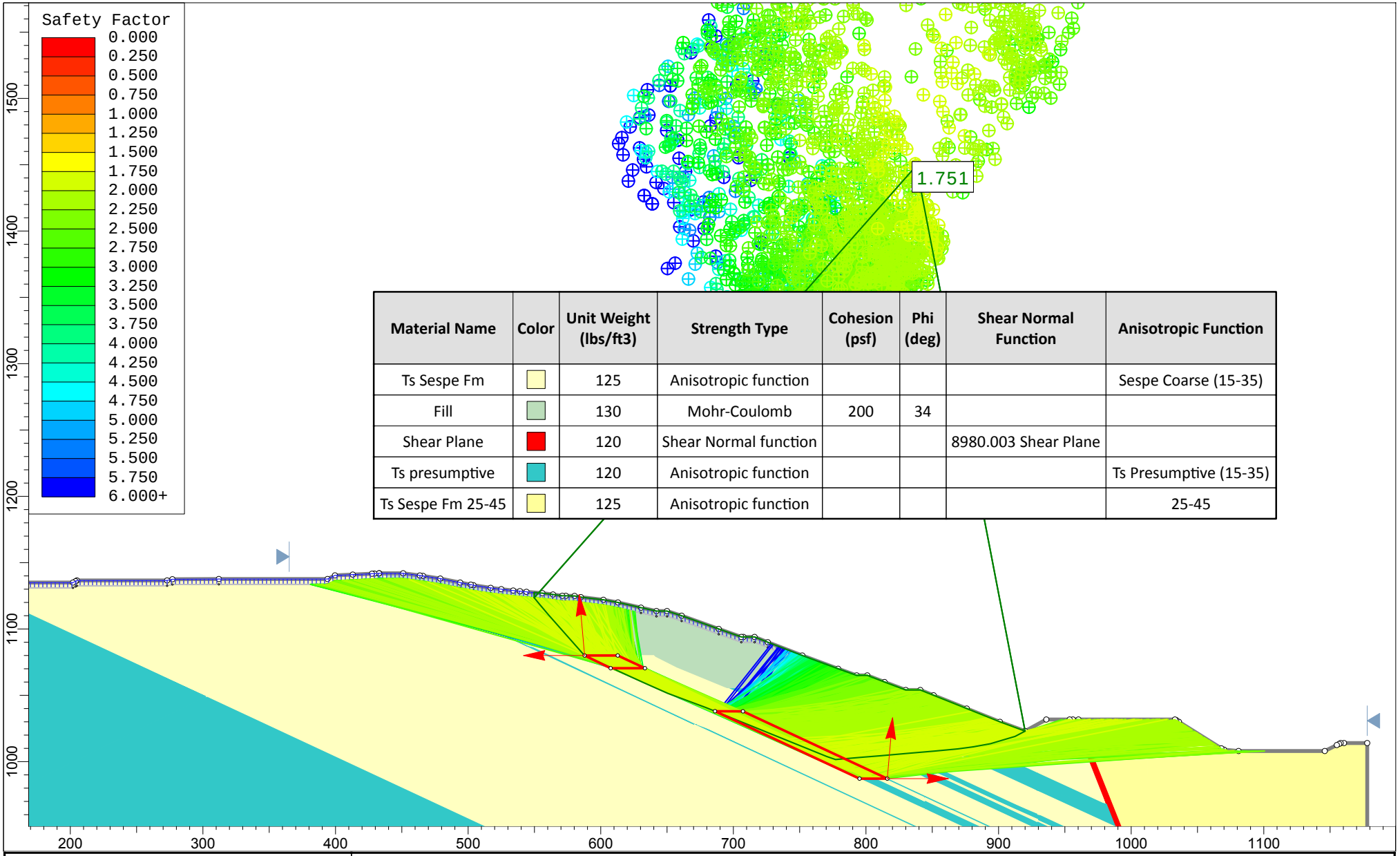
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

rocscience

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G1-G1' static lower fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1 B14at42.slim

PLATE A.50



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

rocscience

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G1-G1' static lower fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1 B14at42.slim

PLATE A.51

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	2018 Update - G1 B14at42.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G1-G1' static lower fine-grained layer
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	50
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle):	95
Left Projection Angle (End Angle):	180
Right Projection Angle (Start Angle):	0
Right Projection Angle (End Angle):	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Tension Crack

Water level: filled with water

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Ts presumptive	Ts Sespe Fm 25-45
Color					
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Anisotropic function	Anisotropic function
Unit Weight [lbs/ft3]	125	130	120	120	125
Cohesion [psf]		200			
Friction Angle [deg]		34			
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	32
-15	90	250	35

Name: Ts Presumptive (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	8.5
-15	90	250	35

Name: 25-45

Angle From	Angle To	c	phi
-90	-45	250	35
-45	-25	200	32
-25	90	250	35

Global Minimums

Method: spencer

FS	1.751350
Axis Location:	837.914, 1449.219
Left Slip Surface Endpoint:	549.771, 1123.521
Right Slip Surface Endpoint:	920.000, 1023.000
Left Slope Intercept:	549.771 1127.521
Right Slope Intercept:	920.000 1023.000
Resisting Moment:	4.33434e+008 lb-ft
Driving Moment:	2.47486e+008 lb-ft
Resisting Horizontal Force:	934233 lb
Driving Horizontal Force:	533436 lb
Total Slice Area:	18254 ft2
Surface Horizontal Width:	370.229 ft
Surface Average Height:	49.3047 ft

Global Minimum Coordinates

Method: spencer

X	Y
549.771	1123.52
554.11	1118.31
560.603	1110.64
574.036	1095.44
587.7	1080.03
602.131	1073.41
616.547	1066.79
631.845	1059.76
650.47	1051.53
663.34	1046.71
679.007	1040.86
691.262	1035.96
703.763	1030.89
714.758	1026.44
726.612	1021.64
740.596	1015.98
754.484	1010.35
770.49	1003.87
777.05	1001.62
795.397	1003.23
810.895	1004.47
832.636	1006.33
851.261	1007.91
869.132	1009.6
881.072	1011.21
893.776	1013.53
912.401	1019.04
920	1023

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2759
Number of Invalid Surfaces: 2242

Error Codes:

Error Code -108 reported for 1314 surfaces
Error Code -111 reported for 6 surfaces
Error Code -112 reported for 922 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.75135

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.3395	3624.04	-50.2071	Fill	200	34	276.839	484.842	422.296	0	422.296	754.652	754.652
2	6.49291	10421.3	-49.7644	Fill	200	34	465.483	815.224	912.108	0	912.108	1462.24	1462.24
3	6.71652	16724.7	-48.5314	Fill	200	34	685.386	1200.35	1483.08	0	1483.08	2258.63	2258.63
4	6.71652	22619	-48.5314	Fill	200	34	895.344	1568.06	2028.23	0	2028.23	3041.35	3041.35
5	6.83167	29643.8	-48.4254	Fill	200	34	1129.52	1978.19	2636.28	0	2636.28	3909.63	3909.63
6	6.83167	35793.2	-48.4254	Fill	200	34	1345.23	2355.96	3196.34	0	3196.34	4712.86	4712.86
7	7.2159	41983.9	-24.6631	Ts presumptive	200	8.5	553.05	968.584	5142.72	0	5142.72	5396.66	5396.66
8	7.2159	44056.5	-24.6631	Ts presumptive	200	8.5	574.811	1006.7	5397.73	0	5397.73	5661.66	5661.66
9	7.20773	45851.3	-24.6648	Ts	200	8.5	594.197	1040.65	5624.9	0	5624.9	5897.75	5897.75

				presumptive									
10	7.20773	47467.7	-24.6648	Ts presumptive	200	8.5	611.187	1070.4	5823.99	0	5823.99	6104.65	6104.65
11	7.64924	52007.4	-24.6644	Ts presumptive	200	8.5	627.353	1098.71	6013.43	0	6013.43	6301.51	6301.51
12	7.64924	53663.1	-24.6644	Ts presumptive	200	8.5	643.752	1127.43	6205.61	0	6205.61	6501.22	6501.22
13	9.31241	67478	-23.843	Ts presumptive	200	8.5	664.049	1162.98	6443.47	0	6443.47	6736.95	6736.95
14	9.31241	70928.9	-23.843	Ts presumptive	200	8.5	692.26	1212.39	6774.07	0	6774.07	7080.02	7080.02
15	6.43492	50792.1	-20.5337	Ts presumptive	200	8.5	725.617	1270.81	7164.92	0	7164.92	7436.71	7436.71
16	6.43492	51115.6	-20.5337	Ts presumptive	200	8.5	729.517	1277.64	7210.65	0	7210.65	7483.89	7483.89
17	7.83362	62425.1	-20.4763	Ts presumptive	200	8.5	731.704	1281.47	7236.27	0	7236.27	7509.49	7509.49
18	7.83362	62583	-20.4763	Ts presumptive	200	8.5	733.269	1284.21	7254.61	0	7254.61	7528.42	7528.42
19	7.14303	57285.6	-21.8134	Ts presumptive	200	8.5	730.625	1279.58	7223.65	0	7223.65	7516.08	7516.08
20	5.11174	41177.9	-21.8134	Ts presumptive	200	8.5	733.383	1284.41	7255.94	0	7255.94	7549.47	7549.47
21	6.25069	50585.4	-22.0465	Ts presumptive	200	8.5	735.364	1287.88	7279.16	0	7279.16	7576.96	7576.96
22	6.25069	50828.9	-22.0465	Ts presumptive	200	8.5	738.362	1293.13	7314.29	0	7314.29	7613.3	7613.3
23	10.9944	91460.1	-22.0472	Ts presumptive	200	8.5	752.751	1318.33	7482.91	0	7482.91	7787.76	7787.76
24	11.8538	102188	-22.0473	Ts presumptive	200	8.5	775.979	1359.01	7755.13	0	7755.13	8069.39	8069.39
25	6.99243	60251.1	-22.0483	Ts presumptive	200	8.5	775.659	1358.45	7751.4	0	7751.4	8065.55	8065.55
26	6.99243	60300.5	-22.0483	Ts presumptive	200	8.5	776.207	1359.41	7757.77	0	7757.77	8072.14	8072.14
27	6.94377	59920.5	-22.0509	Ts presumptive	200	8.5	776.635	1360.16	7762.81	0	7762.81	8077.39	8077.39
28	6.94377	60006.9	-22.0509	Ts presumptive	200	8.5	777.589	1361.83	7774.02	0	7774.02	8088.99	8088.99
29	8.00316	69325.1	-22.0509	Ts presumptive	200	8.5	779.159	1364.58	7792.4	0	7792.4	8108	8108
30	8.00316	69560.7	-22.0509	Ts presumptive	200	8.5	781.426	1368.55	7818.94	0	7818.94	8135.47	8135.47
31	6.5598	57095.7	-18.8808	Ts presumptive	200	8.5	795.249	1392.76	7980.95	0	7980.95	8252.93	8252.93
32	4.98162	42622.2	4.99559	Ts Sespe Fm	250	35	4181.71	7323.64	10102.2	0	10102.2	9736.68	9736.68
33	1.80597	15117.6	4.99559	Ts presumptive	250	35	4094.85	7171.51	9884.95	0	9884.95	9527.01	9527.01
34	11.5589	92668.2	4.99559	Ts Sespe Fm	250	35	3928.7	6880.52	9469.39	0	9469.39	9125.98	9125.98
35	7.41179	57508.2	4.57925	Ts Sespe Fm	250	35	3787.22	6632.74	9115.51	0	9115.51	8812.17	8812.17
36	7.41179	55122.9	4.57925	Ts Sespe Fm	250	35	3636.92	6369.52	8739.58	0	8739.58	8448.29	8448.29
37	0.674937	4862.77	4.57925	Ts presumptive	250	35	3528.38	6179.42	8468.09	0	8468.09	8185.49	8185.49
38	9.72132	67233.8	4.88276	Ts presumptive	250	35	3406.79	5966.49	8164	0	8164	7872.96	7872.96
39	3.62493	23659	4.88276	Ts Sespe Fm	250	35	3224.23	5646.76	7707.36	0	7707.36	7431.92	7431.92
40	6.82868	42458	4.88276	Ts presumptive	250	35	3079.28	5392.9	7344.82	0	7344.82	7081.76	7081.76
41	1.56598	9480.66	4.88276	Ts Sespe Fm	250	35	3002.65	5258.69	7153.18	0	7153.18	6896.67	6896.67
42	9.31243	55698.7	4.87576	Ts Sespe Fm	250	35	2968.14	5198.25	7066.83	0	7066.83	6813.64	6813.64
43	9.31243	51908.1	4.87576	Ts Sespe Fm	250	35	2777.31	4864.04	6589.53	0	6589.53	6352.61	6352.61
44	11.6333	57102.1	5.38743	Ts Sespe Fm	250	35	2481.51	4346	5849.69	0	5849.69	5615.66	5615.66
45	6.23827	27118.8	5.38743	Ts presumptive	250	35	2216.56	3881.98	5187.01	0	5187.01	4977.97	4977.97
46	11.9398	44935.3	7.68504	Ts presumptive	250	35	2000.21	3503.07	4645.86	0	4645.86	4375.96	4375.96
47	4.58001	14683.8	10.3585	Ts presumptive	250	35	1793.06	3140.28	4127.74	0	4127.74	3799.99	3799.99
48	8.12418	22243.9	10.3585	Ts Sespe Fm	250	35	1556.5	2725.98	3536.06	0	3536.06	3251.55	3251.55
49	18.6248	30291.1	16.4669	Ts Sespe Fm	250	35	1088.17	1905.77	2364.68	0	2364.68	2043.03	2043.03
50	7.59869	3210.88	27.5342	Ts Sespe Fm	250	35	510.283	893.684	919.276	0	919.276	653.252	653.252

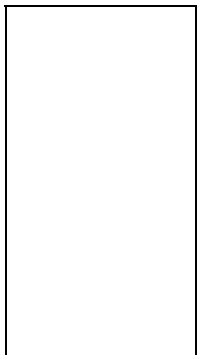
Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.75135

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	549.771	1123.52	499.199	0	0
2	554.11	1118.31	1497.91	349.218	13.1233
3	560.603	1110.64	5474.76	1276.37	13.1234
4	567.32	1103.04	12142.8	2830.94	13.1234
5	574.036	1095.44	21543.8	5022.66	13.1234
6	580.868	1087.74	34130.8	7957.15	13.1233
7	587.7	1080.03	49557.6	11553.7	13.1233
8	594.916	1076.72	62606.2	14595.8	13.1233
9	602.131	1073.41	76342.8	17798.3	13.1233
10	609.339	1070.1	90677.4	21140.2	13.1233
11	616.547	1066.79	105549	24607.3	13.1233
12	624.196	1063.28	121872	28412.9	13.1234
13	631.845	1059.76	138745	32346.6	13.1234
14	641.158	1055.65	159080	37087.4	13.1233
15	650.47	1051.53	180513	42084.2	13.1233
16	656.905	1049.12	193113	45021.7	13.1233
17	663.34	1046.71	205798	47979	13.1233
18	671.174	1043.79	221233	51577.6	13.1234
19	679.007	1040.86	236710	55185.8	13.1233
20	686.15	1038	252143	58783.9	13.1234
21	691.262	1035.96	263240	61370.9	13.1233
22	697.513	1033.42	277069	64595	13.1233
23	703.763	1030.89	290969	67835.6	13.1233
24	714.758	1026.44	316011	73673.8	13.1233
25	726.612	1021.64	344042	80208.9	13.1234
26	733.604	1018.81	360570	84062.2	13.1234
27	740.596	1015.98	377113	87918.9	13.1233
28	747.54	1013.16	393554	91751.9	13.1233
29	754.484	1010.35	410020	95590.8	13.1233
30	762.487	1007.11	429045	100026	13.1233
31	770.49	1003.87	448139	104478	13.1234
32	777.05	1001.62	460827	107436	13.1234
33	782.032	1002.06	435596	101554	13.1234
34	783.838	1002.22	426641	99465.7	13.1233
35	795.397	1003.23	371662	86648.1	13.1233
36	802.808	1003.82	338180	78842.3	13.1234
37	810.22	1004.41	306036	71348.3	13.1234
38	810.895	1004.47	303197	70686.4	13.1233
39	820.616	1005.3	263298	61384.6	13.1234
40	824.241	1005.61	249224	58103.3	13.1233
41	831.07	1006.19	223912	52202.2	13.1234
42	832.636	1006.33	218253	50882.8	13.1233
43	841.948	1007.12	184999	43130	13.1233
44	851.261	1007.91	153901	35879.9	13.1233
45	862.894	1009.01	118615	27653.5	13.1233
46	869.132	1009.6	101736	23718.3	13.1233
47	881.072	1011.21	70368.3	16405.4	13.1233
48	885.652	1012.05	58700.5	13685.2	13.1233
49	893.776	1013.53	40804.2	9512.96	13.1233
50	912.401	1019.04	7519.1	1752.98	13.1234
51	920	1023	0	0	0

List Of Coordinates

Tension Crack



X	Y
0.000130068	1118
86.0001	1124
110	1126
121	1128
125	1130
129	1131
202	1131
204	1132
205	1132.6
273	1132.6
277	1133.5
312	1133.7
394	1133.7
399.525	1136.46
413	1137
433	1138
451	1138
466	1136
479	1134
494	1131
504	1129
517	1127
525	1126
534	1125
544	1124
556	1123
564	1122
571	1121
573.656	1120.99
580.212	1120.96
585	1120
602	1118
613	1116
630.294	1112.12
642	1109.5
650	1109.5
661	1106
689	1096
706	1090
716	1090
726	1086
752	1076
779	1066
793	1061
801	1061
814	1056
830	1050
841	1050
851	1046
876	1036

