



Date: 8/2/2023

Job#: 222028

To: Lulu Pang
Assistant Planner
County of Santa Clara
70 West Hedding Street
San Jose, CA 95110
408.299.5718 lulu.pang@pln.sccgov.org

Re: Responses to revised incomplete letter dated 11/3/2022 Revised on 6/27/23
Project Address: Hayes Lane – APN 779-44-014
Plan Review Number: PLN22-184

Additional Information / Issues of Concern:

1. The recreation accessory structure has been revised to propose 2 plumbing fixtures.
2. As discussed in our 11/22 meeting, this comment was focused on the accessory structure. I have added additional information to the statement of justification on how a tiered approach to this structure is not possible due to the use (tennis court). The slope in the area of the accessory structure is also in a non-visible area to limit any impacts to the viewshed.
3. The garage has been fully detached to qualify as a detached structure.

Planning:

1. Please find the petition for exemption from environmental assessment form included in the resubmittal.
2. The top of banks and 35-foot setback have been added to the site map on sheet C1.
3. The architectural and civil plans have been combined.
4. Please see revised architectural plans for calculation diagrams.
5. Grading quantities for the pool have been added to the table.
6. Please see revised materials board in the resubmittal.
7. Noted. A report was not performed. If archaeological resources are encountered during the project, work in the immediate vicinity of the finds will be halted until a qualified archaeologist has evaluated the situation.

CALFIRE:

8. Hayes lane from Watsonville Road to the project site was measured and the width exceeds 20 feet in all portions leading up to the site. The road was found to have a width of 20 to 23 feet. A note has been added to the plans. Please see updated CALFIRE notes on sheet C1.
9. Correspondence between CALFIRE and I show that a turnaround would not be required because the driveways are less than 300 feet in length. Turnouts have been added to each driveway. Email correspondence has been included in the resubmittal.
10. A note has been added on sheet C2 for gates if they are proposed.
11. A note has been added to sheet C1 for defensible space requirements.

Fire Marshal:

12. Noted.
13. Two standard hydrants are now proposed to meet this requirement.
14. See previous comment.
15. Please see included will serve letter.
16. Turnouts meeting the PRC 4290 have been added to each driveway.
17. As stated in a previous response, the driveways are less than 300 feet and will not require a turnaround meeting the PRC 4290.



18. Noted. The driveway slope going to the ADU has been updated to a maximum of 15%. There was small increase to the grading quantities, but the 15% driveway won't require a variance and is safer for emergency vehicles.

Land Development Engineering:

19. Limits of the disturbed area have been added to the plans. The project disturbs more than 1 acre and will be required to file with the state waterboard.
20. Hayes Lane was measured about every 100 feet from the entrance at Watsonville Road to the project site. The width was found to vary between 20 feet and 23 feet. Please see the added sheet C4.
21. The driveway approaches have been designed to meet the county standard. Please see sheet C3 for details.
22. The driveway width is shown to remain. Once the turnouts were designed per Fire Marshal's comments, the length of the 16' wide sections are very short and the grading is extremely minimal for these slightly wider sections. The width was originally designed wider than the minimum set by SD2 because the property owner owns a larger RV and frequently has a truck and trailer that will access the site.
23. This option was discussed in or 11/2022 meeting. I performed a preliminary design to check the grading quantities. Connecting the two driveways to eliminate a driveway approach would cause the need for a larger PRC 4290 turnaround and increase the grading quantities. Connecting the two driveways to eliminate the turnaround near the ADU would cause the accessory structure to be relocated closer to the driveway entrance. This causes the structure to be in a visible location from the valley floor. To accomplish the driveway connection, the driveway would have to pass over the OWTS drain field. The percolation tests required to design the OWTS are not guaranteed to pass in any other location. Moving the OWTS and placing the accessory structure in a visible location did not justify (in our opinion) the minimal reduction of the grading. For these reasons the driveway design was left as originally proposed.
24. Please see the added sheet C4 for the legal access.
25. Please see included preliminary title report.
26. Please see the included questionnaire.
27. Utilities have been added to the plan.
28. The stationing for the ADU driveway has been updated.
29. A new section through the garage has been added as C-C. The other section names have been updated.

Geology:

30. Please see attached response letter from the geologist and geotechnical engineer.

Please let me know if you have any questions or need any additional information.

David Faria, PE

MH engineering Co.

Office: (408) 779-7381 Ext. 246

davidf@mhengineering.com

ASSOCIATED TERRA CONSULTANTS, Inc.
ENGINEERING GEOLOGY GEOTECHNICAL HYDROGEOLOGY SEPTIC TESTING & DESIGN

July 6, 2023
File No: 280611 L1

Mr. Abhishek Parmar
3155 Greer Road
Palo Alto, CA 94303

Subject: **RESPONSE TO COUNTY COMMENTS**
 APN: 779-44-014
 Santa Clara County, California

Dear Mr. Parmar:

This letter addresses comments made by the Santa Clara County Geologist Mr. David Seymour in County Review Letter dated, November 3, 2022. We understand clarification of certain geologic issues are needed. This letter is intended to supplement our previous report for the subject property. That report was titled *Engineering Geologic and Geotechnical Soils Investigation*, dated August 29, 2022. The reader is referred to that report for the details therein. We have responded in order of the County's review comments.

We have updated our *Project Site Engineering Geologic Map* (Attachment 1) and *Updated Engineering Geologic Cross-Sections A-A' and C-C'* (Attachment 2) to reflect the proposed grading at the project sites.

1. Using the provided grading plan we have calculated the distances from the proposed constructions to the identified scarps in the cited report. All are outside the recommended setback. The proposed house is approximately 74 feet away and the proposed ADU and barn are approximately 69 feet and 66 feet respectfully. See number 3 for *Updated Slope Stability Analyses*.
2. We have updated the seismic design parameters to reflect the underlying geologic conditions as well as updated the CBC to the most recent code using the following tool at <https://asce7hazardtool.online/>.

Site Coordinates	N 37.077931° W 121.641437°	
Seismic Design Category	II	
Site Class	C	
PGA _m (2% probability of being exceeded in 50 years)	0.60 g	
Site Coefficient, F _a	1.0	
Site Coefficient, F _v	2.83	
Short Period Acceleration, (0.2 sec), S _s	1.63 g	
Long Period Acceleration., (1.0 sec), S ₁	0.60 g	
SM _s	F _a x S _s	1.70 g
SM ₁	F _v x S ₁	1.86 g
SD _s	2/3 x SM _s	1.15 g
SD ₁	2/3 x SM ₁	0.57 g
Seismic Kh (Figure 1 SP 117a, 2018)	(PGA _m /1.5) x Median F _{eq}	0.264 g

3. We have updated our slope stability analyses to include the updated CBC information and proposed grading at the site. The revised seismic coefficient used in our updated analysis is 0.264 for an earthquake of magnitude 7.9 M_w at about twelve km on the San Andreas fault, in accordance with values obtained from *ASCE 7 Hazard Tool (ASCE7-22)* and using procedures listed in SP117a (2008) for a threshold displacement of five cm. The site is at approximately 37.077931°N and 121.641437°W, and the Maximum Horizontal Acceleration (PGA_m) was listed as 0.60g. Our analyses gave wide degrees of freedom for the resulting shear plane to move from near surface to below the assumed shear plane. Attachment 3 shows the *Updated Slope Stability Analyses Data Sheets*.

The C-values (cohesion, in psf) and phi angle (in degrees) strength parameters used in the analyses were the same as our cited report. Table 1 shows the results of our updated slope stability analyses.

Table 1
Slope Stability Analyses

Cross-Section	Description	Static Factor of Safety	Pseudostatic Factor of Safety
B-B'	Qls B	3.43*	1.09*
C-C'	Qls A	2.14*	1.01*

*Denotes analyses that passed the minimum industry standard Factor of Safety.

The results show that the Landslides A and B as modeled are considered mathematically stable under static conditions and met or exceeded the minimum industry standard for the Factor of Safety of 1.5 for static. The results show that Landsides A and B are considered mathematically stable in

the event of the modeled earthquake as they meet the minimum industry standard for the Factor of Safety of 1.0 for pseudostatic. The results show that the project sites are considered mathematically stable under static and pseudostatic conditions as they meet the minimum industry standard for the Factor of Safety of 1.5 for static and 1.0 for pseudostatic.

4. The owner(s) should contact the County Geologist for assistance in satisfying this requirement.
5. Please see Attachment 4 for *Updated References*.

We wish to re-emphasize that proper drainage of the subject property is essential. Maintenance of all drainage facilities, particularly during periods of high rainfall, is extremely important. All recommendations of the referenced reports must be carried through in the construction of this project. The *Limitations* of the referenced report are included herein by reference and are therefore not repeated here.

We are pleased to have been of service to you at this time. Please do not hesitate to call us if you have any questions regarding this project, or if we can be of any other service. Thank you.

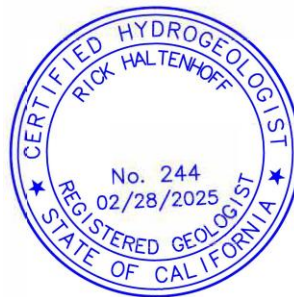
Very truly yours,
ASSOCIATED TERRA CONSULTANTS, Inc.



Katie Bryant
Project Engineering Geologist



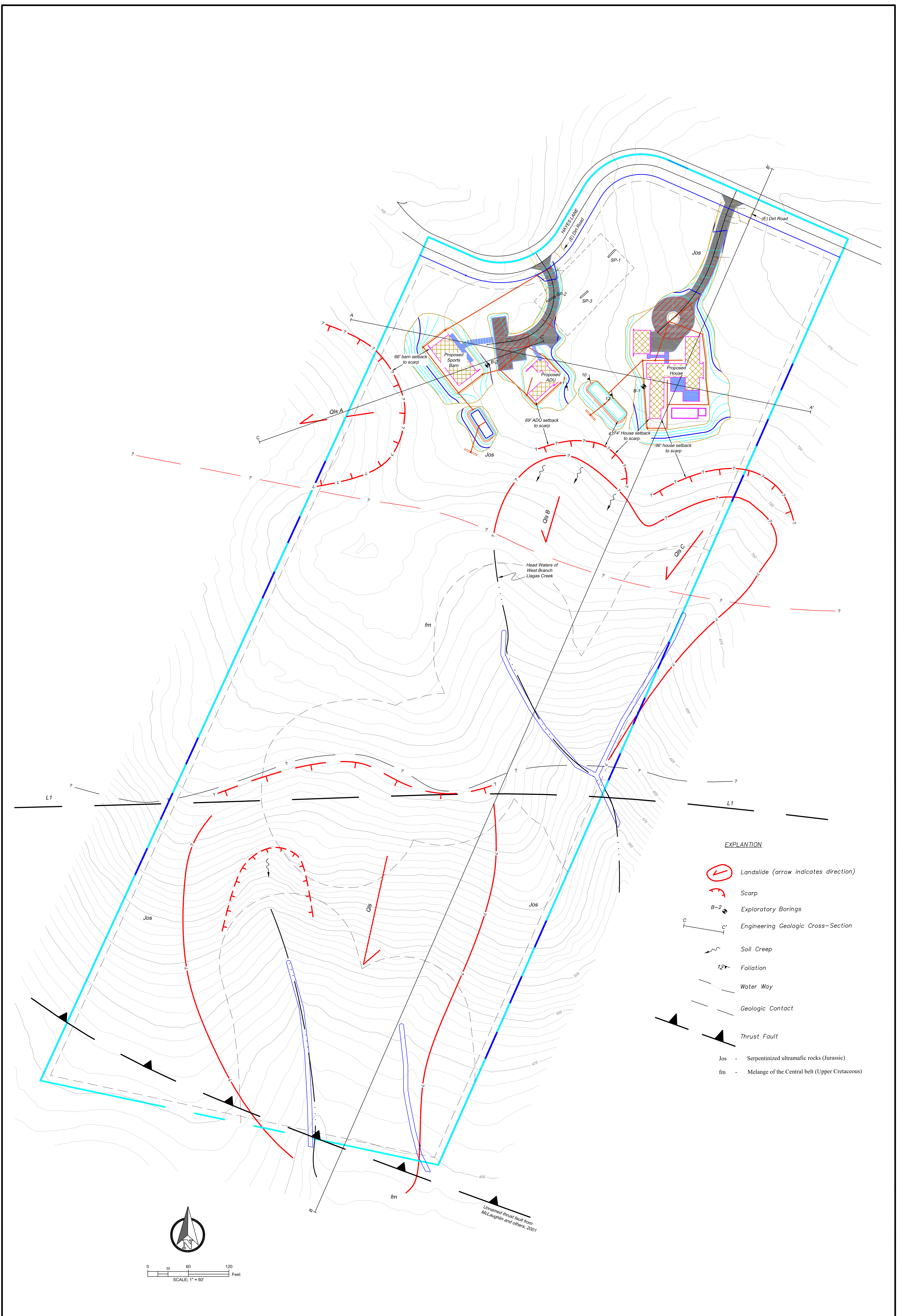
Rick Haltenhoff
Certified Engineering Geologist 1038