Block Search Window

X	Y
587.774	1080
607.446	1070.45
633.307	1070.45
612.829	1080

Block Search Window

X	Y
686.12	1038.02
795.128	987.184
816.075	987.184
707.253	1037.93

External Boundary

X	Y
1160.49	1014

1158	1014
1156.8	1013.4
1155.01	1012.5
1146	1008
1081	1008
1070	1009
1068	1010
1036	1030
1033.93	1031.24
1033	1031.8
960.208	1031.8
956.089	1031.8
953.583	1031.8
936	1031.8
920	1023
901	1030
876	1040
851	1050
841	1054
830	1054
814	1060
801	1065
793	1065
779	1070
752	1080
726	1090
716	1094
707.58	1094
706	1094
689	1100
661	1110
650	1113.5
642	1113.5
630.293	1116.12
613	1120
602	1122
585	1124
580.212	1124.96
573.656	1124.99
571	1125
564	1126
556	1127
544	1128
539.043	1128.5
534	1129
525	1130
517	1131
504	1133
501.957	1133.41
494	1135
479	1138
466	1140
463.523	1140.33
451	1142
433	1142
432.795	1141.99
429.314	1141.82
427.474	1141.73
413	1141
399.525	1140.46
394	1137.7
312	1137.7
277	1137.5
273	1136.6
205	1136.6
204	1136
202	1135
129	1135
125	1134
122.669	1132.83
121	1132
110	1130
86	1128

-5.09388e-010	1122
0	900
621.968	900
945.141	900
947.285	900
982.096	900
994.963	900
1000.9	900
1003.04	900
1008.38	900
1012.69	900
1178	900
1178	1014

Material Boundary

X	Y
956.089	1031.8
981.281	968.062
987.83	951.612
996.884	928.872
998.726	924.245
999.704	921.789
1002.51	914.75
1008.38	900

Material Boundary

X	Y
960.208	1031.8
960.738	1030.47
1012.69	900

Material Boundary

X	Y
571	1125
604.158	1109.04
657.327	1083.24
723.17	1055
763.505	1037.7
844.427	999.964
929.444	960.32
996.884	928.872

Material Boundary

X	Y
539.043	1128.5
604.158	1098.04
630.036	1085
639.956	1080
657.327	1071.24
696.814	1055
738.624	1037.8
844.413	988.47
929.445	948.819
1002.51	914.75

Material Boundary

X	Y
501.957	1133.41
604.158	1084.04
612.829	1080
657.327	1059.24
707.253	1037.93
844.396	973.978
929.447	934.318
1003.04	900

Material Boundary

X	Y
699.102	1037.96
697.276	1041.18
705.089	1037.94
844.395	972.979
929.447	933.318
1000.9	900

Material Boundary

X	Y
429.314	1141.82
546.601	1086.99
672.661	1028.06
947.285	900

Material Boundary

X	Y
427.474	1141.73
544.512	1086.99
670.516	1028.06
862.999	938.303
878.66	931.001
945.141	900

Material Boundary

X	Y
751.027	1037.75
747.332	1040.67
755.354	1037.73
844.422	996.198
929.445	956.552
998.726	924.245

Material Boundary

X	Y
751.027	1037.75
844.42	994.199
929.445	954.552
999.704	921.789

Material Boundary

X	Y
699.102	1037.96
844.391	970.213
929.447	930.55
994.963	900

Material Boundary

X	Y
463.523	1140.33
587.774	1080
604.158	1072.04
657.327	1048.24
686.12	1038.02
844.384	964.216
929.448	924.55
982.096	900

Material Boundary

X	Y

X	Y
122.669	1132.83
302.157	1049.13
621.968	900

Material Boundary

X	Y
630.293	1116.12
763.028	1055
817.317	1030
929.442	978.367
987.83	951.612

Material Boundary

X	Y
707.58	1094
766.203	1067.02
846.645	1030
929.441	991.896
981.281	968.062

Material Boundary

X	Y
956.089	1031.8
960.738	1030.47
974	1028
994	1025.5
1005	1025
1012	1026
1018	1027
1032	1031
1033.93	1031.24

Material Boundary

X	Y
1156.8	1013.4
1160.49	1014

Material Boundary

X	Y
587.774	1080
612.829	1080
639.956	1080

Material Boundary

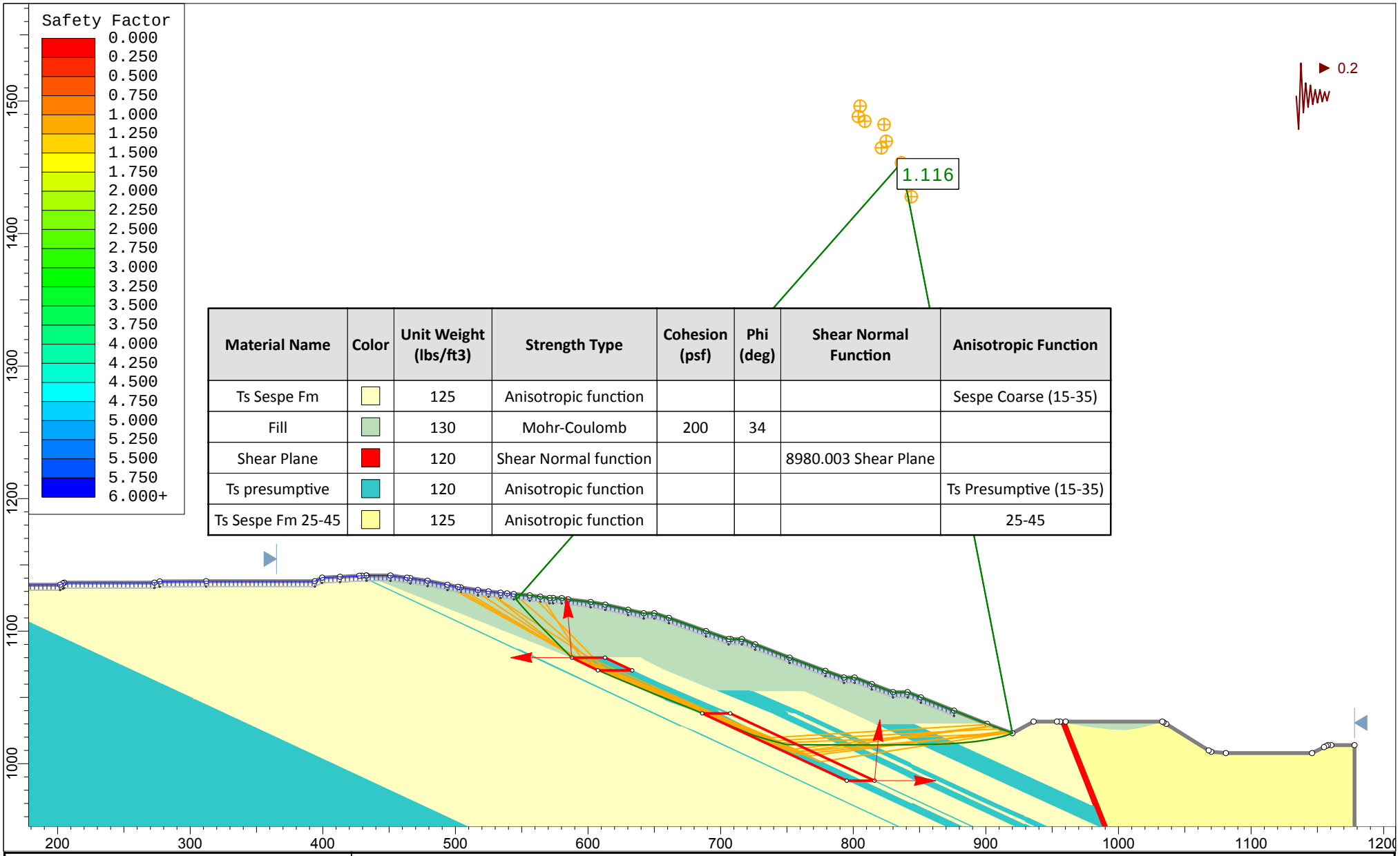
X	Y
696.814	1055
723.17	1055
763.028	1055

Material Boundary

X	Y
817.317	1030
846.645	1030
901	1030

Material Boundary

X	Y
432.795	1141.99
587.774	1080



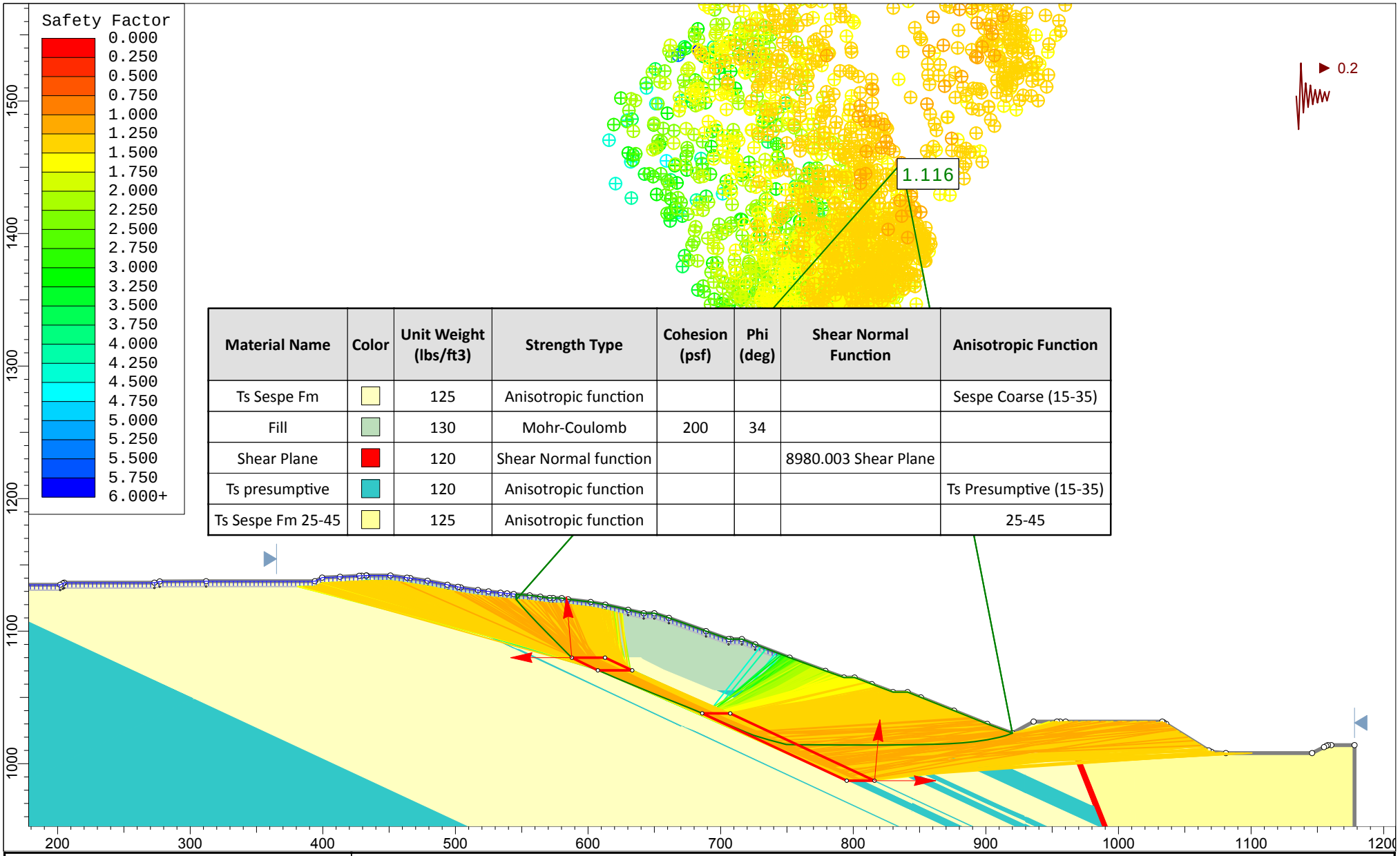
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

rocscience

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G1-G1' pseudostatic lower fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1p B14at42.slim

PLATE A.62



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Anisotropic Function
Ts Sespe Fm		125	Anisotropic function				Sespe Coarse (15-35)
Fill		130	Mohr-Coulomb	200	34		
Shear Plane		120	Shear Normal function			8980.003 Shear Plane	
Ts presumptive		120	Anisotropic function				Ts Presumptive (15-35)
Ts Sespe Fm 25-45		125	Anisotropic function				25-45

rocscience

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G1-G1' pseudostatic lower fine-grained layer		
Drawn By	RMP	Scale 1:1200	Company GWV
Date			File Name 2018 Update - G1p B14at42.slim

PLATE A.63

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	2018 Update - G1p B14at42.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G1-G1' pseudostatic lower fine-grained layer
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	50
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle):	95
Left Projection Angle (End Angle):	180
Right Projection Angle (Start Angle):	0
Right Projection Angle (End Angle):	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Loading

Seismic Load Coefficient (Horizontal): 0.2

Tension Crack

Water level: filled with water

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Ts presumptive	Ts Sespe Fm 25-45
Color					
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Anisotropic function	Anisotropic function
Unit Weight [lbs/ft3]	125	130	120	120	125
Cohesion [psf]		200			
Friction Angle [deg]		34			
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	32
-15	90	250	35

Name: Ts Presumptive (15-35)

Angle From	Angle To	c	phi
-90	-35	250	35
-35	-15	200	8.5
-15	90	250	35

Name: 25-45

Angle From	Angle To	c	phi
-90	-45	250	35
-45	-25	200	32
-25	90	250	35

Global Minimums

Method: spencer

FS	1.115870
Axis Location:	836.305, 1453.329
Left Slip Surface Endpoint:	545.899, 1123.843
Right Slip Surface Endpoint:	920.000, 1023.000
Left Slope Intercept:	545.899 1127.843
Right Slope Intercept:	920.000 1023.000
Resisting Moment:	4.52513e+008 lb-ft
Driving Moment:	4.05527e+008 lb-ft
Resisting Horizontal Force:	989852 lb
Driving Horizontal Force:	887071 lb
Total Slice Area:	17180.2 ft2
Surface Horizontal Width:	374.101 ft
Surface Average Height:	45.924 ft

Global Minimum Coordinates

Method: spencer

X	Y
545.899	1123.84
549.849	1119.14
556.321	1111.98
561.978	1106.03
570.331	1097.52
578.886	1088.89
587.699	1080.04
596.305	1075.87
604.916	1071.7
616.407	1066.74
627.897	1061.77
643.279	1055.44
656.489	1050.11
665.166	1046.62
672.111	1043.81
681.057	1040.18
689.465	1036.58
697.553	1033.07
705.878	1029.45
714.653	1025.63
724.813	1021.47
735.912	1018.13
749.458	1014.49
757.168	1014.36
763.768	1014.29
777.368	1014.21
797.063	1014.17
805.514	1014.1
814.121	1014.06
824.596	1014.1
838.264	1014.26
851.291	1014.39
866.607	1014.81
878.338	1015.46
891.463	1016.67
904.622	1018.72
915.209	1021.27
920	1023

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2587
Number of Invalid Surfaces: 2414

Error Codes:

Error Code -108 reported for 812 surfaces
Error Code -111 reported for 20 surfaces
Error Code -112 reported for 1582 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

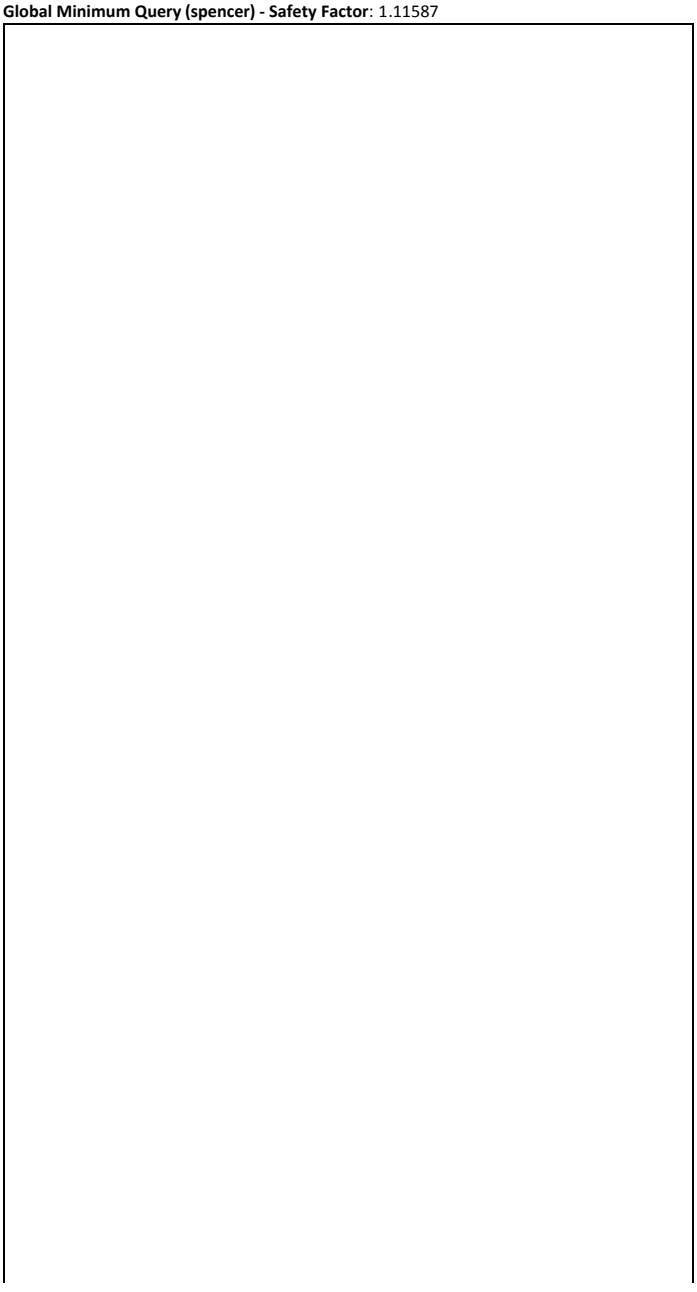
Global Minimum Query (spencer) - Safety Factor: 1.11587