Distribution: 3 Copies – Addressee

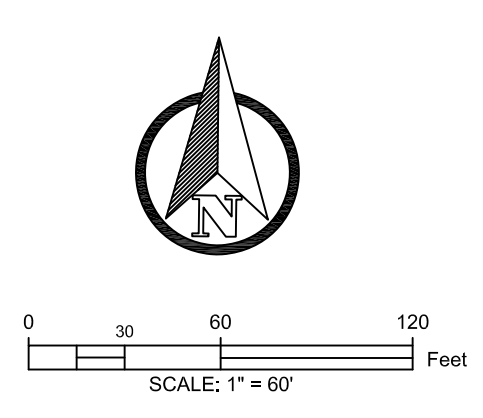
Attachments:

1. *Updated Project Site Engineering Geologic Map*
2. *Updated Engineering Cross Sections A-A through C-C'*
3. *Updated Slope Stability Analysis Engineering Geologic Cross Sections B-B' and C-C'*
4. *Updated Reference List*



EXPLANATION

- Landslide (arrow indicates direction)
- Scarp
- Exploratory Borings
- Engineering Geologic Cross-Section
- Soil Creep
- Foliation
- Water Way
- Geologic Contact
- Thrust Fault
- Jos - Serpentinized ultramafic rocks (Jurassic)
- fm - Melange of the Central belt (Upper Cretaceous)



TOPOGRAPHY BASE: MH Engineering Co., (2022)

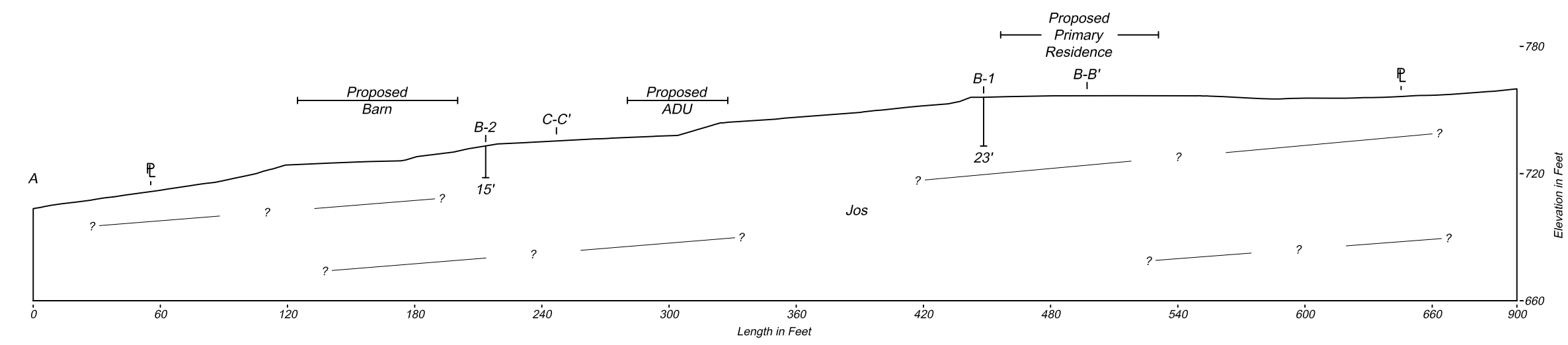
Designed:	No	Revision	By	Date
Drawn By: KK/DD				
Checked: RH/KB				
Date: 07/06/23				



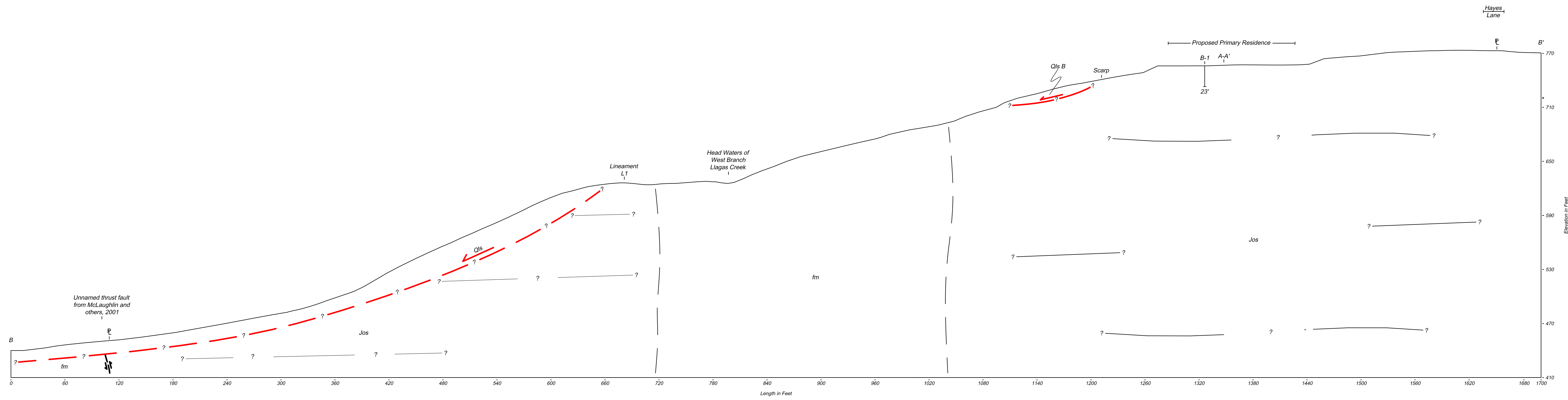
ASSOCIATED TERRA CONSULTANTS, Inc.
 ENGINEERING GEOLOGY/GEO TECHNICAL/HYDROGEOLOGY/SEPTIC TESTING & DESIGN
 1725 Dell Avenue, Campbell, CA 95008
 Phone: 408-866-1067 Email: office@atterracon.com

**UPDATED PROJECT SITE
 ENGINEERING GEOLOGIC MAP
 APN: 779-44-014; HAYES LANE
 SANTA CLARA COUNTY, CALIFORNIA**

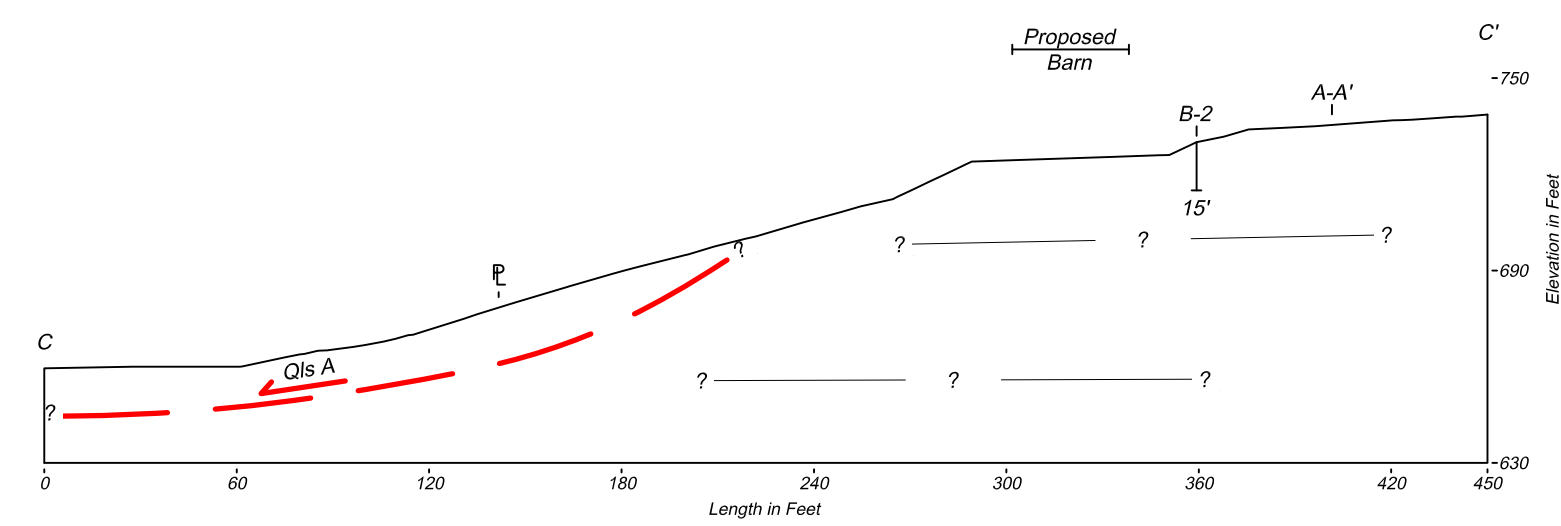
Project Number:
280611
Attachment 1



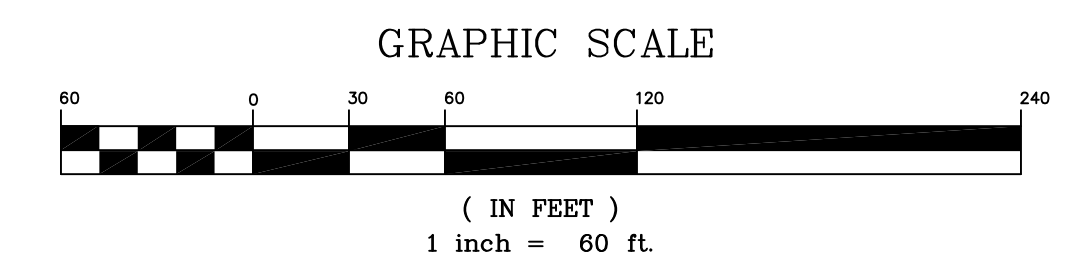
ENGINEERING CROSS-SECTION A-A'



ENGINEERING CROSS-SECTION B-B'



ENGINEERING CROSS-SECTION C-C'



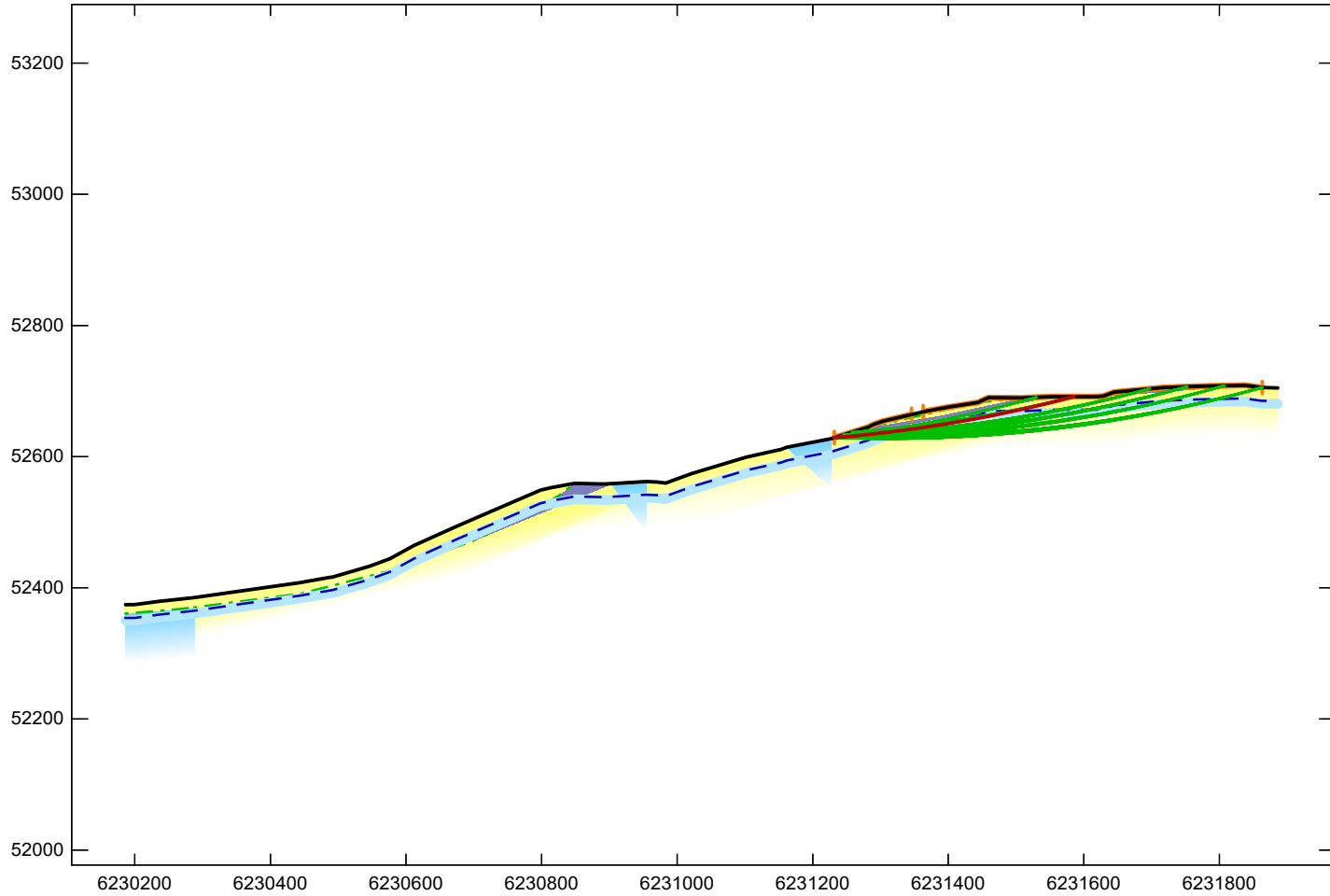
See Engineering Geologic Project Site Map for Explanation

Designed:	By	Date
Drawn By: DB/KK		
Checked: KB/RH		
Date: 07/06/23		

FoS Ranges ≤ 1.00 $> 1.00 \leq 1.20$ $> 1.20 \leq 1.40$ > 1.40

Material Keys

- 1: Jos
- 2: fm
- 3: Qls



Analysis 1

Multiple Stability Analysis
Method: Spencer-Wright
Surface: Circular

Results

Critical Factor of Safety: 3.43
Interslice Force (Final) Angle: 7.9°

Edited: 17 Jul 2023 Processed: 17 Jul 2023

GALENA Version 7.2

Project Parmar 280611
Engineering Geologic Cross Section B-B' with Proposed Grading

File: C:\Users\katie\Dropbox\ATC\Galena mStab Files\Model Files\Parmar\Parmar BB update with grading F.gmf

Associated Terra Consultants, Inc.