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.94964	3176.17	-49.9635	Fill	200	34	352.469	393.31	286.594	0	286.594	706.109	706.109
2	6.47252	9828.51	-47.8789	Fill	200	34	596.907	666.071	690.978	0	690.978	1351.1	1351.1
3	5.65708	12945.6	-46.4897	Fill	200	34	852.447	951.22	1113.73	0	1113.73	2011.7	2011.7
4	8.35317	25971.3	-45.5155	Fill	200	34	1129.01	1259.83	1571.26	0	1571.26	2720.78	2720.78
5	8.55474	35343.7	-45.2376	Fill	200	34	1462.18	1631.6	2122.44	0	2122.44	3596.79	3596.79
6	8.81271	45701	-45.1473	Fill	200	34	1802.89	2011.79	2686.1	0	2686.1	4498.28	4498.28
7	8.60631	50419.8	-25.8251	Ts presumptive	200	8.5	789.518	881	4556.68	0	4556.68	4938.78	4938.78
8	8.61095	53582.8	-25.8247	Ts presumptive	200	8.5	827.618	923.514	4841.15	0	4841.15	5241.67	5241.67
9	11.4906	75229.7	-23.3568	Ts presumptive	200	8.5	877.584	979.27	5214.22	0	5214.22	5593.2	5593.2
10	11.4901	78642	-23.3959	Ts presumptive	200	8.5	909.101	1014.44	5449.54	0	5449.54	5842.86	5842.86
11	7.69096	54417.3	-22.3733	Ts presumptive	200	8.5	940.971	1050	5687.48	0	5687.48	6074.81	6074.81
12	7.69096	55791.2	-22.3733	Ts presumptive	200	8.5	960.232	1071.49	5831.31	0	5831.31	6226.57	6226.57
13	6.6053	49919.6	-21.955	Ts presumptive	200	8.5	996.07	1111.49	6098.89	0	6098.89	6500.42	6500.42
14	6.6053	51371	-21.955	Ts presumptive	200	8.5	1019.85	1138.02	6276.41	0	6276.41	6687.53	6687.53
15	8.67641	68200.9	-21.9543	Ts presumptive	200	8.5	1028.86	1148.08	6343.74	0	6343.74	6758.47	6758.47
16	6.9454	54972	-22.0125	Ts presumptive	200	8.5	1034.29	1154.14	6384.28	0	6384.28	6802.42	6802.42
17	8.9459	71258.4	-22.0789	Ts presumptive	200	8.5	1039.24	1159.66	6421.24	0	6421.24	6842.79	6842.79
18	5.11211	40986.3	-23.1571	Ts presumptive	200	8.5	1036.36	1156.44	6399.71	0	6399.71	6842.97	6842.97
19	3.29563	26548.7	-23.1571	Ts presumptive	200	8.5	1040.45	1161.01	6430.27	0	6430.27	6875.28	6875.28
20	8.08821	65620.5	-23.4863	Ts presumptive	200	8.5	1043.97	1164.94	6456.56	0	6456.56	6910.2	6910.2
21	8.32511	68191.4	-23.5047	Ts presumptive	200	8.5	1052.15	1174.06	6517.6	0	6517.6	6975.19	6975.19
22	8.775	74094.3	-23.5033	Ts presumptive	200	8.5	1079.15	1204.19	6719.18	0	6719.18	7188.48	7188.48
23	10.1599	88663.6	-22.2994	Ts presumptive	200	8.5	1119.66	1249.39	7021.65	0	7021.65	7480.84	7480.84
24	11.0987	96068.4	-16.7312	Ts presumptive	200	8.5	1159.86	1294.25	7321.78	0	7321.78	7670.44	7670.44
25	6.773	57837.7	-15.0211	Ts presumptive	200	8.5	1161.5	1296.08	7334.02	0	7334.02	7645.7	7645.7
26	6.773	57125.4	-15.0211	Ts presumptive	200	8.5	1149.42	1282.6	7243.87	0	7243.87	7552.31	7552.31
27	6.13707	50590.3	-0.999638	Ts Sespe Fm	250	35	6334.7	7068.7	9738.11	0	9738.11	9848.64	9848.64
28	1.57333	12693.6	-0.999638	Ts presumptive	250	35	6205.96	6925.04	9532.94	0	9532.94	9641.23	9641.23
29	0.645301	5174.69	-0.631238	Ts presumptive	250	35	6218.88	6939.46	9553.54	0	9553.54	9622.06	9622.06
30	5.95425	46829.7	-0.631238	Ts Sespe Fm	250	35	6104.85	6812.22	9371.82	0	9371.82	9439.08	9439.08
31	13.6002	100910	-0.3187	Ts Sespe Fm	250	35	5814.49	6488.21	8909.09	0	8909.09	8941.43	8941.43
32	11.903	81526.3	-0.132805	Ts Sespe Fm	250	35	5411.18	6038.17	8266.36	0	8266.36	8278.9	8278.9
33	7.79204	50457.8	-0.132805	Ts presumptive	250	35	5131.66	5726.27	7820.93	0	7820.93	7832.82	7832.82
34	4.6159	29835.3	-0.440326	Ts presumptive	250	35	5088.81	5678.45	7752.63	0	7752.63	7791.74	7791.74
35	3.83553	24376.1	-0.440326	Ts Sespe Fm	250	35	5008.38	5588.7	7624.46	0	7624.46	7662.95	7662.95
36	0.522459	3267.16	-0.294561	Ts Sespe Fm	250	35	4948.17	5521.51	7528.51	0	7528.51	7553.95	7553.95

37	8.08415	48992	-0.294561	Ts presumptive	250	35	4804.19	5360.85	7299.04	0	7299.04	7323.74	7323.74
38	0.0838454	492.814	0.264105	Ts presumptive	250	35	4724.99	5272.48	7172.84	0	7172.84	7151.06	7151.06
39	10.3918	58399.1	0.264105	Ts Sespe Fm	250	35	4530.34	5055.27	6862.65	0	6862.65	6841.76	6841.76
40	6.83376	35409	0.667435	Ts Sespe Fm	250	35	4236.87	4727.8	6394.96	0	6394.96	6345.6	6345.6
41	6.83376	34521.7	0.667435	Ts Sespe Fm	250	35	4138.01	4617.48	6237.42	0	6237.42	6189.21	6189.21
42	12.9477	62257.1	0.565585	Ts Sespe Fm	250	35	3943.95	4400.93	5928.15	0	5928.15	5889.22	5889.22
43	0.0790611	353.443	0.565585	Ts presumptive	250	35	3687.28	4114.52	5519.1	0	5519.1	5482.7	5482.7
44	15.3163	62230.8	1.54873	Ts presumptive	250	35	3451.85	3851.82	5143.92	0	5143.92	5050.6	5050.6
45	11.6498	38786.5	3.17133	Ts presumptive	250	35	2990.05	3336.51	4407.99	0	4407.99	4242.32	4242.32
46	0.0808697	242.51	3.17133	Ts Sespe Fm	250	35	2723.33	3038.88	3982.94	0	3982.94	3832.05	3832.05
47	13.1257	33851.9	5.29782	Ts Sespe Fm	250	35	2507.94	2798.53	3639.68	0	3639.68	3407.12	3407.12
48	13.1585	22299.6	8.83781	Ts Sespe Fm	250	35	1921.85	2144.54	2705.69	0	2705.69	2406.87	2406.87
49	10.5868	8891.75	13.5615	Ts Sespe Fm	250	35	1286.26	1435.3	1692.79	0	1692.79	1382.52	1382.52
50	4.79134	1045.73	19.8197	Ts Sespe Fm	250	35	763.107	851.528	859.072	0	859.072	584.041	584.041

Interslice Data

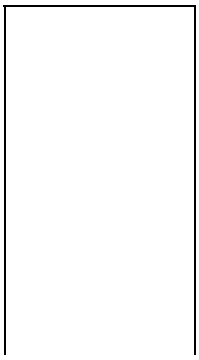
Global Minimum Query (spencer) - Safety Factor: 1.11587



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	545.899	1123.84	499.199	0	0
2	549.849	1119.14	1089.56	387.281	19.5676
3	556.321	1111.98	4137.75	1470.76	19.5677
4	561.978	1106.03	8541.4	3036.03	19.5677
5	570.331	1097.52	17668.2	6280.13	19.5677
6	578.886	1088.89	30536.4	10854.1	19.5677
7	587.699	1080.04	47582	16913	19.5677
8	596.305	1075.87	69850.2	24828.1	19.5676
9	604.916	1071.7	93614.5	33275.1	19.5677
10	616.407	1066.74	124450	44235.6	19.5677
11	627.897	1061.77	156824	55742.8	19.5677
12	635.588	1058.6	178476	63438.9	19.5676
13	643.279	1055.44	200709	71341.9	19.5677
14	649.884	1052.78	220353	78324.3	19.5677
15	656.489	1050.11	240603	85522.1	19.5677
16	665.166	1046.62	267504	95083.8	19.5677
17	672.111	1043.81	289241	102810	19.5676
18	681.057	1040.18	317496	112854	19.5678
19	686.169	1037.99	334389	118858	19.5677
20	689.465	1036.58	345333	122748	19.5677
21	697.553	1033.07	372706	132478	19.5677
22	705.878	1029.45	401183	142600	19.5677
23	714.653	1025.63	432173	153615	19.5677
24	724.813	1021.47	467787	166274	19.5677
25	735.912	1018.13	498556	177211	19.5677
26	742.685	1016.31	515586	183264	19.5677
27	749.458	1014.49	532392	189238	19.5677
28	755.595	1014.39	504676	179386	19.5676
29	757.168	1014.36	497713	176911	19.5676
30	757.813	1014.35	494802	175877	19.5677
31	763.768	1014.29	468433	166504	19.5677
32	777.368	1014.21	410211	145809	19.5677
33	789.271	1014.18	362335	128791	19.5676
34	797.063	1014.17	332581	118216	19.5678
35	801.679	1014.13	315334	112085	19.5677
36	805.514	1014.1	301224	107070	19.5677
37	806.037	1014.1	299313	106390	19.5676
38	814.121	1014.06	270576	96176	19.5677
39	814.205	1014.06	270276	96069.2	19.5677
40	824.596	1014.1	234548	83369.9	19.5677
41	831.43	1014.18	212167	75414.5	19.5677
42	838.264	1014.26	190297	67640.7	19.5677
43	851.212	1014.39	150925	53646.2	19.5677
44	851.291	1014.39	150700	53566.2	19.5677
45	866.607	1014.81	108146	38440.5	19.5678
46	878.257	1015.45	78225	27805	19.5677
47	878.338	1015.46	78035.4	27737.6	19.5677
48	891.463	1016.67	47457.3	16868.6	19.5677
49	904.622	1018.72	21092.6	7497.34	19.5677
50	915.209	1021.27	4930.66	1752.6	19.5677
51	920	1023	0	0	0

List Of Coordinates

Tension Crack



X	Y
0.000130068	1118
86.0001	1124
110	1126
121	1128
125	1130
129	1131
202	1131
204	1132
205	1132.6
273	1132.6
277	1133.5
312	1133.7
394	1133.7
399.525	1136.46
413	1137
433	1138
451	1138
466	1136
479	1134
494	1131
504	1129
517	1127
525	1126
534	1125
544	1124
556	1123
564	1122
571	1121
573.656	1120.99
580.212	1120.96
585	1120
602	1118
613	1116
630.294	1112.12
642	1109.5
650	1109.5
661	1106
689	1096
706	1090
716	1090
726	1086
752	1076
779	1066
793	1061
801	1061
814	1056
830	1050
841	1050
851	1046
876	1036

Block Search Window

X	Y
587.774	1080
607.446	1070.45
633.307	1070.45
612.829	1080

Block Search Window

X	Y
686.12	1038.02
795.128	987.184
816.075	987.184
707.253	1037.93

External Boundary

X	Y
1160.49	1014

1158	1014
1156.8	1013.4
1155.01	1012.5
1146	1008
1081	1008
1070	1009
1068	1010
1036	1030
1033.93	1031.24
1033	1031.8
960.208	1031.8
956.089	1031.8
953.583	1031.8
936	1031.8
920	1023
901	1030
876	1040
851	1050
841	1054
830	1054
814	1060
801	1065
793	1065
779	1070
752	1080
726	1090
716	1094
707.58	1094
706	1094
689	1100
661	1110
650	1113.5
642	1113.5
630.293	1116.12
613	1120
602	1122
585	1124
580.212	1124.96
573.656	1124.99
571	1125
564	1126
556	1127
544	1128
539.043	1128.5
534	1129
525	1130
517	1131
504	1133
501.957	1133.41
494	1135
479	1138
466	1140
463.523	1140.33
451	1142
433	1142
432.795	1141.99
429.314	1141.82
427.474	1141.73
413	1141
399.525	1140.46
394	1137.7
312	1137.7
277	1137.5
273	1136.6
205	1136.6
204	1136
202	1135
129	1135
125	1134
122.669	1132.83
121	1132
110	1130
86	1128

-5.09388e-010	1122
0	900
621.968	900
945.141	900
947.285	900
982.096	900
994.963	900
1000.9	900
1003.04	900
1008.38	900
1012.69	900
1178	900
1178	1014

Material Boundary

X	Y
956.089	1031.8
981.281	968.062
987.83	951.612
996.884	928.872
998.726	924.245
999.704	921.789
1002.51	914.75
1008.38	900

Material Boundary

X	Y
960.208	1031.8
960.738	1030.47
1012.69	900

Material Boundary

X	Y
571	1125
604.158	1109.04
657.327	1083.24
723.17	1055
763.505	1037.7
844.427	999.964
929.444	960.32
996.884	928.872

Material Boundary

X	Y
539.043	1128.5
604.158	1098.04
630.036	1085
639.956	1080
657.327	1071.24
696.814	1055
738.624	1037.8
844.413	988.47
929.445	948.819
1002.51	914.75

Material Boundary

X	Y
501.957	1133.41
604.158	1084.04
612.829	1080
657.327	1059.24
707.253	1037.93
844.396	973.978
929.447	934.318
1003.04	900

Material Boundary

X	Y
699.102	1037.96
697.276	1041.18
705.089	1037.94
844.395	972.979
929.447	933.318
1000.9	900

Material Boundary

X	Y
429.314	1141.82
546.601	1086.99
672.661	1028.06
947.285	900

Material Boundary

X	Y
427.474	1141.73
544.512	1086.99
670.516	1028.06
862.999	938.303
878.66	931.001
945.141	900

Material Boundary

X	Y
751.027	1037.75
747.332	1040.67
755.354	1037.73
844.422	996.198
929.445	956.552
998.726	924.245

Material Boundary

X	Y
751.027	1037.75
844.42	994.199
929.445	954.552
999.704	921.789

Material Boundary

X	Y
699.102	1037.96
844.391	970.213
929.447	930.55
994.963	900

Material Boundary

X	Y
463.523	1140.33
587.774	1080
604.158	1072.04
657.327	1048.24
686.12	1038.02
844.384	964.216
929.448	924.55
982.096	900