Project: Parmar 280611

File: C:\Users\katie\Dropbox\ATC\Galena mStab Files\Model Files\Parmar\Parmar BB update with grading F.gmf

Processed: 17 Jul 2023 08:43:48

DATA: Analysis 1 - Engineering Geologic Cross Section B-B' with Proposed Grading

Material Properties (4 materials)

```

-----
Material: 1 (Mohr-Coulomb Cu increases with depth) - Jos
  Cohesion  Phi    PI  UnitWeight  Ru
    589.00  15.0   15    95.00    0.10
Material: 2 (Mohr-Coulomb Cu increases with depth) - fm
  Cohesion  Phi    PI  UnitWeight  Ru
    674.00  23.0   15    95.00    0.10
Material: 3 (Mohr-Coulomb Cu increases with depth) - Qls
  Cohesion  Phi    PI  UnitWeight  Ru
    872.00  11.0   15   100.00    0.10
Material: 4 (Mohr-Coulomb Cu increases with depth) - Qaf
  Cohesion  Phi    PI  UnitWeight  Ru
    100.00  25.0   15   125.00    0.10
    
```

Water Properties

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Unit weight of water: 62.430          Unit weight of water/medium above ground: 0.000
    
```

Material Profiles (6 profiles)

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-----
Profile: 1 (15 points)  Material beneath: 3 - Qls
6230186.00 1852374.25    6230199.50 1852374.25    6230236.00 1852379.25    6230285.50 1852384.75    6230443.50 1852407.88
6230486.50 1852415.75    6230492.00 1852416.50    6230546.00 1852432.88    6230576.00 1852444.25    6230611.50 1852464.25
6230675.50 1852494.25    6230739.00 1852522.38    6230798.50 1852549.00    6230813.50 1852552.62    6230848.50 1852559.25
Profile: 2 (2 points)  Material beneath: 3 - Qls
6230155.00 1852906.00    6231923.00 1852892.00
Profile: 3 (9 points)  Material beneath: 1 - Jos
6230288.00 1852370.00    6230446.50 1852391.25    6230578.00 1852426.50    6230698.00 1852471.38    6230778.50 1852511.12
6230825.50 1852540.75    6230848.50 1852559.25    6230890.50 1852558.38    6230903.00 1852558.75
Profile: 4 (3 points)  Material beneath: 2 - fm
6230186.00 1852360.75    6230262.00 1852367.38    6230288.00 1852370.00
Profile: 5 (9 points)  Material beneath: 2 - fm
6230903.00 1852558.75    6230953.50 1852561.88    6230970.50 1852561.25    6230983.00 1852559.75    6231021.50 1852574.25
6231102.50 1852599.25    6231153.50 1852611.25    6231162.00 1852614.25    6231227.00 1852627.25
Profile: 6 (16 points) Material beneath: 1 - Jos
6231227.00 1852627.25    6231282.00 1852645.00    6231329.00 1852649.50    6231360.50 1852656.75    6231383.00 1852665.62
6231443.50 1852682.75    6231507.00 1852689.38    6231554.00 1852691.50    6231619.00 1852691.50    6231628.00 1852692.25
6231645.00 1852698.25    6231716.00 1852705.12    6231768.00 1852707.12    6231836.50 1852708.75    6231861.50 1852705.25
6231886.00 1852704.75
    
```

Slope Surface (43 points)

6230186.00	1852374.25	6230199.50	1852374.25	6230236.00	1852379.25	6230285.50	1852384.75	6230443.50	1852407.88
6230486.50	1852415.75	6230492.00	1852416.50	6230546.00	1852432.88	6230576.00	1852444.25	6230611.50	1852464.25
6230675.50	1852494.25	6230739.00	1852522.38	6230798.50	1852549.00	6230813.50	1852552.62	6230848.50	1852559.25
6230890.50	1852558.38	6230903.00	1852558.75	6230953.50	1852561.88	6230970.50	1852561.25	6230983.00	1852559.75
6231021.50	1852574.25	6231102.50	1852599.25	6231153.50	1852611.25	6231162.00	1852614.25	6231227.00	1852627.25
6231282.00	1852645.00	6231289.50	1852649.25	6231304.00	1852654.25	6231325.00	1852659.25	6231368.50	1852669.75
6231397.50	1852675.12	6231443.50	1852682.75	6231459.00	1852689.88	6231507.00	1852689.38	6231554.00	1852691.50
6231619.00	1852691.50	6231628.00	1852692.25	6231645.00	1852698.25	6231716.00	1852705.12	6231768.00	1852707.12
6231836.50	1852708.75	6231861.50	1852705.25	6231886.00	1852704.75				

Phreatic Surface (43 points)

6230186.00	1852354.25	6230199.50	1852354.25	6230236.00	1852359.25	6230285.50	1852364.75	6230443.50	1852387.88
6230486.50	1852395.75	6230492.00	1852396.50	6230546.00	1852412.88	6230576.00	1852424.25	6230611.50	1852444.25
6230675.50	1852474.25	6230739.00	1852502.38	6230798.50	1852529.00	6230813.50	1852532.62	6230848.50	1852539.25
6230890.50	1852538.38	6230903.00	1852538.75	6230953.50	1852541.88	6230970.50	1852541.25	6230983.00	1852539.75
6231021.50	1852554.25	6231102.50	1852579.25	6231153.50	1852591.25	6231162.00	1852594.25	6231227.00	1852607.25
6231282.00	1852625.00	6231289.50	1852629.25	6231304.00	1852634.25	6231325.00	1852639.25	6231368.50	1852649.75
6231397.50	1852655.12	6231443.50	1852662.75	6231459.00	1852669.88	6231507.00	1852669.38	6231554.00	1852671.50
6231619.00	1852671.50	6231628.00	1852672.25	6231645.00	1852678.25	6231716.00	1852685.12	6231768.00	1852687.12
6231836.50	1852688.75	6231861.50	1852685.25	6231886.00	1852684.75				

Failure Surface

Initial circular surface for critical search defined by: XL, XR, R
 Intersects: XL: 6231289.00 YL: 1852649.00 XR: 6231613.00 YR: 1852691.50
 Centre: XC: 6231192.00 YC: 1854646.62 Radius: R: 2000.00

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	114.00	500.00	10.00
Trial positions within range:	10	10	10

RESULTS: Analysis 1 - Engineering Geologic Cross Section B-B' with Proposed Grading

Spencer-Wright Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 5.548 Final Angle of Interslice Forces (Theta): 5.7 degrees

Analysis Summary

=====

There were: 630 successful analyses from a total of 1001 trial failure surfaces (Theta filter applied)
 216 analyses terminated due to unacceptable geometry
 155 analyses that failed to produce a valid result

Critical (minimum) Factor of Safety: 3.43

Final Angle of Interslice Forces: 7.9 degrees

Negative interslice forces exist on one or more slices; examine slice data and consult the GALENA Help utility

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	Theta	
1	6231232.00	1852628.88	6231585.50	1852691.50	6231060.50	1854625.38	2003.89	3.430	7.9	<-- Critical Surface
2	6231232.00	1852628.88	6231585.50	1852691.50	6231061.50	1854621.00	1999.44	3.430	7.9	
3	6231232.00	1852628.88	6231585.50	1852691.50	6231061.50	1854619.88	1998.33	3.430	7.9	
4	6231232.00	1852628.88	6231585.50	1852691.50	6231062.00	1854616.62	1995.00	3.431	7.9	
5	6231232.00	1852628.88	6231585.50	1852691.50	6231060.50	1854626.50	2005.00	3.432	7.9	
6	6231232.00	1852628.88	6231585.50	1852691.50	6231062.00	1854618.88	1997.22	3.433	7.9	
7	6231232.00	1852628.88	6231585.50	1852691.50	6231062.00	1854617.75	1996.11	3.433	7.9	
8	6231232.00	1852628.88	6231585.50	1852691.50	6231061.00	1854623.25	2001.67	3.435	7.9	
9	6231232.00	1852628.88	6231585.50	1852691.50	6231061.00	1854622.12	2000.56	3.436	7.9	
10	6231232.00	1852628.88	6231585.50	1852691.50	6231061.00	1854624.38	2002.78	3.436	7.9	
11	6231232.00	1852628.88	6231529.50	1852690.38	6230977.50	1854610.88	1998.33	3.551	9.5	
12	6231232.00	1852628.88	6231529.50	1852690.38	6230976.50	1854615.25	2002.78	3.558	9.5	
13	6231232.00	1852628.88	6231529.50	1852690.38	6230978.00	1854608.75	1996.11	3.560	9.5	
14	6231232.00	1852628.88	6231529.50	1852690.38	6230978.00	1854607.62	1995.00	3.562	9.5	
15	6231232.00	1852628.88	6231529.50	1852690.38	6230977.00	1854612.00	1999.44	3.569	9.5	
16	6231232.00	1852628.88	6231529.50	1852690.38	6230977.00	1854613.12	2000.56	3.569	9.5	
17	6231232.00	1852628.88	6231529.50	1852690.38	6230976.00	1854616.38	2003.89	3.577	9.5	
18	6231232.00	1852628.88	6231529.50	1852690.38	6230977.50	1854609.88	1997.22	3.577	9.5	
19	6231232.00	1852628.88	6231529.50	1852690.38	6230976.00	1854617.50	2005.00	3.577	9.5	
20	6231232.00	1852628.88	6231529.50	1852690.38	6230976.50	1854614.25	2001.67	3.581	9.5	
21	6231232.00	1852628.88	6231752.00	1852706.50	6231199.00	1854630.25	2001.67	3.583	6.4	
22	6231232.00	1852628.88	6231752.00	1852706.50	6231200.00	1854623.62	1995.00	3.583	6.4	
23	6231232.00	1852628.88	6231752.00	1852706.50	6231199.00	1854629.12	2000.56	3.583	6.4	
24	6231232.00	1852628.88	6231752.00	1852706.50	6231199.00	1854631.38	2002.78	3.584	6.4	
25	6231232.00	1852628.88	6231752.00	1852706.50	6231200.00	1854624.75	1996.11	3.585	6.4	
26	6231232.00	1852628.88	6231752.00	1852706.50	6231199.50	1854628.00	1999.44	3.585	6.4	
27	6231232.00	1852628.88	6231752.00	1852706.50	6231199.50	1854625.88	1997.22	3.591	6.4	
28	6231232.00	1852628.88	6231752.00	1852706.50	6231198.50	1854633.62	2005.00	3.592	6.4	
29	6231232.00	1852628.88	6231752.00	1852706.50	6231198.50	1854632.50	2003.89	3.592	6.4	
30	6231232.00	1852628.88	6231752.00	1852706.50	6231199.50	1854627.00	1998.33	3.594	6.4	
31	6231232.00	1852628.88	6231807.50	1852708.00	6231251.00	1854624.88	1996.11	3.598	6.3	
32	6231232.00	1852628.88	6231807.50	1852708.00	6231251.00	1854623.75	1995.00	3.598	6.3	
33	6231232.00	1852628.88	6231807.50	1852708.00	6231249.50	1854633.75	2005.00	3.599	6.3	
34	6231232.00	1852628.88	6231807.50	1852708.00	6231250.50	1854626.00	1997.22	3.600	6.3	
35	6231232.00	1852628.88	6231807.50	1852708.00	6231249.50	1854632.62	2003.89	3.600	6.3	
36	6231232.00	1852628.88	6231807.50	1852708.00	6231250.50	1854628.25	1999.44	3.600	6.3	
37	6231232.00	1852628.88	6231807.50	1852708.00	6231250.50	1854627.12	1998.33	3.600	6.3	
38	6231232.00	1852628.88	6231807.50	1852708.00	6231250.00	1854629.38	2000.56	3.603	6.3	
39	6231232.00	1852628.88	6231807.50	1852708.00	6231250.00	1854630.50	2001.67	3.603	6.3	
40	6231232.00	1852628.88	6231807.50	1852708.00	6231250.00	1854631.62	2002.78	3.604	6.3	
41	6231232.00	1852628.88	6231696.50	1852703.25	6231151.00	1854622.25	1995.00	3.614	5.6	
42	6231232.00	1852628.88	6231696.50	1852703.25	6231150.50	1854626.62	1999.44	3.614	5.6	
43	6231232.00	1852628.88	6231696.50	1852703.25	6231150.50	1854625.50	1998.33	3.615	5.6	
44	6231232.00	1852628.88	6231696.50	1852703.25	6231149.50	1854632.12	2005.00	3.616	5.6	
45	6231232.00	1852628.88	6231696.50	1852703.25	6231150.00	1854627.75	2000.56	3.618	5.5	