Material Boundary

X	Y

X	Y
122.669	1132.83
302.157	1049.13
621.968	900

Material Boundary

X	Y
630.293	1116.12
763.028	1055
817.317	1030
929.442	978.367
987.83	951.612

Material Boundary

X	Y
707.58	1094
766.203	1067.02
846.645	1030
929.441	991.896
981.281	968.062

Material Boundary

X	Y
956.089	1031.8
960.738	1030.47
974	1028
994	1025.5
1005	1025
1012	1026
1018	1027
1032	1031
1033.93	1031.24

Material Boundary

X	Y
1156.8	1013.4
1160.49	1014

Material Boundary

X	Y
587.774	1080
612.829	1080
639.956	1080

Material Boundary

X	Y
696.814	1055
723.17	1055
763.028	1055

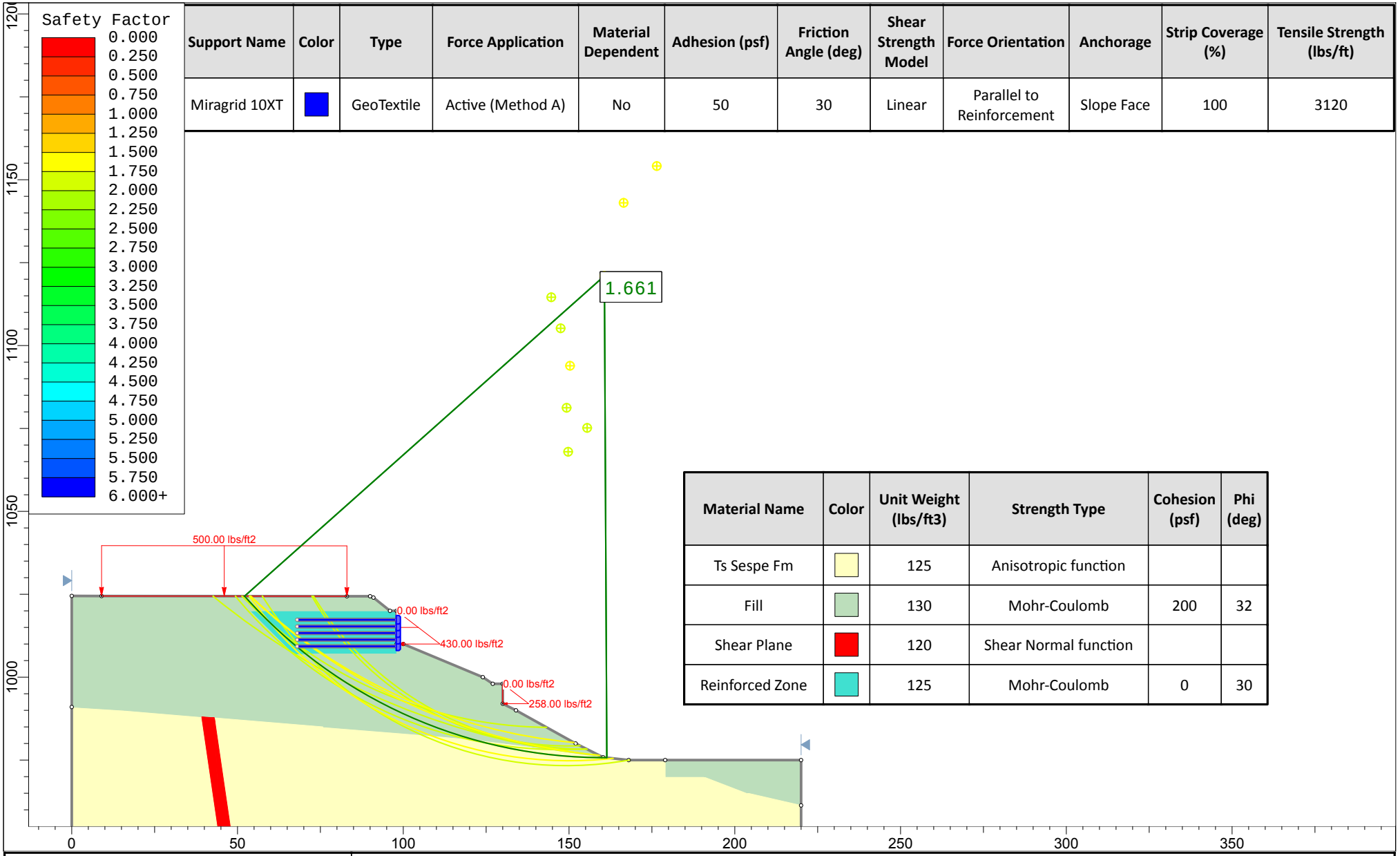
Material Boundary

X	Y
817.317	1030
846.645	1030
901	1030

Material Boundary

X	Y
432.795	1141.99
587.774	1080

Support Name	Color	Type	Force Application	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Force Orientation	Anchorage	Strip Coverage (%)	Tensile Strength (lbs/ft)
Miragrid 10XT		GeoTextile	Active (Method A)	No	50	30	Linear	Parallel to Reinforcement	Slope Face	100	3120



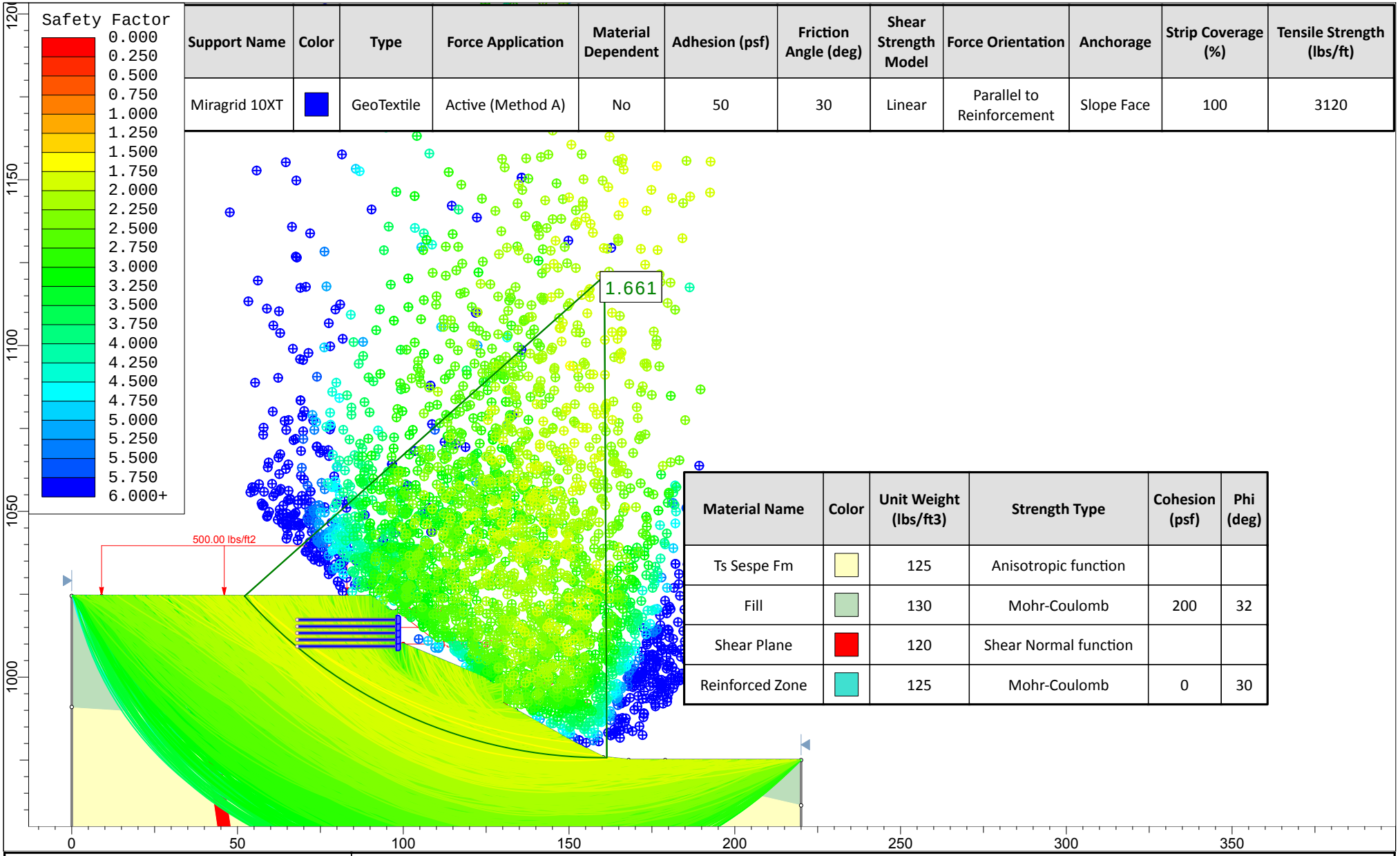
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Ts Sespe Fm		125	Anisotropic function		
Fill		130	Mohr-Coulomb	200	32
Shear Plane		120	Shear Normal function		
Reinforced Zone		125	Mohr-Coulomb	0	30

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G20.1-G20.1' static		
Drawn By	RMP	Scale 1:480	Company GWV
Date			File Name G20.1R_EFP and grids.slim

PLATE A.75

Support Name	Color	Type	Force Application	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Force Orientation	Anchorage	Strip Coverage (%)	Tensile Strength (lbs/ft)
Miragrid 10XT		GeoTextile	Active (Method A)	No	50	30	Linear	Parallel to Reinforcement	Slope Face	100	3120



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Ts Sespe Fm		125	Anisotropic function		
Fill		130	Mohr-Coulomb	200	32
Shear Plane		120	Shear Normal function		
Reinforced Zone		125	Mohr-Coulomb	0	30

rocscience

SLIDEINTERPRET 7.036

Project	North Canyon Ranch		
Analysis Description	G20.1-G20.1' static		
Drawn By	RMP	Scale 1:480	Company GWV
Date			File Name G20.1R_EFP and grids.slim

PLATE A.76

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	G20.1R_EFP and grids.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G20.1-G20.1' static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	25
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Slope Search
Number of Surfaces:	5000
Upper Angle:	Not Defined
Lower Angle:	Not Defined
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	3
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

3 Distributed Loads present

Distributed Load 1	
Distribution:	Constant
Magnitude [psf]:	500
Orientation:	Vertical

Distributed Load 2	
Distribution:	Triangular
Magnitude 1 [psf]:	430
Magnitude 2 [psf]:	0
Orientation:	Normal to boundary

Distributed Load 3	
Distribution:	Triangular
Magnitude 1 [psf]:	258
Magnitude 2 [psf]:	0
Orientation:	Normal to boundary

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Reinforced Zone
Color				
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Mohr-Coulomb
Unit Weight [lbs/ft3]	125	130	120	125
Cohesion [psf]		200		0
Friction Angle [deg]		32		30
Water Surface	None	None	None	None
Ru Value	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (30-50)

Angle From	Angle To	c	phi
-90	-50	250	35
-50	-30	200	32
-30	90	250	35

Support Properties

Miragrid 10XT

Support Type: GeoTextile
Force Application: Active
Force Orientation: Parallel to Reinforcement
Anchorage: Slope Face
Shear Strength Model: Linear
Use External Loads for Strength: yes
Strip Coverage: 100 percent
Tensile Strength: 3120 lb/ft
Pullout Strength Adhesion: 50 psf
Pullout Strength Friction Angle: 30 degrees

Global Minimums

Method: spencer

FS	1.661320
Center:	160.684, 1121.000
Radius:	145.269
Left Slip Surface Endpoint:	52.149, 1024.442
Right Slip Surface Endpoint:	161.411, 975.732
Resisting Moment:	2.40774e+007 lb-ft
Driving Moment:	1.44929e+007 lb-ft
Resisting Horizontal Force:	148891 lb
Driving Horizontal Force:	89622 lb
Total Slice Area:	1739.25 ft2
Surface Horizontal Width:	109.262 ft
Surface Average Height:	15.9181 ft

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3102
Number of Invalid Surfaces: 1898

Error Codes:

Error Code -100 reported for 56 surfaces
Error Code -105 reported for 5 surfaces
Error Code -106 reported for 97 surfaces
Error Code -107 reported for 449 surfaces
Error Code -108 reported for 570 surfaces
Error Code -109 reported for 2 surfaces
Error Code -111 reported for 105 surfaces
Error Code -112 reported for 36 surfaces
Error Code -115 reported for 578 surfaces

Error Codes

The following errors were encountered during the computation:

-100 = Both surface / slope intersections are on the same horizontal surface. In general, this will give a very high or infinite factor of safety (zero driving force), if calculated.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-109 = Soiltype for slice base not located. This error should occur very rarely, if at all. It may occur if a very low number of slices is combined with certain soil geometries, such that the midpoint of a slice base is actually outside the soil region,even though the slip surface is wholly within the soil region.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-115 = Surface too shallow, below the minimum depth.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.66132

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.12099	1188.64	-47.1473	Fill	200	32	278.038	461.91	419.145	0	419.145	718.845	718.845
2	4.79117	4178.26	-44.6246	Reinforced Zone	0	30	298.224	495.446	858.138	0	858.138	1152.48	1152.48
3	4.79117	6883.92	-42.0249	Reinforced Zone	0	30	438.53	728.538	1261.87	0	1261.87	1657.07	1657.07
4	4.79117	9357.4	-39.5278	Reinforced Zone	0	30	576.77	958.199	1659.65	0	1659.65	2135.57	2135.57
5	4.22176	10166.9	-37.2567	Fill	200	32	868.629	1443.07	1989.34	0	1989.34	2650.02	2650.02
6	4.22176	11862.5	-35.1918	Fill	200	32	1001.6	1663.97	2342.84	0	2342.84	3049.17	3049.17
7	4.22176	13434.4	-33.1782	Fill	200	32	1122.26	1864.43	2663.63	0	2663.63	3397.41	3397.41
8	4.22176	14891.2	-31.21	Fill	200	32	1118.47	1858.14	2653.59	0	2653.59	3331.22	3331.22
9	4.22176	16145.8	-29.2819	Fill	200	32	1234.27	2050.51	2961.43	0	2961.43	3653.56	3653.56
10	4.22176	16013	-27.3897	Fill	200	32	1255.83	2086.34	3018.77	0	3018.77	3669.45	3669.45
11	4.22176	13515.3	-25.5293	Fill	200	32	1167.14	1939	2782.98	0	2782.98	3340.41	3340.41
12	4.22176	11548.9	-23.6974	Fill	200	32	983.387	1633.72	2294.43	0	2294.43	2726.05	2726.05
13	4.22176	11557.4	-21.8908	Fill	200	32	1006.91	1672.8	2356.97	0	2356.97	2761.56	2761.56
14	4.22176	11481.6	-20.1069	Fill	200	32	1024.08	1701.32	2402.62	0	2402.62	2777.52	2777.52
15	4.22176	11324.4	-18.3431	Fill	200	32	1034.74	1719.03	2430.96	0	2430.96	2774.03	2774.03
16	4.22176	11088.4	-16.5972	Fill	200	32	1038.69	1725.6	2441.47	0	2441.47	2751.06	2751.06
17	4.45628	11304.9	-14.8193	Ts Sespe Fm	250	35	1178.32	1957.57	2438.67	0	2438.67	2750.42	2750.42
18	4.45628	10606.6	-13.0083	Ts Sespe Fm	250	35	1172.21	1947.42	2424.17	0	2424.17	2694.97	2694.97
19	4.45628	7070.52	-11.2104	Ts Sespe Fm	250	35	836.106	1389.04	1626.72	0	1626.72	1792.43	1792.43
20	4.45628	6152.37	-9.42357	Ts Sespe Fm	250	35	767.239	1274.63	1463.32	0	1463.32	1590.66	1590.66
21	4.45628	5104.49	-7.646	Ts Sespe Fm	250	35	681.193	1131.68	1259.17	0	1259.17	1350.62	1350.62
22	4.45628	3979.51	-5.8758	Ts Sespe Fm	250	35	582.098	967.051	1024.05	0	1024.05	1083.96	1083.96
23	4.45628	2778.04	-4.11122	Ts Sespe Fm	250	35	469.029	779.207	755.786	0	755.786	789.499	789.499
24	4.45628	1587.27	-2.35054	Ts Sespe Fm	250	35	350.404	582.134	474.335	0	474.335	488.719	488.719
25	4.45628	407.868	-0.59208	Ts Sespe Fm	250	35	226.002	375.461	179.177	0	179.177	181.512	181.512

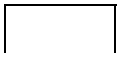
Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.66132

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	52.1493	1024.44	0	0	0
2	56.2703	1020	716.104	286.873	21.8312
3	61.0615	1015.27	3345.26	1340.12	21.8312
4	65.8527	1010.95	6692.69	2681.1	21.8311
5	70.6438	1007	10490.7	4202.6	21.8312
6	74.8656	1003.79	13211.6	5292.58	21.8311
7	79.0874	1000.81	15958.4	6392.95	21.8311
8	83.3091	998.051	18573.2	7440.46	21.8311
9	87.5309	995.494	20638.7	8267.92	21.8312
10	91.7526	993.126	22439	8989.11	21.8311
11	95.9744	990.939	23740.6	9510.52	21.8311
12	100.196	988.922	22274.7	8923.3	21.8312
13	104.418	987.069	22374.8	8963.38	21.8311
14	108.64	985.373	22122.2	8862.21	21.8312
15	112.861	983.828	21512.3	8617.85	21.8311
16	117.083	982.428	20546.7	8231.04	21.8311
17	121.305	981.17	19233.9	7705.14	21.8311
18	125.761	979.99	16858.3	6753.48	21.8312
19	130.218	978.961	13356.4	5350.62	21.8312
20	134.674	978.078	11067.4	4433.61	21.8311
21	139.13	977.338	8730.74	3497.55	21.8311
22	143.586	976.74	6448.52	2583.29	21.8311
23	148.043	976.281	4324.25	1732.3	21.8311
24	152.499	975.961	2476.28	992.002	21.8311
25	156.955	975.778	1001.59	401.24	21.8312
26	161.411	975.732	0	0	0

List Of Coordinates

Distributed Load



X	Y
9	1024.49
83	1024.41

Distributed Load

X	Y
98	1010
98	1020

Distributed Load

X	Y
130	992
130	998

External Boundary

X	Y
168	975
160.306	975.855
152	980
134	990
130	992
130	998
127	998
124	1000
100	1010
98	1010
98	1020
96	1020
91	1024
90	1024.4
83	1024.41
9	1024.49
0	1024.5
0	991
0	800
135.482	800
139.482	800
220	800
220	961.364
220	975
179	975