46	6231232.00	1852628.88	6231696.50	1852703.25	6231151.00	1854623.38	1996.11	3.618	5.6
47	6231232.00	1852628.88	6231696.50	1852703.25	6231150.00	1854628.88	2001.67	3.619	5.6
48	6231232.00	1852628.88	6231696.50	1852703.25	6231150.00	1854630.00	2002.78	3.621	5.6
49	6231232.00	1852628.88	6231696.50	1852703.25	6231149.50	1854631.12	2003.89	3.627	5.5
50	6231232.00	1852628.88	6231696.50	1852703.25	6231150.50	1854624.50	1997.22	3.628	5.5
51	6231245.00	1852633.00	6231585.50	1852691.50	6231078.00	1854626.50	2000.56	3.656	7.6
52	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854623.38	1996.11	3.678	6.0
53	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854624.50	1997.22	3.679	6.0
54	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854625.62	1998.33	3.682	6.0
55	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854626.75	1999.44	3.682	6.0
56	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854631.25	2003.89	3.683	6.0
57	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854630.12	2002.78	3.684	6.0
58	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854629.00	2001.67	3.684	6.0
59	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854627.88	2000.56	3.684	6.0
60	6231232.00	1852628.88	6231863.00	1852705.25	6231311.00	1854622.38	1995.00	3.684	6.0
61	6231232.00	1852628.88	6231863.00	1852705.25	6231309.50	1854632.38	2005.00	3.684	6.0
62	6231245.00	1852633.00	6231807.50	1852708.00	6231264.00	1854637.88	2005.00	3.825	6.1
63	6231245.00	1852633.00	6231807.50	1852708.00	6231265.50	1854627.88	1995.00	3.825	6.1
64	6231245.00	1852633.00	6231752.00	1852706.50	6231214.50	1854628.88	1996.11	3.826	6.1
65	6231245.00	1852633.00	6231752.00	1852706.50	6231214.50	1854627.75	1995.00	3.826	6.1
66	6231245.00	1852633.00	6231752.00	1852706.50	6231213.50	1854635.50	2002.78	3.827	6.1
67	6231245.00	1852633.00	6231752.00	1852706.50	6231213.50	1854634.38	2001.67	3.827	6.1
68	6231245.00	1852633.00	6231752.00	1852706.50	6231213.50	1854636.62	2003.89	3.828	6.1
69	6231245.00	1852633.00	6231752.00	1852706.50	6231214.50	1854630.00	1997.22	3.828	6.1
70	6231245.00	1852633.00	6231752.00	1852706.50	6231214.00	1854633.38	2000.56	3.828	6.1
71	6231245.00	1852633.00	6231807.50	1852708.00	6231265.00	1854631.25	1998.33	3.828	6.1
72	6231245.00	1852633.00	6231752.00	1852706.50	6231214.00	1854631.12	1998.33	3.829	6.1
73	6231245.00	1852633.00	6231752.00	1852706.50	6231214.00	1854632.25	1999.44	3.829	6.1
74	6231245.00	1852633.00	6231752.00	1852706.50	6231213.00	1854637.75	2005.00	3.831	6.1
75	6231245.00	1852633.00	6231696.50	1852703.25	6231166.00	1854626.38	1995.00	3.867	5.2
76	6231245.00	1852633.00	6231696.50	1852703.25	6231166.00	1854627.50	1996.11	3.870	5.2
77	6231245.00	1852633.00	6231696.50	1852703.25	6231165.00	1854634.12	2002.78	3.871	5.2
78	6231245.00	1852633.00	6231696.50	1852703.25	6231165.50	1854628.62	1997.22	3.877	5.1
79	6231245.00	1852633.00	6231696.50	1852703.25	6231164.50	1854635.25	2003.89	3.877	5.1
80	6231245.00	1852633.00	6231696.50	1852703.25	6231165.50	1854629.75	1998.33	3.878	5.1
81	6231245.00	1852633.00	6231696.50	1852703.25	6231165.50	1854630.88	1999.44	3.880	5.1
82	6231245.00	1852633.00	6231696.50	1852703.25	6231164.50	1854636.38	2005.00	3.881	5.1
83	6231245.00	1852633.00	6231696.50	1852703.25	6231165.00	1854632.00	2000.56	3.884	5.0
84	6231245.00	1852633.00	6231696.50	1852703.25	6231165.00	1854633.12	2001.67	3.887	5.1
85	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854626.38	1995.00	3.901	5.8
86	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854627.50	1996.11	3.904	5.7
87	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854632.00	2000.56	3.904	5.7
88	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854630.88	1999.44	3.904	5.7
89	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854628.62	1997.22	3.906	5.7
90	6231245.00	1852633.00	6231863.00	1852705.25	6231324.00	1854635.38	2003.89	3.906	5.7
91	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854633.12	2001.67	3.907	5.7
92	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854634.25	2002.78	3.907	5.7
93	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854629.75	1998.33	3.907	5.7
94	6231245.00	1852633.00	6231863.00	1852705.25	6231324.00	1854636.50	2005.00	3.908	5.8
95	6231257.50	1852637.12	6231585.50	1852691.50	6231096.00	1854627.75	1997.22	3.943	7.2
96	6231257.50	1852637.12	6231585.50	1852691.50	6231096.00	1854628.88	1998.33	3.945	7.2
97	6231257.50	1852637.12	6231585.50	1852691.50	6231095.00	1854634.38	2003.89	3.947	7.2

98	6231257.50	1852637.12	6231585.50	1852691.50	6231095.00	1854633.25	2002.78	3.947	7.2
99	6231257.50	1852637.12	6231585.50	1852691.50	6231096.50	1854625.62	1995.00	3.949	7.2

Critical Failure Surface (circle 1)

 Intersects: XL: 6231232.00 YL: 1852628.88 XR: 6231585.50 YR: 1852691.50
 Centre: XC: 6231060.50 YC: 1854625.38 Radius: R: 2003.89

Generated failure surface: (20 points)

6231232.001852628.88	6231251.001852630.50	6231269.501852632.38	6231288.501852634.50	6231307.501852636.75
6231326.001852639.12	6231345.001852641.75	6231363.501852644.50	6231382.001852647.50	6231401.001852650.62
6231419.501852653.88	6231438.001852657.38	6231456.501852661.00	6231475.001852664.88	6231493.501852668.88
6231512.001852673.00	6231530.501852677.38	6231549.001852681.88	6231567.001852686.62	6231585.501852691.50

Slice Geometry and Properties - Critical Failure Surface (circle 1, 49 slices)

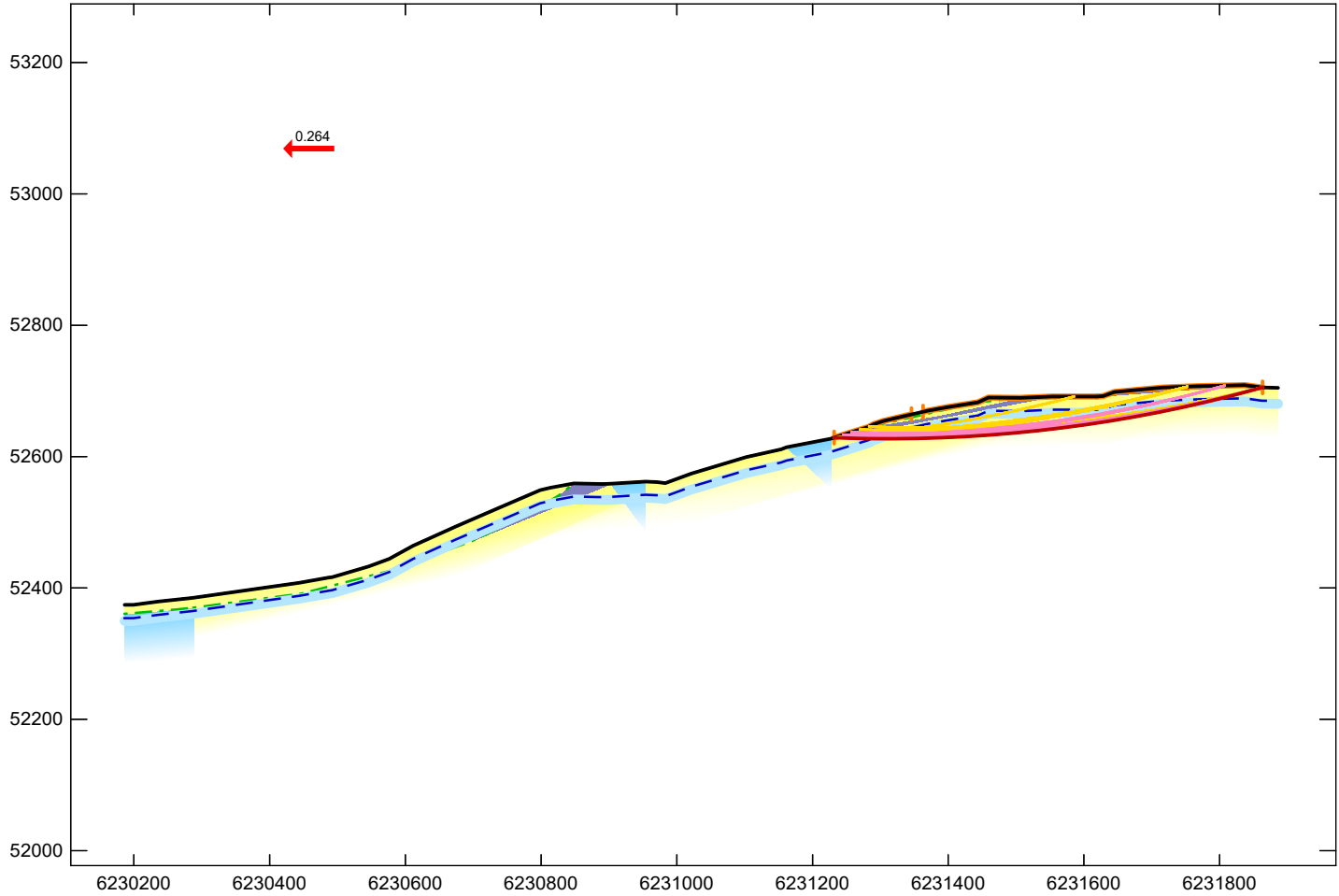
Slice	X-S	Base							PoreWater	--- Left Hand Side ---			
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Side Force	l/h	l'/h
1	6231232.00	11.88	5.3	9.50	9.54	1	589.00	15.0	1128.12	113.29	0.00	0.00	0.00
2	6231241.50	30.88	4.5	9.50	9.53	1	589.00	15.0	2933.12	294.23	1621.41	0.10	0.34
3	6231251.00	49.50	5.6	9.00	9.04	1	589.00	15.0	4702.50	472.47	3242.91	0.12	0.33
4	6231260.00	72.44	6.0	9.50	9.55	1	589.00	15.0	6881.56	691.96	4675.35	0.11	0.33
5	6231269.50	60.94	6.6	6.50	6.54	1	589.00	15.0	5789.06	582.75	6080.51	0.09	0.33
6	6231276.00	63.00	5.9	6.00	6.03	1	589.00	15.0	5985.00	601.74	6946.23	0.08	0.33
7	6231282.00	82.06	6.6	6.50	6.54	1	589.00	15.0	7844.69	789.67	7782.95	0.08	0.33
8	6231288.50	114.38	6.7	7.50	7.55	1	589.00	15.0	11020.31	1109.51	8556.23	0.07	0.33
9	6231296.00	136.00	7.1	8.00	8.06	1	589.00	15.0	13165.00	1326.75	9346.04	0.07	0.33
10	6231304.00	63.44	6.1	3.50	3.52	1	589.00	15.0	6157.81	619.31	10015.49	0.06	0.33
11	6231307.50	139.69	7.6	7.50	7.57	1	589.00	15.0	13575.00	1369.51	10395.10	0.06	0.33
12	6231315.00	147.19	6.7	7.50	7.55	1	589.00	15.0	14334.38	1443.16	10844.94	0.06	0.33
13	6231322.50	50.31	8.5	2.50	2.53	1	589.00	15.0	4904.69	495.96	11481.53	0.06	0.33
14	6231325.00	82.00	7.1	4.00	4.03	1	589.00	15.0	8000.00	806.23	11528.30	0.06	0.33
15	6231329.00	168.00	8.0	8.00	8.08	1	589.00	15.0	16390.00	1655.13	11785.85	0.06	0.33
16	6231337.00	175.00	8.0	8.00	8.08	1	589.00	15.0	17060.00	1722.79	12029.64	0.06	0.33
17	6231345.00	181.00	8.9	8.00	8.10	1	589.00	15.0	17630.00	1784.39	12226.69	0.05	0.33
18	6231353.00	176.25	7.6	7.50	7.57	1	589.00	15.0	17156.25	1730.81	12117.28	0.05	0.33
19	6231360.50	71.62	9.5	3.00	3.04	1	589.00	15.0	6965.62	706.17	12342.83	0.04	0.33
20	6231363.50	121.25	8.5	5.00	5.06	1	589.00	15.0	11775.00	1190.67	12201.92	0.04	0.33
21	6231368.50	159.25	9.8	6.50	6.60	1	589.00	15.0	15425.31	1565.46	12140.36	0.04	0.33
22	6231375.00	173.25	9.1	7.00	7.09	1	589.00	15.0	16730.00	1694.47	11708.74	0.03	0.33
23	6231382.00	199.00	9.8	8.00	8.12	1	589.00	15.0	19165.00	1944.60	11430.25	0.02	0.33
24	6231390.00	187.50	8.5	7.50	7.58	1	589.00	15.0	18028.12	1822.98	10902.81	0.01	0.33
25	6231397.50	87.94	10.1	3.50	3.56	1	589.00	15.0	8445.94	857.95	10781.61	0.01	0.33
26	6231401.00	226.12	10.2	9.00	9.15	1	589.00	15.0	21684.38	2203.50	10490.74	0.01	0.33
27	6231410.00	236.31	9.7	9.50	9.64	1	589.00	15.0	22604.06	2293.24	9705.42	-0.01	0.33
28	6231419.50	235.12	10.4	9.50	9.66	1	589.00	15.0	22443.75	2282.14	9112.32	-0.02	0.33
29	6231429.00	221.62	11.0	9.00	9.17	1	589.00	15.0	21110.62	2150.60	8253.71	-0.04	0.33
30	6231438.00	134.06	11.6	5.50	5.61	1	589.00	15.0	12746.25	1301.02	7252.76	-0.07	0.33
31	6231443.50	164.12	10.9	6.50	6.62	1	589.00	15.0	15632.50	1591.89	6538.72	-0.10	0.33
32	6231450.00	173.88	10.9	6.50	6.62	1	589.00	15.0	16627.81	1693.25	5800.37	-0.12	0.33
33	6231456.50	70.00	11.3	2.50	2.55	1	589.00	15.0	6714.06	684.70	4942.83	-0.14	0.33
34	6231459.00	220.00	12.3	8.00	8.19	1	589.00	15.0	21105.00	2160.41	4526.04	-0.16	0.33
35	6231467.00	206.00	11.5	8.00	8.16	1	589.00	15.0	19735.00	2013.80	2869.50	-0.30	0.33

36	6231475.00	213.75	12.5	9.00	9.22	1	589.00	15.0	20446.88	2094.57	1700.18	-0.56	0.33
37	6231484.00	205.44	11.9	9.50	9.71	1	589.00	15.0	19611.56	2004.15	248.26	-4.35	0.34
38	6231493.50	50.62	11.3	2.50	2.55	1	589.00	15.0	4826.56	492.21	-778.71	1.52	0.33
39	6231496.00	206.25	12.8	11.00	11.28	1	589.00	15.0	19628.12	2012.87	-955.59	1.26	0.33
40	6231507.00	85.00	12.7	5.00	5.12	1	589.00	15.0	8075.00	827.69	-2026.87	0.64	0.33
41	6231512.00	140.62	13.3	9.00	9.25	1	589.00	15.0	13359.38	1372.67	-2367.38	0.55	0.33
42	6231521.00	133.00	13.3	9.50	9.76	1	589.00	15.0	12635.00	1298.45	-2938.82	0.45	0.33
43	6231530.50	115.19	13.3	9.50	9.76	1	589.00	15.0	10942.81	1124.55	-3313.83	0.38	0.33
44	6231540.00	93.38	14.0	9.00	9.28	1	589.00	15.0	8870.62	914.36	-3414.71	0.35	0.33
45	6231549.00	44.38	15.4	5.00	5.19	1	589.00	15.0	4215.62	437.21	-3372.08	0.32	0.33
46	6231554.00	48.75	14.0	6.50	6.70	1	589.00	15.0	4631.25	477.38	-3315.96	0.28	0.33
47	6231560.50	36.56	15.1	6.50	6.73	1	589.00	15.0	3473.44	359.71	-2975.67	0.28	0.33
48	6231567.00	33.75	14.8	9.00	9.31	1	589.00	15.0	3206.25	331.60	-2489.58	0.26	0.33
49	6231576.00	10.69	14.7	9.50	9.82	1	589.00	15.0	1015.31	104.99	-1494.89	0.24	0.33
RHS	6231585.50	-----			-----				-----		-0.91	0.00	0.00
	X-S Area:	6108.38	Path Length:	359.50			X-S Weight:	586533.75					

FoS Ranges <=1.00 >1.00 <=1.20 >1.20 <=1.40 >1.40

Material Keys

- 1: Jos
- 2: fm
- 3: Qls



GALENA Version 7.2

Analysis 2

Multiple Stability Analysis
 Method: Spencer-Wright
 Surface: Circular

Results

Critical Factor of Safety: 1.09
 Interslice Force (Final) Angle: 3.7°

Edited: 17 Jul 2023 Processed: 17 Jul 2023

Project Parmar 280611
 Engineering Geologic Cross Section B-B' with Proposed Grading

File: C:\Users\katie\Dropbox\ATC\Galena mStab Files\Model Files\Parmar\Parmar BB update with grading F.gmf

Associated Terra Consultants, Inc.

DATA: Analysis 2 - Engineering Geologic Cross Section B-B' with Proposed Grading

Material Properties (4 materials)

Material:	Cohesion	Phi	PI	UnitWeight	Ru	
1 (Mohr-Coulomb Cu increases with depth) - Jos	589.00	15.0	15	95.00	0.10	
2 (Mohr-Coulomb Cu increases with depth) - fm	674.00	23.0	15	95.00	0.10	
3 (Mohr-Coulomb Cu increases with depth) - Qls	872.00	11.0	15	100.00	0.10	
4 (Mohr-Coulomb Cu increases with depth) - Qaf	100.00	25.0	15	125.00	0.10	

Water Properties

Unit weight of water: 62.430 Unit weight of water/medium above ground: 0.000

Material Profiles (6 profiles)

Profile:	Material beneath:										
1 (15 points)	3 - Qls	6230186.00	1852374.25	6230199.50	1852374.25	6230236.00	1852379.25	6230285.50	1852384.75	6230443.50	1852407.88
		6230486.50	1852415.75	6230492.00	1852416.50	6230546.00	1852432.88	6230576.00	1852444.25	6230611.50	1852464.25
		6230675.50	1852494.25	6230739.00	1852522.38	6230798.50	1852549.00	6230813.50	1852552.62	6230848.50	1852559.25
2 (2 points)	3 - Qls	6230155.00	1852906.00	6231923.00	1852892.00						
3 (9 points)	1 - Jos	6230288.00	1852370.00	6230446.50	1852391.25	6230578.00	1852426.50	6230698.00	1852471.38	6230778.50	1852511.12
		6230825.50	1852540.75	6230848.50	1852559.25	6230890.50	1852558.38	6230903.00	1852558.75		
4 (3 points)	2 - fm	6230186.00	1852360.75	6230262.00	1852367.38	6230288.00	1852370.00				
5 (9 points)	2 - fm	6230903.00	1852558.75	6230953.50	1852561.88	6230970.50	1852561.25	6230983.00	1852559.75	6231021.50	1852574.25
		6231102.50	1852599.25	6231153.50	1852611.25	6231162.00	1852614.25	6231227.00	1852627.25		
6 (16 points)	1 - Jos	6231227.00	1852627.25	6231282.00	1852645.00	6231329.00	1852649.50	6231360.50	1852656.75	6231383.00	1852665.62
		6231443.50	1852682.75	6231507.00	1852689.38	6231554.00	1852691.50	6231619.00	1852691.50	6231628.00	1852692.25
		6231645.00	1852698.25	6231716.00	1852705.12	6231768.00	1852707.12	6231836.50	1852708.75	6231861.50	1852705.25
		6231886.00	1852704.75								

Slope Surface (43 points)

6230186.00	1852374.25	6230199.50	1852374.25	6230236.00	1852379.25	6230285.50	1852384.75	6230443.50	1852407.88
6230486.50	1852415.75	6230492.00	1852416.50	6230546.00	1852432.88	6230576.00	1852444.25	6230611.50	1852464.25
6230675.50	1852494.25	6230739.00	1852522.38	6230798.50	1852549.00	6230813.50	1852552.62	6230848.50	1852559.25
6230890.50	1852558.38	6230903.00	1852558.75	6230953.50	1852561.88	6230970.50	1852561.25	6230983.00	1852559.75
6231021.50	1852574.25	6231102.50	1852599.25	6231153.50	1852611.25	6231162.00	1852614.25	6231227.00	1852627.25
6231282.00	1852645.00	6231289.50	1852649.25	6231304.00	1852654.25	6231325.00	1852659.25	6231368.50	1852669.75
6231397.50	1852675.12	6231443.50	1852682.75	6231459.00	1852689.88	6231507.00	1852689.38	6231554.00	1852691.50

6231619.00 1852691.50 6231628.00 1852692.25 6231645.00 1852698.25 6231716.00 1852705.12 6231768.00 1852707.12
6231836.50 1852708.75 6231861.50 1852705.25 6231886.00 1852704.75

Phreatic Surface (43 points)

6230186.00 1852354.25 6230199.50 1852354.25 6230236.00 1852359.25 6230285.50 1852364.75 6230443.50 1852387.88
6230486.50 1852395.75 6230492.00 1852396.50 6230546.00 1852412.88 6230576.00 1852424.25 6230611.50 1852444.25
6230675.50 1852474.25 6230739.00 1852502.38 6230798.50 1852529.00 6230813.50 1852532.62 6230848.50 1852539.25
6230890.50 1852538.38 6230903.00 1852538.75 6230953.50 1852541.88 6230970.50 1852541.25 6230983.00 1852539.75
6231021.50 1852554.25 6231102.50 1852579.25 6231153.50 1852591.25 6231162.00 1852594.25 6231227.00 1852607.25
6231282.00 1852625.00 6231289.50 1852629.25 6231304.00 1852634.25 6231325.00 1852639.25 6231368.50 1852649.75
6231397.50 1852655.12 6231443.50 1852662.75 6231459.00 1852669.88 6231507.00 1852669.38 6231554.00 1852671.50
6231619.00 1852671.50 6231628.00 1852672.25 6231645.00 1852678.25 6231716.00 1852685.12 6231768.00 1852687.12
6231836.50 1852688.75 6231861.50 1852685.25 6231886.00 1852684.75

Failure Surface

Initial circular surface for critical search defined by: XL, XR, R
Intersects: XL: 6231289.00 YL: 1852649.00 XR: 6231613.00 YR: 1852691.50
Centre: XC: 6231192.00 YC: 1854646.62 Radius: R: 2000.00

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.264

Variable Restraints

Parameter descriptor: XL XR R
Range of variation: 114.00 500.00 10.00
Trial positions within range: 10 10 10

RESULTS: Analysis 2 - Engineering Geologic Cross Section B-B' with Proposed Grading

Spencer-Wright Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 1.806 Final Angle of Interslice Forces (Theta): 3.6 degrees

Analysis Summary

=====
There were: 579 successful analyses from a total of 1001 trial failure surfaces (Theta filter applied)
216 analyses terminated due to unacceptable geometry
206 analyses that failed to produce a valid result

Critical (minimum) Factor of Safety: 1.09 Final Angle of Interslice Forces: 3.7 degrees

=====
Negative interslice forces exist on one or more slices; examine slice data and consult the GALENA Help utility