Material Boundary

X	Y
0	991
16	990
38.9754	988.085
43.0248	987.748
76	985
101	983
113	982
123	981
131	980
139	979
159	976
160.306	975.855

Material Boundary

X	Y
179	975
179	970
191	970
204	965
220	961.364

Material Boundary

X	Y
38.9754	988.085
39	987.917
44.8188	948.271
68.0583	886.949
105.168	828.964
135.482	800

Material Boundary

X	Y
43.0248	987.748
48.8188	948.271
72.0583	886.949
109.168	828.964
139.482	800

Material Boundary

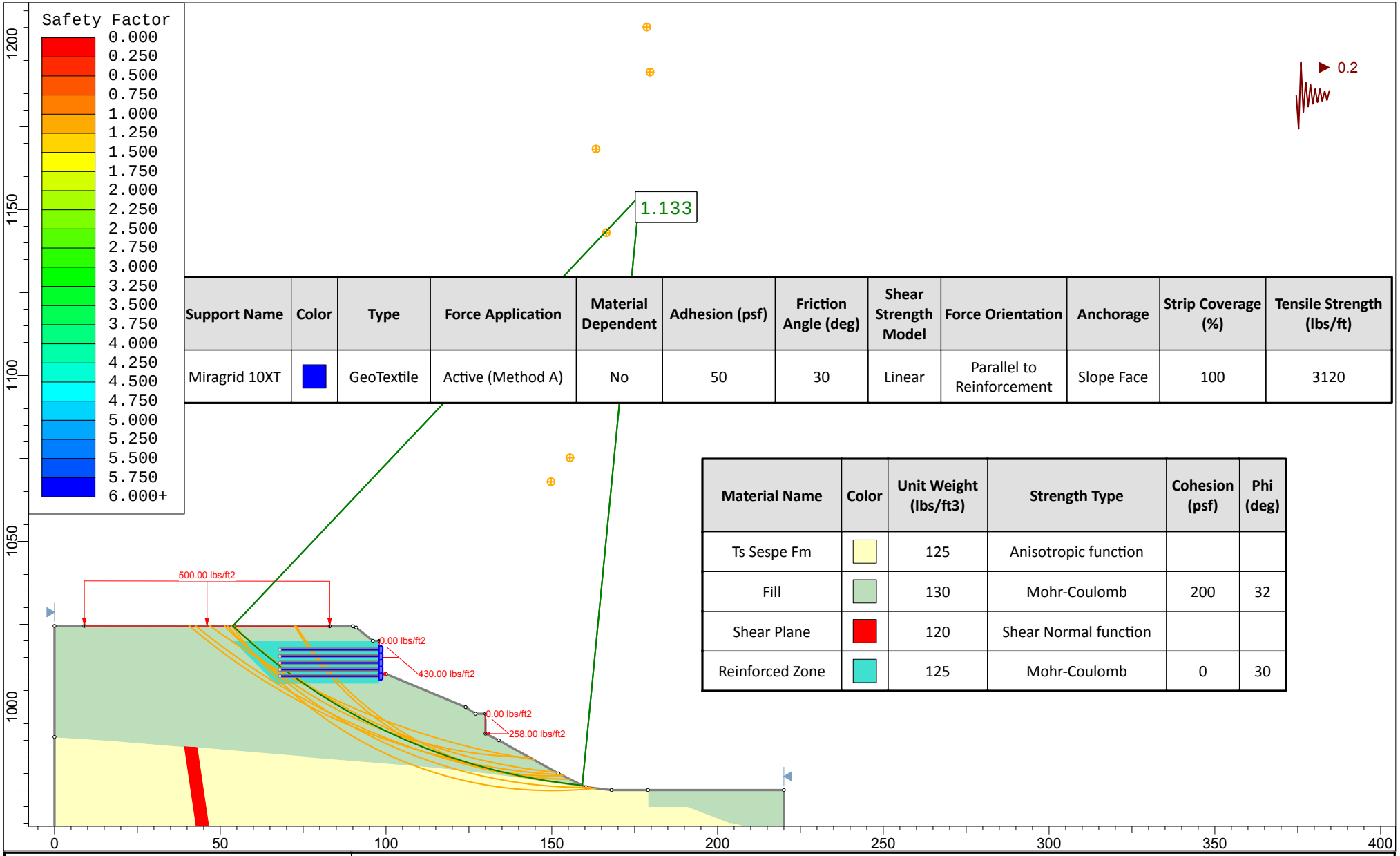
X	Y
96	1020
96	1008
98	1008
98	1010

Material Boundary

X	Y
54	1020
67	1007
98	1007
98	1008

Material Boundary

X	Y
54	1020
96	1020



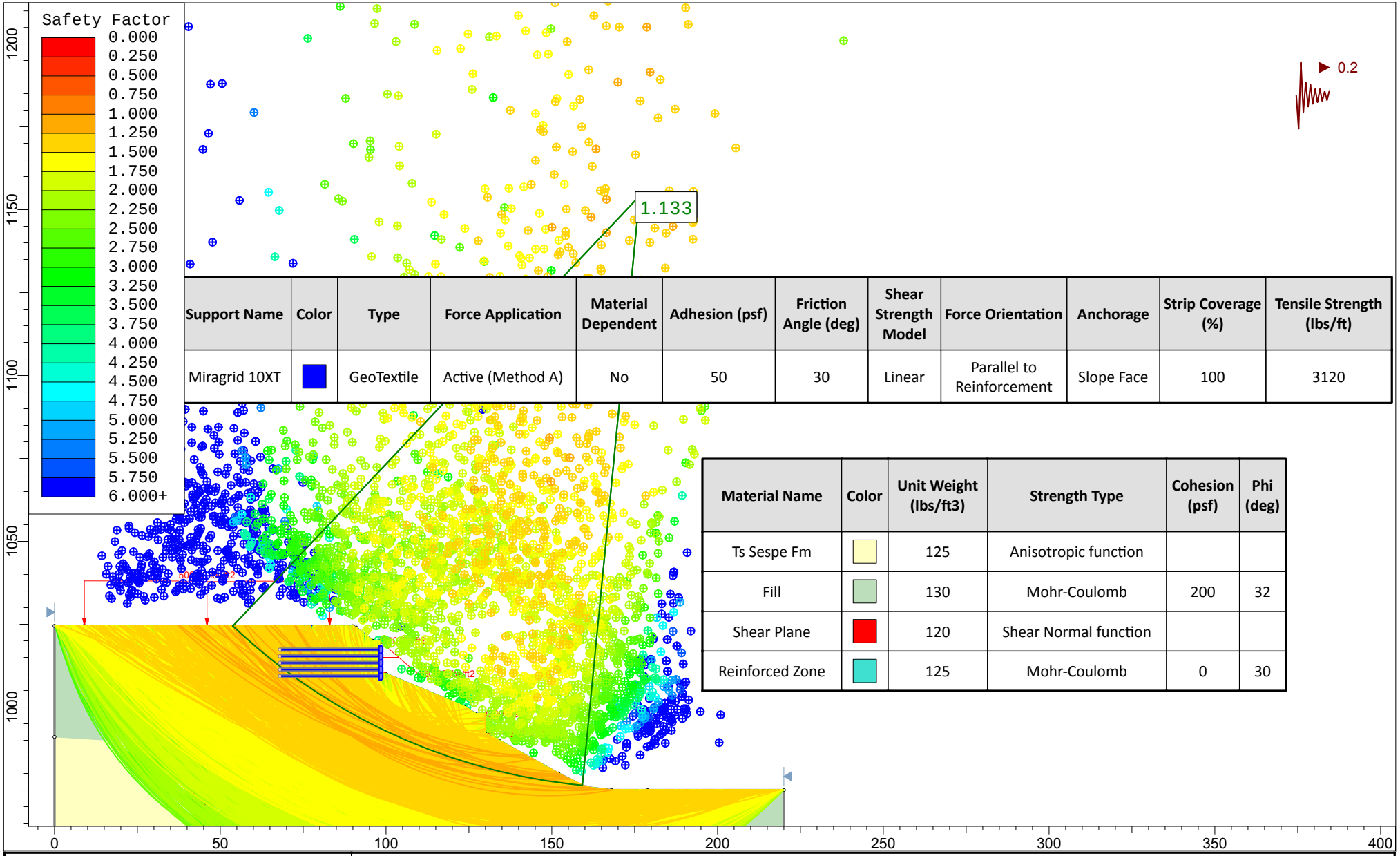
Support Name	Color	Type	Force Application	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Force Orientation	Anchorage	Strip Coverage (%)	Tensile Strength (lbs/ft)
Miragrid 10XT		GeoTextile	Active (Method A)	No	50	30	Linear	Parallel to Reinforcement	Slope Face	100	3120

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Ts Sespe Fm		125	Anisotropic function		
Fill		130	Mohr-Coulomb	200	32
Shear Plane		120	Shear Normal function		
Reinforced Zone		125	Mohr-Coulomb	0	30

Project	North Canyon Ranch		
Analysis Description	G20.1-G20.1' pseudostatic		
Drawn By	RMP	Scale	1:480
Company	GWV		
Date		File Name	G20.1Rp_EFP and grids.slim

SLIDEINTERPRET 7.036

PLATE A.83



Support Name	Color	Type	Force Application	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Force Orientation	Anchorage	Strip Coverage (%)	Tensile Strength (lbs/ft)
Miragrid 10XT		GeoTextile	Active (Method A)	No	50	30	Linear	Parallel to Reinforcement	Slope Face	100	3120

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Ts Sespe Fm		125	Anisotropic function		
Fill		130	Mohr-Coulomb	200	32
Shear Plane		120	Shear Normal function		
Reinforced Zone		125	Mohr-Coulomb	0	30

Project	North Canyon Ranch		
Analysis Description	G20.1-G20.1' pseudostatic		
Drawn By	RMP	Scale	1:480
Company	GWV		
Date		File Name	G20.1Rp_EFP and grids.slim

SLIDEINTERPRET 7.036

PLATE A.84

Slide Analysis Information

North Canyon Ranch

Project Summary

File Name:	G20.1Rp_EFP and grids.slim
Slide Modeler Version:	7.036
Project Title:	North Canyon Ranch
Analysis:	G20.1-G20.1' pseudostatic
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Left to Right
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Spencer
Number of slices:	25
Tolerance:	0.0001
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Slope Search
Number of Surfaces:	5000
Upper Angle:	Not Defined
Lower Angle:	Not Defined
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	3
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

Seismic Load Coefficient (Horizontal): 0.2

3 Distributed Loads present

Distributed Load 1	
Distribution:	Constant
Magnitude [psf]:	500
Orientation:	Vertical

Distributed Load 2	
Distribution:	Triangular
Magnitude 1 [psf]:	430
Magnitude 2 [psf]:	0
Orientation:	Normal to boundary

Distributed Load 3	
Distribution:	Triangular
Magnitude 1 [psf]:	258
Magnitude 2 [psf]:	0
Orientation:	Normal to boundary

Material Properties

Property	Ts Sespe Fm	Fill	Shear Plane	Reinforced Zone
Color				
Strength Type	Anisotropic function	Mohr-Coulomb	Shear Normal function	Mohr-Coulomb
Unit Weight [lbs/ft3]	125	130	120	125
Cohesion [psf]		200		0
Friction Angle [deg]		32		30
Water Surface	None	None	None	None
Ru Value	0	0	0	0

Shear Normal Functions

Name: 8980.003 Shear Plane

Normal (psf)	Shear (psf)
0	0
2064	559.8
8329	1928.6
14595	2578

Anisotropic Functions

Name: Sespe Coarse (30-50)

Angle From	Angle To	c	phi
-90	-50	250	35
-50	-30	200	32
-30	90	250	35

Support Properties

Miragrid 10XT

Support Type: GeoTextile
Force Application: Active
Force Orientation: Parallel to Reinforcement
Anchorage: Slope Face
Shear Strength Model: Linear
Use External Loads for Strength: yes
Strip Coverage: 100 percent
Tensile Strength: 3120 lb/ft
Pullout Strength Adhesion: 50 psf
Pullout Strength Friction Angle: 30 degrees

Global Minimums

Method: spencer

FS	1.132850
Center:	176.465, 1154.137
Radius:	178.560
Left Slip Surface Endpoint:	53.735, 1024.440
Right Slip Surface Endpoint:	159.185, 976.415
Resisting Moment:	2.23821e+007 lb-ft
Driving Moment:	1.97573e+007 lb-ft
Resisting Horizontal Force:	112749 lb
Driving Horizontal Force:	99526.2 lb
Active Support Moment:	-897353 lb-ft
Active Horizontal Support Force:	-6240 lb
Total Slice Area:	1432.21 ft2
Surface Horizontal Width:	105.449 ft
Surface Average Height:	13.582 ft

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3350
Number of Invalid Surfaces: 1650

Error Codes:

Error Code -100 reported for 56 surfaces
Error Code -105 reported for 5 surfaces
Error Code -106 reported for 97 surfaces
Error Code -107 reported for 203 surfaces
Error Code -108 reported for 416 surfaces
Error Code -109 reported for 2 surfaces
Error Code -111 reported for 284 surfaces
Error Code -112 reported for 9 surfaces
Error Code -115 reported for 578 surfaces

Error Codes

The following errors were encountered during the computation:

-100 = Both surface / slope intersections are on the same horizontal surface. In general, this will give a very high or infinite factor of safety (zero driving force), if calculated.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-109 = Soiltype for slice base not located. This error should occur very rarely, if at all. It may occur if a very low number of slices is combined with certain soil geometries, such that the midpoint of a slice base is actually outside the soil region,even though the slip surface is wholly within the soil region.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-115 = Surface too shallow, below the minimum depth.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.13285

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.86926	1403.65	-42.3618	Fill	200	32	399.355	452.409	403.939	0	403.939	768.112	768.112
2	4.17364	3332.37	-40.4248	Reinforced Zone	0	30	354.506	401.602	695.594	0	695.594	997.567	997.567
3	4.17364	5129.05	-38.6873	Reinforced Zone	0	30	482.929	547.086	947.582	0	947.582	1334.31	1334.31
4	4.17364	6818.49	-36.991	Reinforced Zone	0	30	796.854	902.716	1563.55	0	1563.55	2163.83	2163.83
5	4.17364	8407.86	-35.3318	Reinforced Zone	0	30	935.446	1059.72	1835.49	0	1835.49	2498.6	2498.6
6	4.19428	9985.13	-33.7021	Fill	200	32	1137.95	1289.13	1742.97	0	1742.97	2501.95	2501.95
7	4.19428	11462.5	-32.0989	Fill	200	32	1261.57	1429.17	1967.08	0	1967.08	2758.43	2758.43
8	4.19428	12851.4	-30.5233	Fill	200	32	1247.98	1413.77	1942.44	0	1942.44	2678.24	2678.24
9	4.19428	14014.3	-28.9729	Fill	200	32	1388.46	1572.92	2197.12	0	2197.12	2965.89	2965.89
10	4.19428	13784.6	-27.4454	Fill	200	32	1413.92	1601.76	2243.28	0	2243.28	2977.61	2977.61
11	4.19428	11084.2	-25.9388	Fill	200	32	1388.47	1572.93	2197.15	0	2197.15	2872.52	2872.52
12	4.19428	9448.29	-24.4512	Fill	200	32	1097.1	1242.85	1668.91	0	1668.91	2167.76	2167.76
13	4.19428	9500.26	-22.981	Fill	200	32	1137.24	1288.32	1741.67	0	1741.67	2223.95	2223.95
14	4.19428	9483.33	-21.5266	Fill	200	32	1172.04	1327.74	1804.77	0	1804.77	2267.08	2267.08
15	4.19428	9399.63	-20.0867	Fill	200	32	1201.17	1360.75	1857.59	0	1857.59	2296.84	2296.84
16	4.19428	9251.04	-18.6599	Fill	200	32	1224.26	1386.9	1899.44	0	1899.44	2312.87	2312.87
17	4.19428	8996.04	-17.245	Fill	200	32	1235.99	1400.19	1920.7	0	1920.7	2304.37	2304.37
18	4.19428	8603.4	-15.8409	Fill	200	32	1231.51	1395.12	1912.59	0	1912.59	2262.02	2262.02
19	4.19428	5481.3	-14.4465	Fill	200	32	978.253	1108.21	1453.45	0	1453.45	1705.46	1705.46
20	4.19428	4697.93	-13.0608	Fill	200	32	825.869	935.586	1177.18	0	1177.18	1368.77	1368.77
21	4.19428	3929.11	-11.6828	Fill	200	32	753.239	853.307	1045.51	0	1045.51	1201.26	1201.26
22	4.19428	3103.07	-10.3116	Fill	200	32	666.633	755.195	888.499	0	888.499	1009.79	1009.79
23	4.19428	2220.6	-8.94641	Fill	200	32	564.639	639.651	703.589	0	703.589	792.477	792.477
24	4.19428	1315.23	-7.5863	Fill	200	32	450.45	510.292	496.572	0	496.572	556.565	556.565
25	4.19428	445.789	-6.23049	Fill	200	32	331.654	375.714	281.2	0	281.2	317.408	317.408

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.13285

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	53.7354	1024.44	0	0	0
2	58.6046	1020	129.687	98.0921	37.103
3	62.7783	1016.44	1789.47	1353.51	37.1029
4	66.9519	1013.1	3966.62	3000.25	37.1029
5	71.1256	1009.96	3800.25	2874.41	37.1029
6	75.2992	1007	3887.88	2940.69	37.1029
7	79.4935	1004.2	5987.69	4528.94	37.103
8	83.6878	1001.57	8163.87	6174.95	37.103
9	87.882	999.099	10303	7792.97	37.1031
10	92.0763	996.776	12384.5	9367.34	37.103
11	96.2706	994.598	14097.4	10662.9	37.1029
12	100.465	992.558	12822.8	9698.85	37.103
13	104.659	990.651	13293.5	10054.9	37.103
14	108.853	988.872	13521.4	10227.3	37.1031
15	113.048	987.218	13487.9	10201.9	37.1029
16	117.242	985.684	13178.7	9968.01	37.1029
17	121.436	984.267	12584.1	9518.34	37.1031
18	125.631	982.965	11699.7	8849.38	37.103
19	129.825	981.775	10531	7965.41	37.103
20	134.019	980.695	8320.54	6293.45	37.103
21	138.213	979.722	6941.45	5250.34	37.103
22	142.408	978.855	5474.59	4140.84	37.1029
23	146.602	978.091	3977.05	3008.14	37.1029
24	150.796	977.431	2517.38	1904.08	37.1029
25	154.99	976.873	1168.42	883.765	37.103
26	159.185	976.415	0	0	0

List Of Coordinates

Distributed Load

X	Y
9	1024.49
83	1024.41

Distributed Load

X	Y
98	1010
98	1020

Distributed Load

X	Y
130	992
130	998

External Boundary

X	Y
168	975
160.306	975.855
152	980
134	990
130	992
130	998
127	998
124	1000
100	1010
98	1010
98	1020
96	1020
91	1024
90	1024.4
83	1024.41
9	1024.49
0	1024.5
0	991
0	800
135.482	800
139.482	800
220	800
220	961.364
220	975
179	975

Material Boundary

X	Y
0	991
16	990
38.9754	988.085
43.0248	987.748
76	985
101	983
113	982
123	981
131	980
139	979
159	976
160.306	975.855

Material Boundary

X	Y
179	975
179	970
191	970
204	965
220	961.364

Material Boundary

X	Y
38.9754	988.085
39	987.917
44.8188	948.271
68.0583	886.949
105.168	828.964
135.482	800

Material Boundary

X	Y
43.0248	987.748
48.8188	948.271
72.0583	886.949
109.168	828.964
139.482	800

Material Boundary

X	Y
96	1020
96	1008
98	1008
98	1010

Material Boundary

X	Y
54	1020
67	1007
98	1007
98	1008

Material Boundary

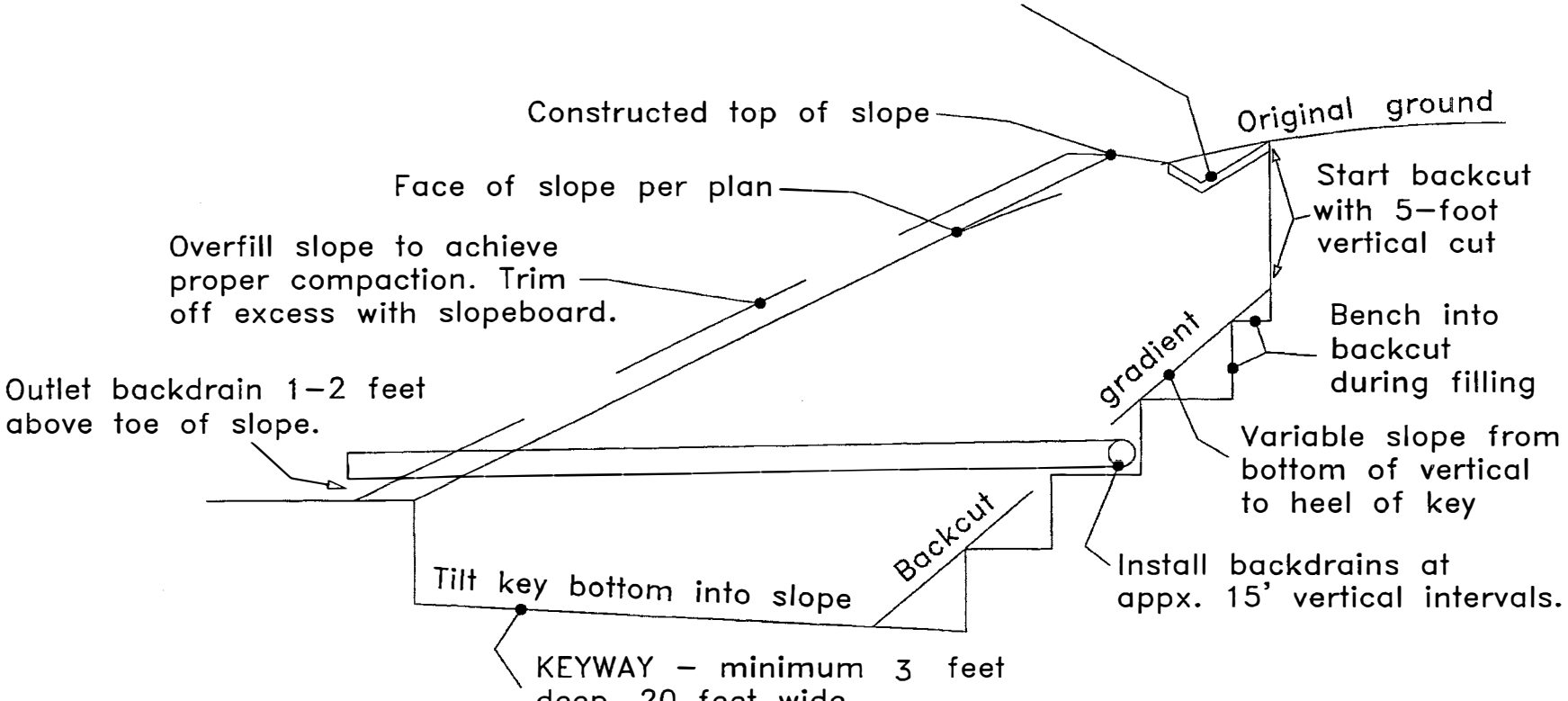
X	Y
54	1020
96	1020

APPENDIX B

Typical Details

September 14, 2018
W.O. 8980

TYPICAL STABILITY FILL/BUTTRESS BELOW NATURAL SLOPE



Install lowermost backdrain at heel of key if gravity flow outlet can be maintained.

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 9/14/2018 BY

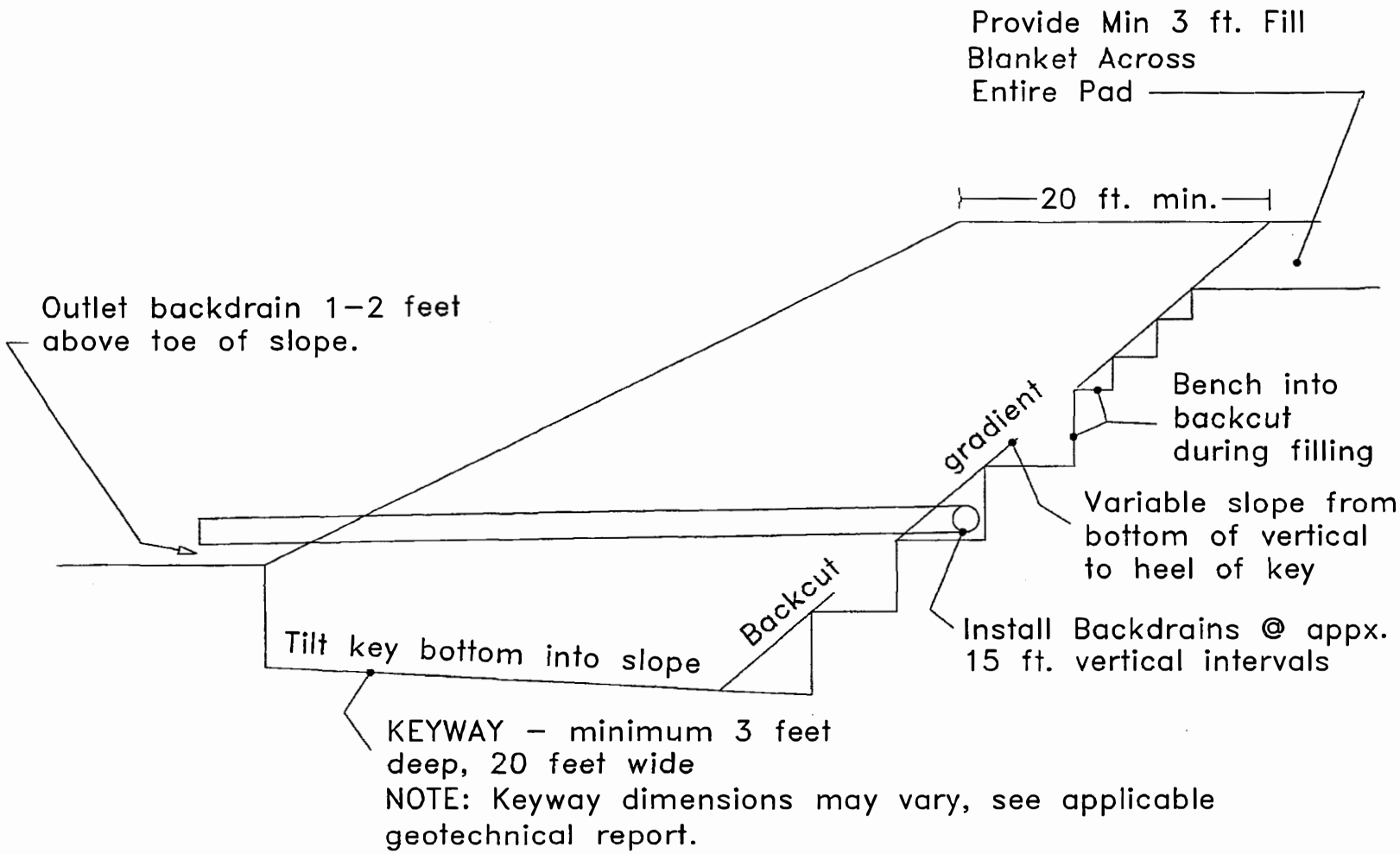
SCALE N.T.S. W.O. 8980

SFI(3ftkey)10.96

PLATE B.1

SHEET

TYPICAL STABILITY/BUTTRESS FILL BELOW PAD OR OTHER FLAT GRADED AREA



Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 9/14/2018 BY
SCALE N.T.S. W.O. 8980

PLATE B.2

GeoDynamics Report
Jul 26, 2019

APPENDIX F

Date: July 26, 2019
GDI #: 07.00101.0001
GDI Log: # 0321

CITY OF SIMI VALLEY - DEPARTMENT OF PUBLIC WORKS
ENGINEERING GEOLOGY AND GEOTECHNICAL ENGINEERING REVIEW

Submitted to: Brent Siemer, Department of Public Works

Project Location: North Canyon Ranch, Simi Valley, California

Case #: PD-S-1054 - Tentative Tract 5658-A

Geotechnical Report: Geolabs–Westlake Village (2019b), "Response #7 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California," W.O.: 8980, dated May 15, 2019.

References: see attached list

Plans: None for current design.

Previous Reviews: April 12, 2007, November 26, 2008, March 4, 2010, July 19, 2010, January 3, 2011, March 23, 2012, and April 26, 2016, September 9, 2016, and October 19, 2018; January 21, 2019

FINDINGS

Environmental-Level

☒ Acceptable with Conditions
☐ Response Required

Plan Check/Engineering-Level

☐ Acceptable as Presented
☒ Response Required

REMARKS

Geolabs – Westlake Village (GWV; consultant) provided a response to the City of Simi Valley geotechnical review letter dated January 21, 2019 regarding the pro0o9posed development at Tentative Tract Map 5658. The response incorporates elements discussed in a meeting held at the City of Simi Valley on March 7, 2019 between the design team, GeoDyanmics, Inc. and City personnel. The site is located immediately north of the Simi Regional Mall between First Street and Erringer Road in Simi Valley, California. The property was graded as a fill disposal site during construction of the adjacent mall property. Based on our review of the geologic map included with the recent report (GWV 2019b), the most recent development plan includes major grading to enlarge existing fill areas and stabilize hillsides, and to create 158 residential lots as well as apartment developments. The apartments are proposed at the southern edge of the site in an area where geotechnical data is either absent or limited. The apartment component of the current development was addressed by the consultant in a report dated February 15, 2012. GeoDynamics, Inc. (GDI) reviewed that report and issued a review letter dated March 23, 2012. No specific response to that review letter was provided at that time; however, a subsequent report (GWV 2016b) incorporated information that effectively responded to the pertinent issues. The report also indicated that grading required for the apartment site and adjacent south-facing slope may extend outside the tentative tract boundaries to adjacent properties. At that time, GDI recommended approval with the condition that documentation be provided indicating that the adjacent property owner would allow the offsite grading.

GeoDynamics, Inc. (GDI) reviewed the above-referenced reports as well as reports in the attached list of references from a geotechnical perspective for compliance with applicable codes, guidelines, and standards of practice. The review by GDI was performed on behalf of the City of Simi Valley - Department of Public Works (City). Based on our review, Environmental-Level approval could be considered contingent upon compliance with the following Conditions of Approval. Engineering-Level/Plan-Check comments could be addressed during the design stage.

Conditions of Approval:

1) The proposed apartment development and 70-foot-high cut-slope at the southern part of the site may require exploration and grading that would extend outside the property limits. This would require permission from the adjacent property owner(s). GDI recommends that approval of the tentative tract map should be contingent upon receipt in a form acceptable to the City of a letter from the adjacent property owner(s) agreeing to permit grading to extend onto their property should the need arise. ***Note that if permission to extend grading onto offsite properties is not granted, then additional/alternative mitigation measures would be necessary to demonstrate feasibility of the project. Such additional measures (if needed) should be reviewed and approved by the City prior to the tentative tract approval.***

2) The geotechnical map included with the recent report (2019b) depicts limits of grading that are slightly larger than those depicted on earlier maps. City personnel should verify that these expanded limits are acceptable from a planning perspective prior to approval.

3) The northern section of the fire road that extends toward the northwest corner of the property is flanked by natural slopes that extend to significant heights. The consultant identifies these slopes as possibly subject to landslides or debris flows that could impact the future fire road, such that grading operations may be periodically required to maintain access through the area. Approval should be contingent upon verification that these conditions are acceptable to both the City and the Fire Department.

Seismic Hazard Zone: *Portions of the site are located within Liquefaction and Earthquake-Induced Landslide Hazard Zones as defined by the Seismic Hazards Mapping Act (California PRC Div. 2, Chap 7.8, sec, 2690-2699.6). Upon acceptance by the City of this seismic hazard evaluation report(s), the City must forward the report(s) to the State Geologist within 30 days of approval.*

ENGINEERING-LEVEL/PLAN CHECK COMMENTS

1. Since first submitted (GWA 2007), the project has undergone a variety of changes in the proposed grading/development plans, and additional recommendations have been provided in response to numerous review letters. At the Grading Plan stage of development, once 40-scale plans are available, the consultant should perform a geotechnical grading plan review using the 40-scale plan as a base map for the geotechnical map. Geologic cross sections should be updated based on the 40-scale plan, with additional cross sections provided as necessary. Additional subsurface exploration may be necessary in some areas to better define vertical limits of identified landslides. The consultant should provide a stand-alone geotechnical report that addresses the currently proposed development at the site, and incorporates as appropriate all available pertinent geotechnical/geologic data and analyses from previous investigations, and all geotechnical recommendations necessary to specifically address the proposed development. As discussed by the consultant, some of the previous geotechnical recommendations need to be updated to reflect changes in applicable codes and guidelines.

2. The cut slope in the central area of the proposed development was evaluated using previous Cross-Section G1-G1'. This section passes through a more gently inclined section of the proposed cut. The cut has been substantially reconfigured and located further south than in previous evaluations. The more southerly location appears to move the cut face into an area where a series of fine-grained horizons may impact the stability of the slope to a greater degree than in the previous design. As such, an additional cross section through the more steeply inclined, eastern part of the cut appears

warranted to demonstrate that Cross-Section G1-G1' remains the most critical section for slope stability and buttress design.

3. Geologic Structure depicted on Cross Section G14-G14' appears to differ from previous interpretations (GWV 2008). The consultant should discuss the basis for this change in interpretation. If the current interpretation was presented previously, the consultant should provide a reference to the pertinent GWV report.

4. A cross section appears warranted between Lots 63 and 70. Construction appears to require a 10-foot-high retaining wall above a 20 ft 2:1 slope. Specific recommendations for construction should be provided.

5. A cross-section should be provided where the proposed cut may expose the toe of the queried landslide located northeasterly of Lot 52. Specific grading recommendations should be provided as necessary.

6. Grading in the vicinity of Cross Section G5-G5' has been reconfigured, resulting in a lower grade than previously proposed. Previous recommendations required removal of fine grained beds to a defined bench elevation. Grades currently proposed extend below this bench and will leave a section of fine-grained material unsupported behind the face of the lowest section of the slope, which is currently depicted as a cut. The consultant should discuss the need to continue the removal of fine-grained material in the lowest section of this cut.

7. Several design issues remain from the feasibility-level review regarding the apartment complex grading. Feasibility-level approval was previously recommended on the basis that access to offsite property would be available in the future to complete additional exploration, testing and analysis, and if necessary, to complete offsite grading for mitigation. Presuming that such a conditional approval remains appropriate, during the grading plan stage of development, the consultant should provide appropriate responses to the following comments:

    - The consultant states that "portions" of the southerly descending slope were rebuilt as a stability fill to *"mitigate stability concerns due to a clay seam (CTE 2004)".* Based on the map, it appears that the entire slope is constructed of artificial fill. The consultant should provide a more in-depth discussion of the geotechnical conditions that required stabilization and the limits of the stability fill.

    - The consultant should discuss whether backdrains were installed behind the existing stability fill and if present, verify that outlets remain exposed and unobstructed.

    - Cross Section BB1-BB1' depicts a low dip-angle section of mudstone in the toe region of the existing slope. This transition to significantly lower dip angles near the axis of the syncline is consistent with data elsewhere along the fold axis. As indicated on the section and verified in CTE BA-11, lithology in this area is expected to consist of claystone (Red Beds). Where this region is modeled in the slope stability analysis, cross-bedding shear strength values appear to have been assigned to this horizon. This assignment of shear values appears to be inconsistent with the cross section and the available subsurface data. The consultant should review the cross section and slope stability analyses and revise as necessary.