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	Theta	
1	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854623.38	1996.11	1.089	3.7	<-- Critical Surface
2	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854624.50	1997.22	1.089	3.7	
3	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854626.75	1999.44	1.089	3.7	
4	6231232.00	1852628.88	6231863.00	1852705.25	6231310.50	1854625.62	1998.33	1.089	3.7	
5	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854631.25	2003.89	1.090	3.7	
6	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854630.12	2002.78	1.090	3.7	
7	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854629.00	2001.67	1.090	3.7	
8	6231232.00	1852628.88	6231863.00	1852705.25	6231310.00	1854627.88	2000.56	1.090	3.7	
9	6231232.00	1852628.88	6231863.00	1852705.25	6231311.00	1854622.38	1995.00	1.090	3.7	
10	6231232.00	1852628.88	6231863.00	1852705.25	6231309.50	1854632.38	2005.00	1.090	3.7	
11	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854626.38	1995.00	1.125	3.5	
12	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854627.50	1996.11	1.125	3.4	
13	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854628.62	1997.22	1.125	3.5	
14	6231245.00	1852633.00	6231863.00	1852705.25	6231325.00	1854629.75	1998.33	1.125	3.5	
15	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854632.00	2000.56	1.126	3.4	
16	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854630.88	1999.44	1.126	3.4	
17	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854633.12	2001.67	1.126	3.4	
18	6231245.00	1852633.00	6231863.00	1852705.25	6231324.50	1854634.25	2002.78	1.126	3.4	
19	6231245.00	1852633.00	6231863.00	1852705.25	6231324.00	1854635.38	2003.89	1.126	3.4	
20	6231245.00	1852633.00	6231863.00	1852705.25	6231324.00	1854636.50	2005.00	1.127	3.4	
21	6231232.00	1852628.88	6231807.50	1852708.00	6231251.00	1854624.88	1996.11	1.147	2.2	
22	6231232.00	1852628.88	6231807.50	1852708.00	6231251.00	1854623.75	1995.00	1.147	2.1	
23	6231232.00	1852628.88	6231807.50	1852708.00	6231250.50	1854628.25	1999.44	1.148	2.1	
24	6231232.00	1852628.88	6231807.50	1852708.00	6231250.50	1854627.12	1998.33	1.148	2.1	
25	6231232.00	1852628.88	6231807.50	1852708.00	6231250.50	1854626.00	1997.22	1.148	2.1	
26	6231232.00	1852628.88	6231807.50	1852708.00	6231249.50	1854633.75	2005.00	1.148	2.1	
27	6231232.00	1852628.88	6231807.50	1852708.00	6231249.50	1854632.62	2003.89	1.148	2.1	
28	6231232.00	1852628.88	6231807.50	1852708.00	6231250.00	1854629.38	2000.56	1.149	2.0	
29	6231232.00	1852628.88	6231807.50	1852708.00	6231250.00	1854630.50	2001.67	1.149	2.0	
30	6231232.00	1852628.88	6231807.50	1852708.00	6231250.00	1854631.62	2002.78	1.149	2.1	
31	6231257.50	1852637.12	6231863.00	1852705.25	6231340.00	1854630.38	1995.00	1.162	3.2	
32	6231257.50	1852637.12	6231863.00	1852705.25	6231339.50	1854631.50	1996.11	1.163	3.2	
33	6231257.50	1852637.12	6231863.00	1852705.25	6231339.50	1854633.75	1998.33	1.163	3.2	
34	6231257.50	1852637.12	6231863.00	1852705.25	6231339.50	1854632.62	1997.22	1.163	3.2	
35	6231257.50	1852637.12	6231863.00	1852705.25	6231339.50	1854634.88	1999.44	1.163	3.2	
36	6231257.50	1852637.12	6231863.00	1852705.25	6231339.00	1854636.00	2000.56	1.164	3.2	
37	6231257.50	1852637.12	6231863.00	1852705.25	6231339.00	1854638.25	2002.78	1.164	3.2	
38	6231257.50	1852637.12	6231863.00	1852705.25	6231339.00	1854639.38	2003.89	1.165	3.2	
39	6231257.50	1852637.12	6231863.00	1852705.25	6231339.00	1854637.12	2001.67	1.165	3.2	
40	6231257.50	1852637.12	6231863.00	1852705.25	6231338.50	1854640.50	2005.00	1.166	3.2	
41	6231245.00	1852633.00	6231807.50	1852708.00	6231265.50	1854627.88	1995.00	1.191	1.6	
42	6231245.00	1852633.00	6231807.50	1852708.00	6231264.00	1854637.88	2005.00	1.192	1.6	
43	6231245.00	1852633.00	6231807.50	1852708.00	6231265.00	1854631.25	1998.33	1.192	1.5	
44	6231270.00	1852641.12	6231863.00	1852705.25	6231354.00	1854639.88	2000.56	1.206	3.0	
45	6231270.00	1852641.12	6231863.00	1852705.25	6231354.00	1854638.75	1999.44	1.206	3.0	
46	6231270.00	1852641.12	6231863.00	1852705.25	6231354.50	1854634.38	1995.00	1.207	3.0	
47	6231270.00	1852641.12	6231863.00	1852705.25	6231353.50	1854643.25	2003.89	1.207	3.0	
48	6231270.00	1852641.12	6231863.00	1852705.25	6231353.50	1854642.12	2002.78	1.207	3.0	
49	6231270.00	1852641.12	6231863.00	1852705.25	6231353.50	1854641.00	2001.67	1.207	3.0	

50	6231270.00	1852641.12	6231863.00	1852705.25	6231354.50	1854635.50	1996.11	1.207	3.0
51	6231270.00	1852641.12	6231863.00	1852705.25	6231353.50	1854644.38	2005.00	1.207	3.0
52	6231270.00	1852641.12	6231863.00	1852705.25	6231354.00	1854636.62	1997.22	1.208	2.9
53	6231232.00	1852628.88	6231752.00	1852706.50	6231199.50	1854628.00	1999.44	1.208	-2.6
54	6231270.00	1852641.12	6231863.00	1852705.25	6231354.00	1854637.75	1998.33	1.208	2.9
55	6231232.00	1852628.88	6231752.00	1852706.50	6231200.00	1854623.62	1995.00	1.208	-2.7
56	6231232.00	1852628.88	6231752.00	1852706.50	6231200.00	1854624.75	1996.11	1.208	-2.7
57	6231232.00	1852628.88	6231752.00	1852706.50	6231199.00	1854631.38	2002.78	1.208	-2.7
58	6231232.00	1852628.88	6231752.00	1852706.50	6231199.00	1854630.25	2001.67	1.208	-2.7
59	6231232.00	1852628.88	6231752.00	1852706.50	6231199.00	1854629.12	2000.56	1.208	-2.8
60	6231232.00	1852628.88	6231752.00	1852706.50	6231199.50	1854625.88	1997.22	1.210	-3.1
61	6231232.00	1852628.88	6231752.00	1852706.50	6231198.50	1854633.62	2005.00	1.210	-3.0
62	6231232.00	1852628.88	6231752.00	1852706.50	6231198.50	1854632.50	2003.89	1.211	-3.1
63	6231232.00	1852628.88	6231752.00	1852706.50	6231199.50	1854627.00	1998.33	1.211	-3.0
64	6231245.00	1852633.00	6231752.00	1852706.50	6231214.50	1854628.88	1996.11	1.261	-5.8
65	6231245.00	1852633.00	6231752.00	1852706.50	6231214.50	1854627.75	1995.00	1.261	-5.8
66	6231245.00	1852633.00	6231752.00	1852706.50	6231213.50	1854635.50	2002.78	1.262	-5.8
67	6231245.00	1852633.00	6231752.00	1852706.50	6231213.50	1854634.38	2001.67	1.262	-5.8
68	6231245.00	1852633.00	6231752.00	1852706.50	6231213.50	1854636.62	2003.89	1.262	-5.7
69	6231245.00	1852633.00	6231752.00	1852706.50	6231214.50	1854630.00	1997.22	1.262	-5.7
70	6231283.00	1852645.62	6231863.00	1852705.25	6231371.00	1854638.62	1995.00	1.262	2.7
71	6231283.00	1852645.62	6231863.00	1852705.25	6231371.00	1854640.88	1997.22	1.262	2.7
72	6231283.00	1852645.62	6231863.00	1852705.25	6231371.00	1854639.75	1996.11	1.262	2.7
73	6231283.00	1852645.62	6231863.00	1852705.25	6231371.00	1854642.00	1998.33	1.263	2.7
74	6231245.00	1852633.00	6231752.00	1852706.50	6231214.00	1854633.38	2000.56	1.263	-6.0
75	6231245.00	1852633.00	6231752.00	1852706.50	6231214.00	1854632.25	1999.44	1.263	-6.3
76	6231245.00	1852633.00	6231752.00	1852706.50	6231214.00	1854631.12	1998.33	1.263	-6.5
77	6231283.00	1852645.62	6231863.00	1852705.25	6231370.50	1854643.12	1999.44	1.263	2.7
78	6231283.00	1852645.62	6231863.00	1852705.25	6231370.50	1854644.25	2000.56	1.263	2.7
79	6231283.00	1852645.62	6231863.00	1852705.25	6231370.50	1854645.38	2001.67	1.263	2.7
80	6231245.00	1852633.00	6231752.00	1852706.50	6231213.00	1854637.75	2005.00	1.263	-6.4
81	6231283.00	1852645.62	6231863.00	1852705.25	6231370.50	1854647.62	2003.89	1.264	2.7
82	6231283.00	1852645.62	6231863.00	1852705.25	6231370.50	1854646.50	2002.78	1.264	2.7
83	6231283.00	1852645.62	6231863.00	1852705.25	6231370.00	1854648.75	2005.00	1.265	2.7
84	6231257.50	1852637.12	6231752.00	1852706.50	6231230.00	1854631.88	1995.00	1.318	-9.5
85	6231257.50	1852637.12	6231752.00	1852706.50	6231229.50	1854633.00	1996.11	1.320	-10.6
86	6231257.50	1852637.12	6231752.00	1852706.50	6231229.50	1854635.25	1998.33	1.320	-10.7
87	6231257.50	1852637.12	6231752.00	1852706.50	6231229.50	1854634.12	1997.22	1.320	-10.7
88	6231257.50	1852637.12	6231752.00	1852706.50	6231228.50	1854640.75	2003.89	1.321	-10.9
89	6231257.50	1852637.12	6231752.00	1852706.50	6231228.50	1854641.88	2005.00	1.321	-10.8
90	6231257.50	1852637.12	6231752.00	1852706.50	6231229.00	1854636.38	1999.44	1.322	-11.2
91	6231257.50	1852637.12	6231752.00	1852706.50	6231229.00	1854638.62	2001.67	1.322	-10.8
92	6231257.50	1852637.12	6231752.00	1852706.50	6231229.00	1854637.50	2000.56	1.322	-10.8
93	6231257.50	1852637.12	6231752.00	1852706.50	6231228.50	1854639.75	2002.78	1.324	-12.3
94	6231232.00	1852628.88	6231585.50	1852691.50	6231060.50	1854625.38	2003.89	1.349	4.7
95	6231232.00	1852628.88	6231585.50	1852691.50	6231061.50	1854621.00	1999.44	1.349	4.7
96	6231232.00	1852628.88	6231585.50	1852691.50	6231061.50	1854619.88	1998.33	1.349	4.7
97	6231232.00	1852628.88	6231585.50	1852691.50	6231060.50	1854626.50	2005.00	1.350	4.7
98	6231232.00	1852628.88	6231585.50	1852691.50	6231062.00	1854618.88	1997.22	1.350	4.7
99	6231232.00	1852628.88	6231585.50	1852691.50	6231062.00	1854617.75	1996.11	1.350	4.7

Critical Failure Surface (circle 1)

Intersects: XL: 6231232.00 YL: 1852628.88 XR: 6231863.00 YR: 1852705.25
 Centre: XC: 6231310.50 YC: 1854623.38 Radius: R: 1996.11

Generated failure surface: (20 points)

6231232.001852628.88	6231265.501852627.75	6231299.001852627.25	6231333.001852627.38	6231366.501852628.00
6231400.001852629.25	6231433.501852631.00	6231467.001852633.38	6231500.501852636.38	6231534.001852639.75
6231567.001852643.88	6231600.501852648.50	6231633.501852653.62	6231667.001852659.38	6231700.001852665.62
6231732.501852672.38	6231765.501852679.75	6231798.001852687.75	6231830.501852696.25	6231863.001852705.25

Slice Geometry and Properties - Critical Failure Surface (circle 1, 48 slices)