    - The consultant presents a discussion of the stability fill configuration presented by CTE on Cross Section CC-CC' and concludes that the configuration depicted is not acceptable and should be verified during the grading plan stage of development. The reviewers concur with the consultant's assessment regarding the fill configuration. The reviewers are also concerned that the cross section as presented by CTE does not reflect the shallowing of dip in the axial region of the syncline observed nearby. The recommended exploration should be sufficient not only to assess the fill configuration; but further to verify that the dip inclinations remain steeper than the slope. Should dip inclinations shallower than the slope be encountered, exploration should continue to sufficient depth to verify that low-strength lithologies are not present within vertical limits that could influence the slope stability analysis.

    - The limits of the apartment complex have expanded considerably to the east and west relative to the 2016 submittal, with the additional new element that units appear to be set just behind the top

of slope along the south edge of the pad. At the east end, retaining walls are proposed that appear to extend to about 10 feet high. Somewhat lower walls are proposed at the west end. There appears to be no exploration at either end of this proposed expansion. The consultant should discuss what data constrains the interpretations (structural and stratigraphic) depicted on Cross Sections 20.1 and 23. Cross sections through the apartment complex provided in the July 29, 2016 report should be updated to reflect the current grading and building configurations.

- Cross Section G20.1-G20.1' depicts a slope below the apartment complex that includes two retaining walls, each about ten feet high, supported in a thick wedge of fill over bedrock with south dipping bedding. About 50 feet to the west, the same retaining walls appear likely to support a daylighted bedding condition. Appropriate cross sections should be provided through this area. Analyses and mitigation measures should be provided as necessary.

8. As recommended by the consultant, additional evaluation should be provided for the areas where native alluvium was left in place below artificial fill placed by CTE. Mitigation measures should be provided as necessary.

9. The consultant recommends a compaction criterion for deep fill different from the standards CTE applied for the existing fill at the site. The consultant should evaluate the potential for adverse impacts due to differing compaction standards (i.e. differential settlement). Where total fill depths will exceed 40 feet, the consultant should verify that compaction standards utilized in placing the CTE fill are compatible with deep fill protocols.

10. The consultant should provide cross sections through the north edges of existing fill wedges to illustrate the configuration of the existing contact between the artificial fill and the alluvium, and the backcut that will be required in the existing artificial fill in order to expose the contact between the bedrock and the existing fill.

11. The consultant should discuss the potential for differential settlement in Section G24 due to differential fill thicknesses. Mitigation measures should be recommended as necessary.

12. The consultant should evaluate the potential debris flow hazard on a lot-by lot basis during the Grading Plan Stage of development.

13. Additional subsurface exploration should be provided in the vicinity of natural and minor cut-slopes where stability is assumed based on favorable subsurface conditions to verify assumed neutral geologic structure (e.g. west of Lots 123 & 133 as depicted on the geologic map dated July 29, 2016).

14. As noted by the consultant, the limits of Qls-2 (particularly along the south edge) should be more clearly defined during the grading plan review stage of development.

15. The potential that removals in the toe area of Qls-2 may extend as much as 30 feet deeper than currently anticipated should be clearly noted on the grading plan.

16. As per the consultant recommendations, additional field exploration and laboratory testing should be performed during the grading plan review stage to further delineate and characterize the settlement potential of on-site earth materials. Further evaluation of the existing fill should be based on additional testing of the fill, rather than on remolded fill samples. Additional mitigation measures should be recommended as necessary.

17. The consultant should evaluate the stability of the debris basins under rapid draw-down conditions. Mitigation measures should be recommended as necessary.

18. The consultant should specify the type of materials to be used for backfilling behind retaining walls based on available geotechnical data.

19. Keyways for all recommended buttresses should be shown on the grading plan.

20. Subdrain locations and recommended tie-in locations should be clearly indicated on the grading plan.

21. Print the name, address, and phone number of the Project Geotechnical Consultant and list all applicable geotechnical reports on the building/grading plans.

22. The following notes must be added to the grading plan:

    - The geotechnical consultant should determine the expansion potential of the finish grade materials of building pad areas at the completion of grading. Foundation design recommendations should be revised as necessary if the expansion potential of finish grade materials substantially differ from the assumed expansion range.
    - The consultant should verify assumed shear strength parameters for future fill slopes. Select grading should be utilized to construct the outer 20 ft of the slopes and confirmatory shear strength should be performed on selected samples of the outer slope materials to verify assumed shear strength in the slope stability analyses.
    - Gutters and downspouts should be installed per the City of Simi Valley Building Ordinance 1804.7.1 if the finish grade materials have an expansion index greater than 50.
    - At the completion of grading, samples of the onsite soils should be collected and tested for sulfate content and corrosivity potential.
    - R-value tests should be performed on finish grade materials in the driveway and parking areas.
    - An as-built report prepared by the geotechnical consultant must be submitted to the City for review. The report must include the results of all compaction tests as well as a map depicting the limits of overexcavation, observed geologic conditions, locations of all density tests, locations and elevations of all removal bottoms, and location and elevation of all retaining wall backdrains and outlets.

23. The foundation plans and foundation details shall clearly depict the embedment material and minimum depth of embedment for the foundations.

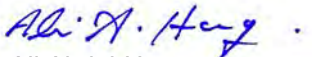
24. The following note must appear on all the foundation plans: "All foundation excavations must be observed and approved by the Project Geotechnical Consultant prior to placement of reinforcing steel."

25. The final grading, drainage, shoring, and foundation plans should be reviewed, signed and wet stamped by the project geotechnical consultant.

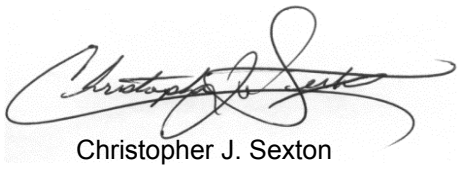
If you have any questions regarding this review letter, please contact GDI at (805) 496-1222.

Respectfully Submitted,

GeoDynamics, INC.



Ali Abdel-Haq
Geotechnical Engineering Reviewer
GE 2308 (exp. 12/31/19)



Christopher J. Sexton
Engineering Geologic Reviewer
CEG 1441 (exp. 11/30/20)

REFERENCES

Geolabs–Westlake Village (2019a), "Response #6 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California," W.O.: 8980, dated January 4, 2019.

Geolabs–Westlake Village (2018), "Update Geotechnical Report, Tentative Tract Map 5658-A, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated September 14, 2018.

Geolabs–Westlake Village (2016b), "Response #5 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated July 29, 2016.

Geolabs–Westlake Village (2016a), "Update Geotechnical Report, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated March 24, 2016.

Geolabs–Westlake Village (2012), "Evaluation of Geotechnical Feasibility, Proposed Apartment Construction, Portion of TT 5658, City of Simi Valley, California," W.O.: 8980, dated February 15, 2012.

Geolabs–Westlake Village (2010c), "Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated November 24, 2010.

Geolabs–Westlake Village (2010b), "Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated March 19, 2010.

Geolabs–Westlake Village (2010a), "Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated January 29, 2010.

Geolabs–Westlake Village (2008), "Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated June 30, 2008.

Geolabs–Westlake Village (2007), "Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, California," W.O.: 8980, dated January 10, 2007.

TGA Engineering, Inc. (2012), "Tentative Tract Map, North Canyon Ranch – in The City of Simi Valley, Sheet 1-2," dated February 2012.

TGA Engineering, Inc. (2012), "Tentative Tract Map No. 5658, Sheets 1-3," Received Dated: April 19, 2016.

GeoLabs Report Aug 11, 2019

APPENDIX F

GEOLABS-WESTLAKE VILLAGE
Foundation and Soils Engineering, Geology
31119 Via Colinas, Suite 502 • Westlake Village, CA 91362
Voice: (818) 889-2562 (805) 495-2197
Fax: (818) 889-2995 (805) 379-2603
a dba of
R & R Services
Corporation

August 11, 2019
W.O. 8980

SLPR, LLC.
c/o Manuel Mancha
865 S. Miliken Avenue, Suite E
Ontario, California 91761

Attention: Manuel Mancha

Subject: Offsite Slope South of TT 5658
North Canyon Ranch Project,
City of Simi Valley, California

Gentlemen,

In accordance with your agent's request we have prepared this letter-report regarding the slope that descends from the south side of the apartment site (Parcel 161) at the subject property. More specifically, we take this opportunity to clarify that potential issues with the existing stability fill configuration ("Slope Issue") *do not* affect the feasibility of the proposed project and that the that Condition of Approval #1 suggested in the July 26, 2019 review letter by GeoDynamics, Inc. ("Condition #1"), is not necessary.

Condition #1 correctly recognizes that the Slope Issue "... may require exploration and grading that would extend outside the property limits." The authors go on to recommend "... that approval of the tentative tract map should be contingent upon receipt in a form acceptable to the City of a letter from the adjacent property owner(s) agreeing to permit grading to extend onto their property should the need arise." We believe that, if desired, the project impacts from the Slope Issue can be mitigated without offsite exploration and/or grading.

The Slope Issue was first recognized in the July 29, 2016 report by this office. In short, documentation reports for prior grading in the area contained information suggesting portions of the stability fill constructed during that work may not have been provided with a proper fill key. Even if the forgoing were to be true, the subject project can be constructed so that its performance would be independent of the offsite property's performance and the Slope Issue.

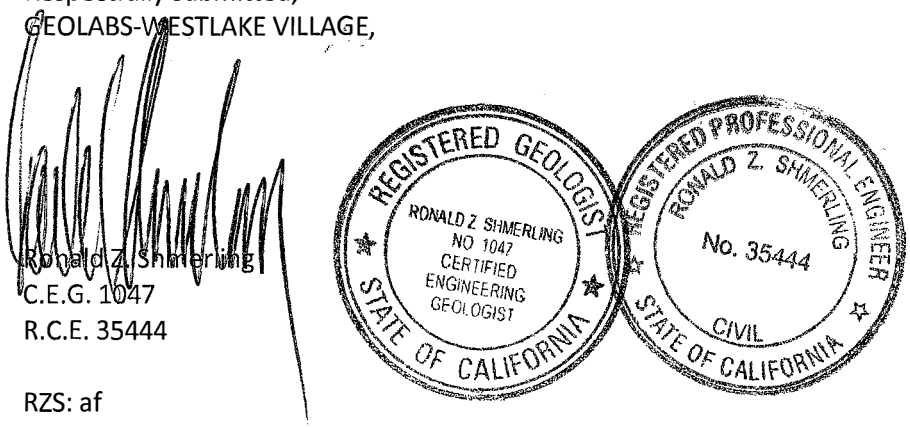
We have developed two cross sections, A1 and A2 (see Plates 2.1 and 2.2), to illustrate simple methods available to address the Slope Issue along the south side of the apartment site. The section locations are indicated on the attached Geologic Map, Plate 1. They consider a case where portions of

the stability fill are anticipated to remain beneath the planned pad (A1), and a case where it is not (A2). Mitigation via removal and recompaction, with and without additional support from a buried retaining wall, are illustrated in the case where mitigation is required, A1. This represents but one concept to mitigate impacts from the Slope Issue for the purpose of illustrating project feasibility without offsite work; other viable concepts may be considered for value engineering purposes.

This geotechnical report has been prepared in accordance with generally accepted engineering practices at this time and location. No other warranties either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

Thank you for this opportunity to be of service. Please do not hesitate to call if you have any questions regarding this report.

Respectfully submitted;
GEOLABS-WESTLAKE VILLAGE,



Ronald Z. Shmerling
C.E.G. 1047
R.C.E. 35444

RZS: af

Enclosures:
Reference List ..... Plates R
Geologic Map ..... Plate 1
Cross Sections A1 & A2 ..... Plates 2.1 & 2.2

XC: (1) Addressee
(1) Christiansen & Company Attn: Keith Christiansen
(1) City of Simi Valley

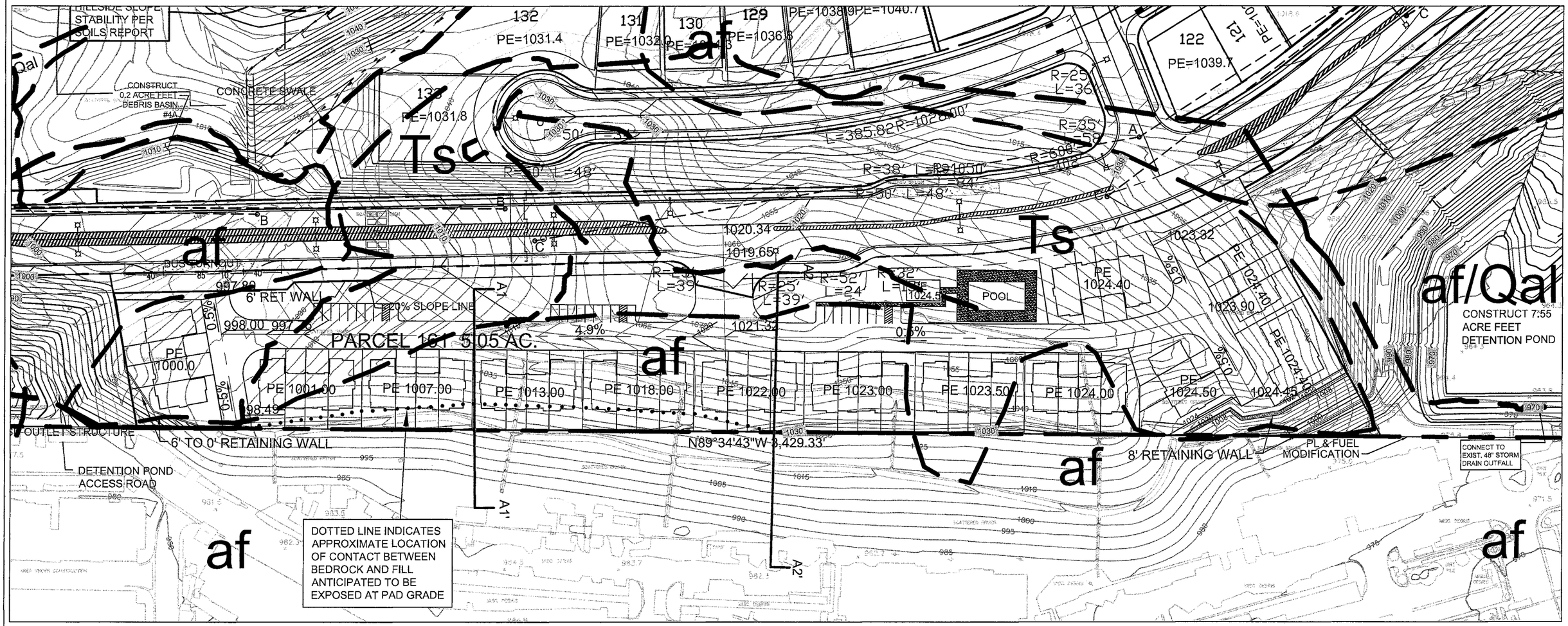
REFERENCE LIST:

Geodynamics, Inc., July 19, 2010; Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658A/PD-S-1054, North Canyon Ranch, Simi Valley, California, GDI Project No.: 07.00101.0001.

Geolabs-Westlake Village, July 29, 2016b; Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California.