Slice	X-S		Base						Weight	PoreWater Force	--- Left Hand Side ---		
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi			Side Force	l/h	l'/h
1	6231232.00	51.00	-2.1	17.00	17.01	1	589.00	15.0	4845.00	484.83	0.00	0.00	0.00
2	6231249.00	146.44	-1.7	16.50	16.51	1	589.00	15.0	13911.56	1391.79	9473.23	0.14	0.33
3	6231265.50	243.38	-0.9	16.50	16.50	1	589.00	15.0	23120.62	2312.33	18514.98	0.14	0.33
4	6231282.00	83.81	-1.6	4.50	4.50	1	589.00	15.0	7981.88	798.50	27029.39	0.13	0.33
5	6231286.50	63.00	0.0	3.00	3.00	1	589.00	15.0	6026.25	602.62	29427.01	0.12	0.33
6	6231289.50	222.06	-0.8	9.50	9.50	1	589.00	15.0	21315.62	2131.75	30819.44	0.12	0.33
7	6231299.00	130.62	0.0	5.00	5.00	1	589.00	15.0	12571.88	1257.19	35456.52	0.11	0.33
8	6231304.00	619.50	0.3	21.00	21.00	1	589.00	15.0	59758.12	5975.92	37667.92	0.11	0.33
9	6231325.00	129.50	0.0	4.00	4.00	1	589.00	15.0	12512.50	1251.25	46253.45	0.11	0.33
10	6231329.00	133.50	0.0	4.00	4.00	1	589.00	15.0	12897.50	1289.75	47916.41	0.11	0.33
11	6231333.00	495.25	1.0	14.00	14.00	1	589.00	15.0	47810.00	4781.76	49562.73	0.11	0.33
12	6231347.00	519.75	1.1	13.50	13.50	1	589.00	15.0	50118.75	5012.73	54259.13	0.11	0.33
13	6231360.50	243.00	1.2	6.00	6.00	1	589.00	15.0	23403.75	2340.88	58501.26	0.11	0.33
14	6231366.50	703.31	2.2	16.50	16.51	1	589.00	15.0	67515.94	6756.44	60256.14	0.11	0.33
15	6231383.00	650.69	2.0	14.50	14.51	1	589.00	15.0	62259.38	6229.64	63625.05	0.11	0.33
16	6231397.50	846.00	2.8	18.00	18.02	1	589.00	15.0	80763.75	8085.91	66569.75	0.11	0.33
17	6231415.50	884.25	3.2	18.00	18.03	1	589.00	15.0	84206.25	8433.61	68723.37	0.11	0.33
18	6231433.50	505.00	4.3	10.00	10.03	1	589.00	15.0	48000.00	4813.48	69929.81	0.10	0.33
19	6231443.50	837.00	3.7	15.50	15.53	1	589.00	15.0	79728.12	7989.39	69494.65	0.10	0.33
20	6231459.00	454.00	4.5	8.00	8.02	1	589.00	15.0	43335.00	4346.70	69045.72	0.09	0.33
21	6231467.00	945.62	5.0	17.00	17.07	1	589.00	15.0	90142.50	9049.27	67955.49	0.09	0.33
22	6231484.00	888.94	5.2	16.50	16.57	1	589.00	15.0	84593.44	8494.23	64938.37	0.09	0.33
23	6231500.50	342.06	5.5	6.50	6.53	1	589.00	15.0	32508.12	3265.81	62169.10	0.09	0.33
24	6231507.00	702.00	5.8	13.50	13.57	1	589.00	15.0	66690.00	6703.50	61015.67	0.09	0.33
25	6231520.50	691.88	5.8	13.50	13.57	1	589.00	15.0	65728.12	6606.82	58349.68	0.08	0.33
26	6231534.00	1000.00	7.1	20.00	20.16	1	589.00	15.0	95000.00	9573.93	55827.16	0.08	0.33
27	6231554.00	630.50	7.1	13.00	13.10	1	589.00	15.0	59897.50	6036.36	50217.50	0.06	0.33
28	6231567.00	790.50	8.0	17.00	17.17	1	589.00	15.0	75097.50	7582.68	46890.56	0.05	0.33
29	6231584.00	728.06	7.8	16.50	16.65	1	589.00	15.0	69165.94	6980.60	41994.48	0.03	0.33
30	6231600.50	767.75	8.8	18.50	18.72	1	589.00	15.0	72936.25	7381.17	38168.25	0.01	0.33
31	6231619.00	357.75	8.7	9.00	9.10	1	589.00	15.0	33986.25	3438.06	33353.98	-0.03	0.33
32	6231628.00	220.00	9.0	5.50	5.57	1	589.00	15.0	20900.00	2116.28	31402.40	-0.06	0.33
33	6231633.50	477.25	9.9	11.50	11.67	1	589.00	15.0	45338.75	4601.93	30054.43	-0.07	0.33
34	6231645.00	464.75	9.7	11.00	11.16	1	589.00	15.0	44151.25	4478.81	26245.79	-0.11	0.33
35	6231656.00	456.50	9.7	11.00	11.16	1	589.00	15.0	43367.50	4399.30	22577.50	-0.16	0.33
36	6231667.00	664.12	10.7	16.50	16.79	1	589.00	15.0	63091.88	6421.35	19079.40	-0.22	0.33
37	6231683.50	637.31	10.7	16.50	16.79	1	589.00	15.0	60544.69	6162.10	13110.47	-0.40	0.33
38	6231700.00	594.00	11.9	16.00	16.35	1	589.00	15.0	56430.00	5767.18	7741.28	-0.78	0.33

39	6231716.00	573.38	11.6	16.50	16.84	1	589.00	15.0	54470.62	5559.84	1925.20	-3.46	0.33
40	6231732.50	525.94	12.4	16.50	16.89	1	589.00	15.0	49964.06	5115.57	-2793.55	2.57	0.33
41	6231749.00	476.44	12.8	16.50	16.92	1	589.00	15.0	45261.56	4641.58	-7090.35	1.05	0.33
42	6231765.50	418.69	13.6	16.50	16.98	1	589.00	15.0	39775.31	4092.74	-10458.97	0.71	0.33
43	6231782.00	350.00	14.0	16.00	16.49	1	589.00	15.0	33250.00	3427.33	-12883.21	0.55	0.33
44	6231798.00	290.00	14.5	16.00	16.52	1	589.00	15.0	27550.00	2845.09	-13937.61	0.46	0.33
45	6231814.00	237.19	14.9	16.50	17.07	1	589.00	15.0	22532.81	2331.14	-13510.46	0.39	0.33
46	6231830.50	69.00	15.2	6.00	6.22	1	589.00	15.0	6555.00	679.12	-11446.14	0.32	0.33
47	6231836.50	101.56	15.6	12.50	12.98	1	589.00	15.0	9648.44	1001.95	-10223.10	0.29	0.33
48	6231849.00	38.50	15.5	14.00	14.53	1	589.00	15.0	3657.50	379.50	-6491.67	0.26	0.33
RHS	6231863.00	-----			-----				-----		-15.99	0.00	0.00
	X-S Area:	22400.75	Path Length:	638.33			X-S Weight:	2134316.75					

FoS Ranges

<=1.00

>1.00 <=1.20

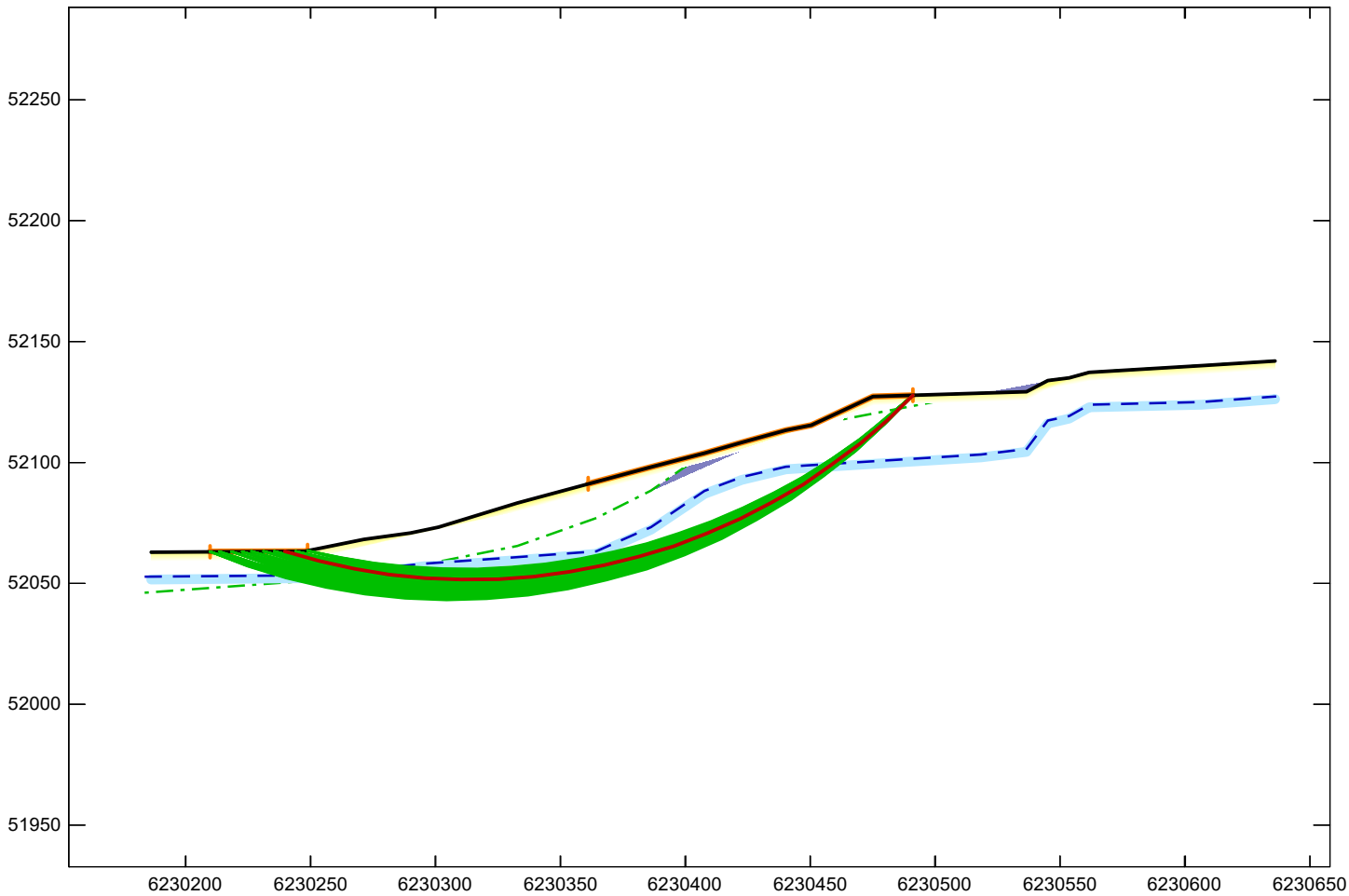
>1.20 <=1.40

>1.40

Material Keys

1: Jos

3: Qls



GALENA Version 7.2

Analysis 1

Multiple Stability Analysis
Method: Spencer-Wright
Surface: Circular

Results

Critical Factor of Safety: 2.14
Interslice Force (Final) Angle: 12.0°

Edited: 27 Jul 2023 Processed: 27 Jul 2023

Project Parmar 280611
Engineering Geologic Cross Section C-C' with Proposed Grading

File: C:\Users\katie\Dropbox\ATC\Galena mStab Files\Model Files\Parmar\CC Update.gmf

Associated Terra Consultants, Inc.

Project: Parmar 280611
 File: C:\Users\katie\Dropbox\ATC\Galena mStab Files\Model Files\Parmar\CC Update.gmf
 Processed: 27 Jul 2023 12:38:36

DATA: Analysis 1 - Engineering Geologic Cross Section C-C' with Proposed Grading

Material Properties (4 materials)

```

-----
Material: 1 (Mohr-Coulomb Cu increases with depth) - Jos
Cohesion  Phi    PI    UnitWeight  Ru
589.00    15.0   15     95.00      0.10
Material: 2 (Mohr-Coulomb Cu increases with depth) - fm
Cohesion  Phi    PI    UnitWeight  Ru
674.00    23.0   15     95.00      0.10
Material: 3 (Mohr-Coulomb Cu increases with depth) - Qls
Cohesion  Phi    PI    UnitWeight  Ru
872.00    11.0   15     100.00     0.10
Material: 4 (Mohr-Coulomb Cu increases with depth) - Qaf
Cohesion  Phi    PI    UnitWeight  Ru
100.00    25.0   15     125.00     0.10
    
```

Water Properties

```

-----
Unit weight of water: 62.430          Unit weight of water/medium above ground: 0.000
    
```

Material Profiles (3 profiles)

```

-----
Profile: 1 (3 points)   Material beneath: 4 - Qaf
6230450.50 1852115.50   6230475.00 1852127.25   6230518.50 1852128.62
Profile: 2 (16 points)  Material beneath: 1 - Jos
6230184.00 1852046.12   6230250.50 1852051.12   6230295.50 1852057.75   6230333.00 1852065.50   6230364.50 1852077.00
6230386.00 1852088.38   6230407.50 1852103.88   6230422.50 1852108.25   6230440.50 1852113.25   6230518.50 1852128.62
6230536.50 1852129.25   6230545.00 1852133.88   6230553.50 1852135.00   6230561.50 1852137.25   6230606.50 1852140.00
6230636.00 1852141.88
Profile: 3 (2 points)  Material beneath: 3 - Qls
6230166.00 1852175.00   6230645.00 1852172.00
    
```

Slope Surface (18 points)

```

-----
6230186.00 1852062.75   6230247.50 1852063.25   6230271.00 1852068.12   6230290.00 1852070.75   6230301.00 1852073.25
6230332.50 1852083.25   6230386.00 1852098.12   6230407.50 1852103.88   6230422.50 1852108.25   6230440.50 1852113.25
6230450.50 1852115.50   6230475.00 1852127.25   6230536.50 1852129.25   6230545.00 1852133.88   6230553.50 1852135.00
6230561.50 1852137.25   6230606.50 1852140.00   6230636.00 1852141.88
    
```

Phreatic Surface (16 points)

```

-----
6230184.00 1852052.75   6230250.50 1852053.25   6230295.50 1852058.12   6230333.00 1852060.75   6230364.50 1852063.25
6230386.00 1852073.25   6230407.50 1852088.12   6230422.50 1852093.88   6230440.50 1852098.25   6230518.50 1852103.25
6230536.50 1852105.50   6230545.00 1852117.25   6230553.50 1852119.25   6230561.50 1852123.88   6230606.50 1852125.00
    
```

6230636.00 1852127.25

Failure Surface

Initial circular surface for critical search defined by: XL, XR, R

Intersects: XL: 6230229.00 YL: 1852063.12 XR: 6230426.00 YR: 1852109.25
Centre: XC: 6230274.50 YC: 1852313.00 Radius: R: 254.00

Variable Restraints

Parameter descriptor: XL XR R
Range of variation: 39.00 130.00 20.00
Trial positions within range: 10 10 10

RESULTS: Analysis 1 - Engineering Geologic Cross Section C-C' with Proposed Grading

Spencer-Wright Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 3.810 Final Angle of Interslice Forces (Theta): 10.1 degrees

Analysis Summary

There were: 969 successful analyses from a total of 1001 trial failure surfaces (Theta filter applied)
32 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety: 2.14 Final Angle of Interslice Forces: 12.0 degrees

Negative interslice forces exist on one or more slices; examine slice data and consult the GALENA Help utility

Results Summary - Lowest 99 Factor of Safety circles

Table with 10 columns: Circle, X-Left, Y-Left, X-Right, Y-Right, X-Centre, Y-Centre, Radius, FoS, Theta. Row 1 is marked as 'Critical Surface'.