GEOLOGIC MAP - Tentative Tract 5658A

City of Simi Valley, CA



Lithologies:

af	Artificial Fill
Qal	Alluvium
Ts	Sespe Formation

A2 ——— A2' Cross Section

Contact - (dashed where inferred, dotted where concealed)

100 50 25 0 100 200 300

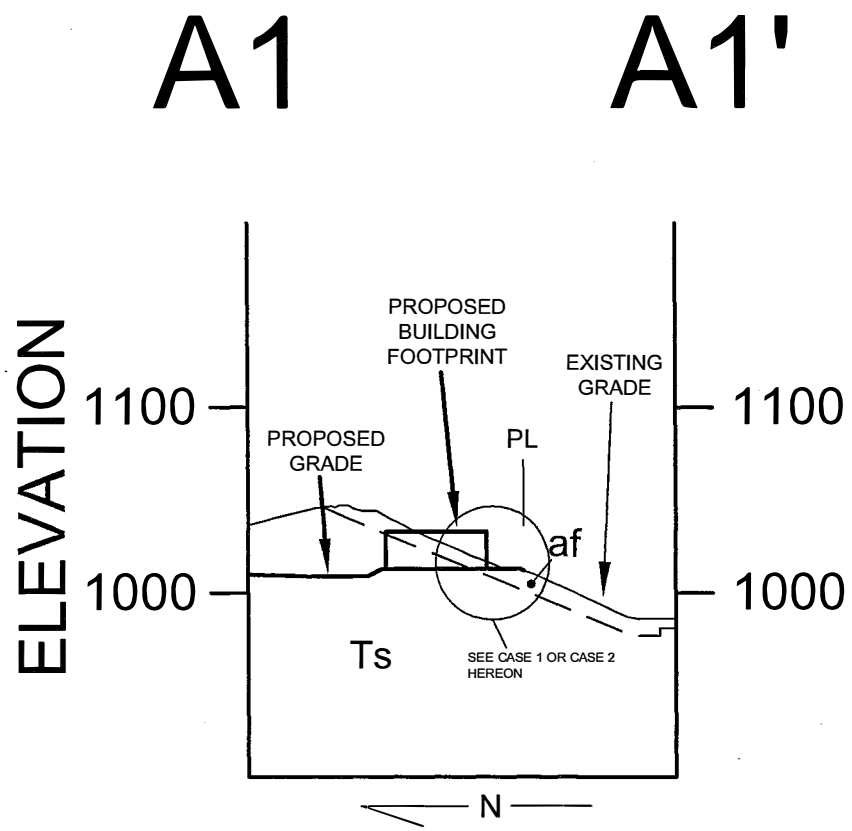
1"=100'

Geolabs-WLV

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

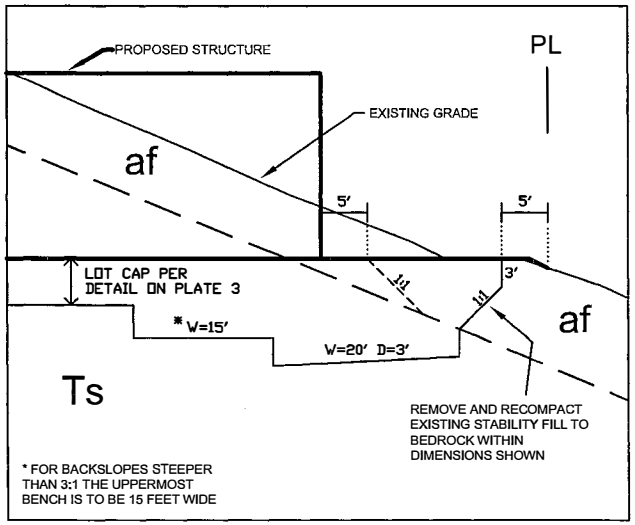
DATE 7/26/2019 BY RMP
SCALE 1"=100' W.O. 8980

PLATE 1



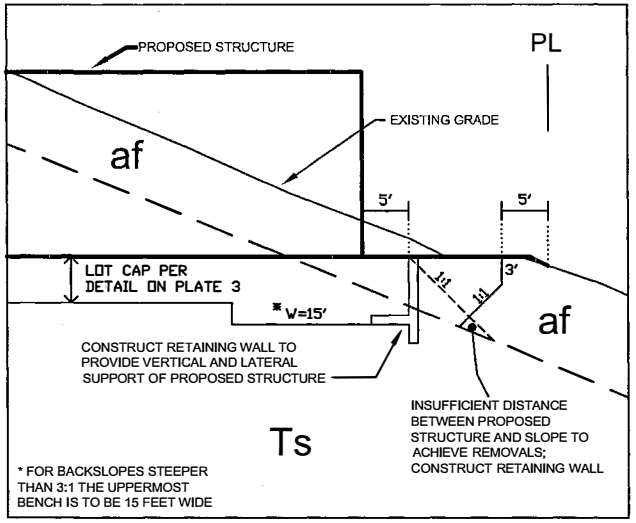
1"=100'

CASE 1 - R&R



1"=20'

CASE 2 - RETAINING WALL



1"=20'

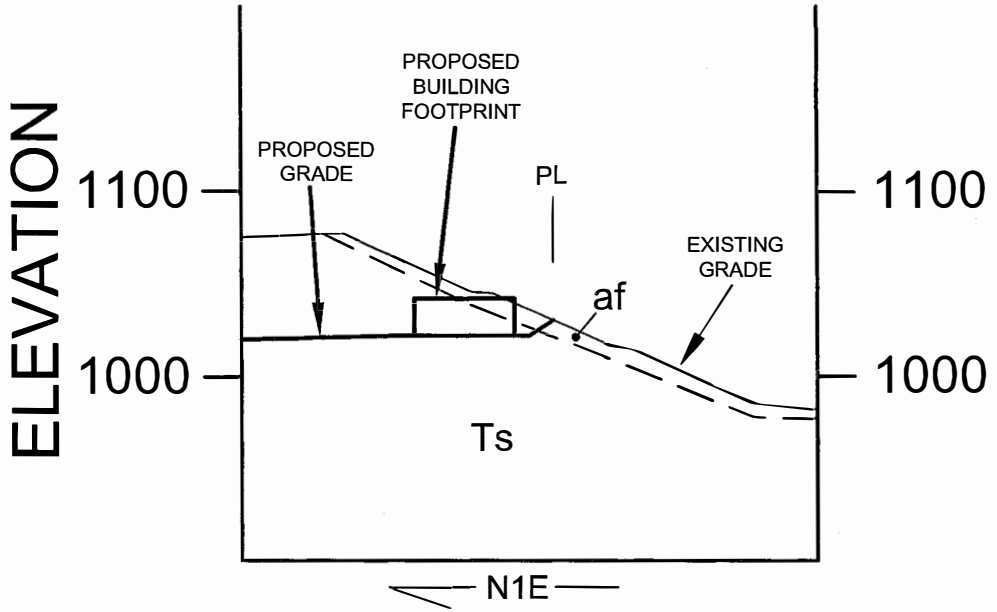
Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 7/26/2019 BY RMP
SCALE as shown W.O. 8980

PLATE 2.1

P:\8980 Unocal\Cross Sections.dwg

A2 A2'



Geolabs – Westlake Village GEOLOGY AND SOIL ENGINEERING	
DATE 7/26/2019 BY RMP	
SCALE 1"=100' W.O. 8980	
PLATE 2.2	

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GeoLabs Draft CEQA Analysis

APPENDIX F

GEOLABS DRAFT CEQA ANALYSIS

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GEOLOGY AND SOILS. Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			X	
ii) Strong seismic ground shaking?			X	
iii) Seismic-related ground failure, including liquefaction?		X		
iv) Landslides?		X		
b) Result in substantial soil erosion or the loss of topsoil?			X	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?		X		
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?		X		
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X

a.i) LESS THAN SIGNIFICANT IMPACT.

Alquist-Priolo Earthquake zones have been established throughout California by the California Geological Survey (CGS). These zones identify areas where potential surface rupture along an active fault could prove hazardous and identify where special studies are required to characterize the fault rupture hazard potential to habitable structures (CGS 2018). Known active faults near the subject site include the Simi-Santa Rosa fault system whose main trace is approximately 1,200 feet south of the site. This fault is considered active and a special studies zone has been established around the fault trace (CGS, 1997 & 1999). North of the main trace, eight subsidiary faults were defined during an investigation for the mall site (BYA, 2003), located south of and adjacent to the subject site. Of these, two faults trend across the subject site. These faults were conclusively proven to be inactive faults on the mall site (BYA, 2003) and are therefore not a constraint to development of Tentative Tract 5658.

a.ii) LESS THAN SIGNIFICANT IMPACT

The Simi-Santa Rosa fault could create substantial ground shaking if a seismic event occurred along the fault. Similarly, a strong seismic event on any other fault system in southern California has the potential to create considerable levels of ground shaking throughout the region. However, all new structures would be required to comply with all applicable provisions of the current California Building Code (CBC). As a result, the exposure of people or structures to significant adverse effects resulting from strong seismic ground shaking would be less than significant.

a.iii) LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

Liquefaction is a condition where the soil undergoes continued deformation at a constant low residual stress due to the build-up of high porewater pressures. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; sufficient groundwater to cause high pore pressures; and on the grain size, relative density, and confining pressures of the soil at the site.

Subsurface studies conducted at the site indicate groundwater is not present within the upper fifty feet of the soil profile in the alluvium (GWV, 2007). As a result, the exposure of people or structures to significant adverse effects resulting from liquefaction would be less than significant.

Seismic compression is a condition where loose soils are rearranged into a denser packing by seismic ground shaking. The possibility of seismic compression occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; and on the grain size and relative density of the soil at the site. This condition can occur with or without liquefaction.

As discussed above, adverse effects resulting from liquefaction would be less than significant. Site specific studies have indicated the potential for significant seismic compression (GWV, 2007). Mitigation measures were presented in that study to reduce the potential for significant adverse effects resulting seismic compression to less than significant. They are discussed below.

Mitigation Measures

The following mitigation measures are required to reduce geological and soil impacts to a less than significant level, including incorporating the recommendations of the Geotechnical Study: Preliminary Geotechnical Investigation, Tentative Tract 5658 (GWV, 2007).

GEO-1 **Incorporate recommendations of Geotechnical Study: Preliminary Geotechnical Investigation, Tentative Tract 5658 (GWV, 2007).** Recommendations presented in the Geotechnical Study shall be incorporated at the project site. These recommendations include removal of alluvial deposits extending to bedrock in the west and central valleys and to depths of 20 feet below ground surface in the east valley. This material shall be replaced with compacted fill in accordance with the compaction standards and grading criteria for placement of engineered fill contained in the Geotechnical Study.

GEO-2 **Additional Geotechnical Study.** The Geotechnical Study (GWV, 2007) recommends that additional exploration and analyses be conducted during the grading plan review phase to further characterize seismic compression potential. Recommendations resulting from the additional geotechnical study shall be incorporated into the proposed project to mitigate geological hazards to a less than significant level.

Impacts due to seismic-related ground failure, including liquefaction, would be mitigated to a less than significant level once all recommendations contained in the Geotechnical Study (GWV, 2007) and any additional geotechnical study are incorporated.

a.iv) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION INCORPORATED

During an earthquake event, the seismic shaking forces applied to native hillside areas can result in "seismically induced landslides." These typically occur in areas of steeper hillsides, near the tops of ridges, where weathered surficial and bedrock materials are exposed on slopes, and in areas of prior landslides.

The Earthquake Zones of Required Investigation Map for the Simi Valley West quadrangle includes portions of the onsite slopes in areas with a potential for earthquake induced landslides (CGS, 1997 & 1999). Geolabs-Westlake Village conducted several geotechnical studies between 2005 and 2019 for the subject site that present findings, conclusions, and recommendations concerning the geotechnical conditions at the subject site (GWV, 2005, 2007, 2008, 2010a, 2010b, 2010c, 2012, 2016a, 2016b, 2018, 2019a, 2019b, 2019c). These studies concluded that the natural slopes identified as areas with a potential for earthquake induced landslides have a potential to adversely impact the project that is less than significant. However, these studies identified two landslides and one queried landslide in the development area near the central valley that could potentially adversely affect the proposed project (GWV, 2007, 2008). The studies also identified three landslides in the east valley that are onsite but outside the development area, and whose impact on the proposed project is less than significant (GWV, 2007). Mitigation measures are presented in these studies to reduce the potential for significant adverse effects resulting from landsliding to less than significant. They are discussed below.

Mitigation Measures

The following mitigation measures are required to reduce geological and soil impacts to a less than significant level, including incorporating the recommendations of the Geotechnical Studies (GWV 2007, 2008, 2010a, 2010b, 2010c, 2019a, 2019b).

GEO-3 **Incorporate recommendations of Geotechnical Studies: (GWV, 2007, 2008, 2010a, 2010b, 2010c, 2019a, 2019b).** Recommendations presented in the Geotechnical Studies shall be incorporated at the project site. These recommendations include removal of landslide deposits extending to bedrock. This material shall be replaced with compacted

fill in accordance with the compaction standards and grading criteria for placement of engineered fill contained in the Geotechnical Studies (GWV, 2007).

Impacts due to landsliding would be mitigated to a less than significant level once all recommendations contained in the Geotechnical Studies (GWV, 2007, 2008, 2010a, 2010b, 2010c, 2019a, 2019b) are incorporated.

b) LESS THAN SIGNIFICANT IMPACT

Erosion is a normal and inevitable geologic process whereby earth materials are loosened, worn away, decomposed, or dissolved and are then removed from one place and transported to another. Preparing land for construction can remove ground cover, exposing soils to wind erosion.

Site topography is hilly with total vertical elevation change from the low point to the high point of approximately 380 feet. Natural slope gradients on the site generally range from 5:1 to 2:1 (horizontal : vertical) with local areas steeper than 1.5:1. Removal of ground cover in preparation for construction in could result in erosion within the disturbed area. The proposed project would be required to comply with the California State Construction General Permit (Order No. 2009-2009-DWQ as amended by 2010-0014-DWQ and 2012-0006-DWQ) and implement a Stormwater Pollution Prevention Plan (SWPPP), which would include best management practices (BMP) for erosion and sediment control during construction. Compliance with construction BMPs would reduce impacts associated with soil erosion and the loss of topsoil to less than significant levels.

c) LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

Subsidence refers to broad-scale lowering of the elevation of the land surface with little or no horizontal movement. Subsidence is caused by a variety of events that include, but are not limited to, withdrawal of groundwater, pumping of oil and gas from underground, dissolution of limestone aquifers (sinkholes), collapse of underground mines, and initial wetting of dry soils (hydroconsolidation).

The Ventura County General Plan Subsidence Zones Map does not identify the project site as being located in an area where subsidence is probable (Ventura County, 2020). There are no underground mines or limestone-bearing geological formations beneath the subject site. Geolabs-Westlake Village conducted a geotechnical study in 2007 evaluating the potential for hydroconsolidation to affect the subject site (GWV, 2007). The study found that portions of the onsite alluvial soils are subject to hydroconsolidation. Mitigation measure **GEO-1** discussed in item a.iii) will reduce the potential for significant adverse effects resulting from subsidence to less than significant.

Lateral spreading is the horizontal movement or spread of soil toward and open face. The potential for failure from lateral spreading is highest in areas where the groundwater table is high and where relatively soft and recent alluvial deposits exist. Lateral spreading hazards may also be present in areas with liquefaction risks.

As discussed in item a.iii) in this section of the Environmental Checklist, the project site is located on geologic units with low risk for liquefaction. The subject site will include slopes, however, they will be constructed in geologic units with a low potential for lateral spreading. Additionally, shallow groundwater is not present on the site (GWV, 2007). Considering these factors, the exposure of people or structures to significant adverse effects resulting from liquefaction and lateral spreading would be less than significant.

Existing landslides and natural slopes with a potential for earthquake induced landslides are discussed in item a.iv) in this section of the Environmental Checklist. Geolabs-Westlake Village conducted several geotechnical studies between 2005 and 2019 for the subject site that present findings, conclusions, and recommendations concerning the geotechnical conditions at the subject site (GWV, 2005, 2007, 2008, 2010a, 2010b, 2010c, 2012, 2016a, 2016b, 2018, 2019a, 2019b, 2019c). These studies recommended mitigation of several proposed cut slopes to reduce the potential for significant adverse effects resulting from landsliding to less than significant. They are discussed below.

Mitigation Measures

The following mitigation measures are required to reduce geological and soil impacts to a less than significant level, including incorporating the recommendations of the Geotechnical Studies (GWV 2007, 2008, 2010a, 2010b, 2010c, 2016a, 2018, 2019a, 2019b, 2019c).

GEO-4 **Incorporate recommendations of Geotechnical Studies: (GWV, 2007, 2008, 2010a, 2010b, 2010c, 2016a, 2016b, 2018, 2019a, 2019b, 2019c).** Recommendations presented in the Geotechnical Studies shall be incorporated at the project site. These recommendations include criteria for construction of buttress and stability fill slopes to provide the proposed manufactured slopes with code compliant factors of safety for surficial and deep seated slope stability.

GEO-5 **Additional Geotechnical Study.** The Geotechnical Study: Response #5 to Engineering Geology and Geotechnical Engineering Review (GWV, 2016b) recommends that additional exploration and analyses be conducted during the grading plan review phase to verify that the existing stability fill that descends offsite to the south of the proposed apartment site was constructed in a manner that does not adversely affect the project. Recommendations resulting from the additional geotechnical study shall be incorporated into the proposed project to mitigate geological hazards to a less than significant level.

Impacts due to soil stability would be mitigated to a less than significant level once all recommendations contained in the Geotechnical Studies (GWV, 2007, 2008, 2010a, 2010b, 2010c, 2016a, 2016b, 2018, 2019a, 2019b, 2019c) and any additional geotechnical study are incorporated.

d) LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

Expansive soils generally contain high percentages of clay. The Geotechnical Study identified the presence of onsite soils that range from non-expansive to highly expansive (GWV, 2007). All development would be required to comply with the Uniform Building Code (UBC) and the CBC. Furthermore, the study provided recommendations for mitigating the expansiveness of soils at the project site. Compliance with building standards and incorporation of mitigation measures discussed below would reduce the potential for significant adverse effects resulting from expansive soils to less than significant.

Mitigation Measures

The following mitigation measures are required to reduce geological and soil impacts to a less than significant level, including incorporating the recommendations of the Geotechnical Studies (GWV, 2007, 2016a, 2018).

GEO-6 **Incorporate recommendations of Geotechnical Studies: (GWV, 2007, 2016a).** Recommendations presented in the Geotechnical Studies shall be incorporated at the project site. These recommendations include foundation design criteria tailored to the anticipated expansive potential of the onsite soils.

GEO-7 **Additional Geotechnical Study.** The Geotechnical Study (GWV, 2018) recommends that geotechnical design criteria for foundations be updated to the current version of the CBC prior to the design of the improvement plans.

Impacts due to expansive soils would be mitigated to a less than significant level once all recommendations contained in the Geotechnical Studies (GWV, 2007, 2016a, 2018) and any additional geotechnical study are incorporated.

e) NO IMPACT

The proposed project will be serviced by the public sewer system and will not utilize septic tanks or alternative waste water disposal systems.

f) NO IMPACT

No paleontological resources or unique geologic features have been identified in the project area and the likelihood of them being present in this area is considered very low. The project would have no impact on paleontological resources or unique geologic features.

REFERENCES

Bing Yen & Associates, Inc., February 21, 2003; Report of Feasibility-Level, Geotechnical Study, Proposed Simi Valley Town Center, Simi Valley, California, Vol. I and II, Project No. 49.25035.0074.

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