17	6230248.50	1852063.50	6230491.00	1852127.75	6230316.00	1852297.88	244.00	2.157	12.3
18	6230235.50	1852063.12	6230491.00	1852127.75	6230312.00	1852297.12	246.22	2.157	11.8
19	6230239.50	1852063.12	6230491.00	1852127.75	6230313.00	1852298.12	246.22	2.157	12.0
20	6230209.50	1852063.00	6230491.00	1852127.75	6230305.50	1852289.75	246.22	2.161	10.9
21	6230231.00	1852063.12	6230491.00	1852127.75	6230310.50	1852298.50	248.44	2.162	11.7
22	6230248.50	1852063.50	6230491.00	1852127.75	6230315.50	1852300.38	246.22	2.162	12.3
23	6230226.50	1852063.12	6230491.00	1852127.75	6230309.50	1852297.38	248.44	2.162	11.5
24	6230218.00	1852063.00	6230491.00	1852127.75	6230307.00	1852294.88	248.44	2.163	11.2
25	6230235.50	1852063.12	6230491.00	1852127.75	6230311.50	1852299.62	248.44	2.163	11.8
26	6230239.50	1852063.12	6230491.00	1852127.75	6230312.50	1852300.62	248.44	2.164	12.0
27	6230226.50	1852063.12	6230491.00	1852127.75	6230309.00	1852299.88	250.67	2.167	11.5
28	6230209.50	1852063.00	6230491.00	1852127.75	6230305.00	1852292.38	248.44	2.168	10.9
29	6230213.50	1852063.00	6230491.00	1852127.75	6230306.00	1852293.62	248.44	2.168	11.1
30	6230231.00	1852063.12	6230491.00	1852127.75	6230310.00	1852301.00	250.67	2.169	11.7
31	6230235.50	1852063.12	6230491.00	1852127.75	6230311.00	1852302.12	250.67	2.170	11.8
32	6230248.50	1852063.50	6230491.00	1852127.75	6230315.00	1852302.88	248.44	2.170	12.3
33	6230244.00	1852063.25	6230491.00	1852127.75	6230313.50	1852301.75	248.44	2.171	12.1
34	6230218.00	1852063.00	6230491.00	1852127.75	6230306.50	1852297.50	250.67	2.171	11.2
35	6230239.50	1852063.12	6230491.00	1852127.75	6230312.00	1852303.12	250.67	2.171	12.0
36	6230222.50	1852063.00	6230491.00	1852127.75	6230307.50	1852298.75	250.67	2.172	11.4
37	6230209.50	1852063.00	6230491.00	1852127.75	6230304.50	1852295.00	250.67	2.174	10.9
38	6230213.50	1852063.00	6230491.00	1852127.75	6230305.50	1852296.25	250.67	2.176	11.1
39	6230231.00	1852063.12	6230491.00	1852127.75	6230309.50	1852303.62	252.89	2.177	11.7
40	6230244.00	1852063.25	6230491.00	1852127.75	6230313.00	1852304.25	250.67	2.178	12.2
41	6230218.00	1852063.00	6230491.00	1852127.75	6230306.00	1852300.12	252.89	2.178	11.2
42	6230235.50	1852063.12	6230491.00	1852127.75	6230310.50	1852304.75	252.89	2.180	11.8
43	6230222.50	1852063.00	6230491.00	1852127.75	6230307.00	1852301.38	252.89	2.180	11.4
44	6230226.50	1852063.12	6230491.00	1852127.75	6230308.00	1852302.50	252.89	2.180	11.5
45	6230213.50	1852063.00	6230491.00	1852127.75	6230305.00	1852298.88	252.89	2.181	11.1
46	6230248.50	1852063.50	6230491.00	1852127.75	6230314.00	1852305.38	250.67	2.182	12.3
47	6230209.50	1852063.00	6230491.00	1852127.75	6230303.50	1852297.62	252.89	2.184	10.9
48	6230244.00	1852063.25	6230491.00	1852127.75	6230312.50	1852306.75	252.89	2.184	12.2
49	6230226.50	1852063.12	6230491.00	1852127.75	6230307.50	1852305.00	255.11	2.186	11.5
50	6230222.50	1852063.00	6230491.00	1852127.75	6230306.50	1852303.88	255.11	2.186	11.4
51	6230218.00	1852063.00	6230491.00	1852127.75	6230305.50	1852302.75	255.11	2.186	11.2
52	6230239.50	1852063.12	6230491.00	1852127.75	6230311.00	1852305.62	252.89	2.188	12.0
53	6230213.50	1852063.00	6230491.00	1852127.75	6230304.00	1852301.50	255.11	2.191	11.1
54	6230231.00	1852063.12	6230491.00	1852127.75	6230308.50	1852306.12	255.11	2.192	11.7
55	6230239.50	1852063.12	6230491.00	1852127.75	6230310.50	1852308.12	255.11	2.193	12.0
56	6230235.50	1852063.12	6230491.00	1852127.75	6230309.50	1852307.25	255.11	2.193	11.8
57	6230209.50	1852063.00	6230491.00	1852127.75	6230303.00	1852300.38	255.11	2.195	10.9
58	6230222.50	1852063.00	6230491.00	1852127.75	6230306.00	1852306.50	257.33	2.195	11.4
59	6230248.50	1852063.50	6230491.00	1852127.75	6230313.50	1852307.88	252.89	2.195	12.3
60	6230244.00	1852063.25	6230491.00	1852127.75	6230311.50	1852309.25	255.11	2.196	12.2
61	6230239.50	1852063.12	6230491.00	1852127.75	6230310.00	1852310.62	257.33	2.198	12.0
62	6230213.50	1852063.00	6230491.00	1852127.75	6230303.50	1852304.00	257.33	2.198	11.1
63	6230218.00	1852063.00	6230491.00	1852127.75	6230304.50	1852305.25	257.33	2.199	11.2
64	6230231.00	1852063.12	6230491.00	1852127.75	6230308.00	1852308.62	257.33	2.199	11.7
65	6230235.50	1852063.12	6230491.00	1852127.75	6230309.00	1852309.75	257.33	2.199	11.9
66	6230226.50	1852063.12	6230491.00	1852127.75	6230307.00	1852307.62	257.33	2.200	11.5
67	6230209.50	1852063.00	6230491.00	1852127.75	6230302.50	1852303.00	257.33	2.201	10.9
68	6230248.50	1852063.50	6230491.00	1852127.75	6230313.00	1852310.38	255.11	2.203	12.3

69	6230209.50	1852063.00	6230491.00	1852127.75	6230302.00	1852305.50	259.56	2.205	11.0
70	6230213.50	1852063.00	6230491.00	1852127.75	6230303.00	1852306.62	259.56	2.206	11.1
71	6230244.00	1852063.25	6230491.00	1852127.75	6230311.00	1852311.75	257.33	2.206	12.2
72	6230222.50	1852063.00	6230491.00	1852127.75	6230305.00	1852309.00	259.56	2.206	11.4
73	6230226.50	1852063.12	6230491.00	1852127.75	6230306.50	1852310.12	259.56	2.206	11.5
74	6230218.00	1852063.00	6230491.00	1852127.75	6230304.00	1852307.88	259.56	2.207	11.2
75	6230239.50	1852063.12	6230491.00	1852127.75	6230309.50	1852313.12	259.56	2.208	12.0
76	6230235.50	1852063.12	6230491.00	1852127.75	6230308.50	1852312.25	259.56	2.208	11.9
77	6230244.00	1852063.25	6230491.00	1852127.75	6230310.50	1852314.12	259.56	2.210	12.2
78	6230231.00	1852063.12	6230491.00	1852127.75	6230307.50	1852311.25	259.56	2.210	11.7
79	6230209.50	1852063.00	6230491.00	1852127.75	6230301.50	1852308.12	261.78	2.212	11.0
80	6230218.00	1852063.00	6230491.00	1852127.75	6230303.50	1852310.38	261.78	2.213	11.2
81	6230213.50	1852063.00	6230491.00	1852127.75	6230302.50	1852309.25	261.78	2.214	11.1
82	6230226.50	1852063.12	6230491.00	1852127.75	6230305.50	1852312.62	261.78	2.215	11.5
83	6230248.50	1852063.50	6230491.00	1852127.75	6230312.00	1852312.88	257.33	2.215	12.4
84	6230235.50	1852063.12	6230491.00	1852127.75	6230308.00	1852314.75	261.78	2.216	11.9
85	6230231.00	1852063.12	6230491.00	1852127.75	6230306.50	1852313.75	261.78	2.217	11.7
86	6230222.50	1852063.00	6230491.00	1852127.75	6230304.50	1852311.62	261.78	2.217	11.4
87	6230244.00	1852063.25	6230491.00	1852127.75	6230310.00	1852316.62	261.78	2.219	12.2
88	6230248.50	1852063.50	6230491.00	1852127.75	6230311.50	1852315.25	259.56	2.220	12.3
89	6230239.50	1852063.12	6230491.00	1852127.75	6230308.50	1852315.62	261.78	2.220	12.0
90	6230226.50	1852063.12	6230491.00	1852127.75	6230305.00	1852315.12	264.00	2.220	11.6
91	6230218.00	1852063.00	6230491.00	1852127.75	6230303.00	1852313.00	264.00	2.221	11.2
92	6230222.50	1852063.00	6230491.00	1852127.75	6230304.00	1852314.12	264.00	2.223	11.4
93	6230239.50	1852063.12	6230491.00	1852127.75	6230308.00	1852318.12	264.00	2.226	12.1
94	6230213.50	1852063.00	6230491.00	1852127.75	6230301.50	1852311.88	264.00	2.227	11.1
95	6230231.00	1852063.12	6230491.00	1852127.75	6230306.00	1852316.25	264.00	2.228	11.7
96	6230235.50	1852063.12	6230491.00	1852127.75	6230307.00	1852317.25	264.00	2.228	11.9
97	6230209.50	1852063.00	6230491.00	1852127.75	6230300.50	1852310.75	264.00	2.229	11.0
98	6230248.50	1852063.50	6230491.00	1852127.75	6230311.00	1852317.75	261.78	2.230	12.3
99	6230244.00	1852063.25	6230491.00	1852127.75	6230309.00	1852319.12	264.00	2.234	12.2

Critical Failure Surface (circle 1)

Intersects: XL: 6230239.50 YL: 1852063.12 XR: 6230491.00 YR: 1852127.75
 Centre: XC: 6230314.00 YC: 1852295.50 Radius: R: 244.00

Generated failure surface: (20 points)

6230239.50	1852063.12	6230253.50	1852059.12	6230267.50	1852056.00	6230281.50	1852053.62	6230296.00	1852052.12
6230310.50	1852051.50	6230325.00	1852051.75	6230339.00	1852052.75	6230353.50	1852054.75	6230367.50	1852057.50
6230381.50	1852061.00	6230395.50	1852065.38	6230408.50	1852070.62	6230422.00	1852076.62	6230434.50	1852083.38
6230447.00	1852090.88	6230458.50	1852099.00	6230470.00	1852108.00	6230481.00	1852117.50	6230491.00	1852127.75

Slice Geometry and Properties - Critical Failure Surface (circle 1, 43 slices)

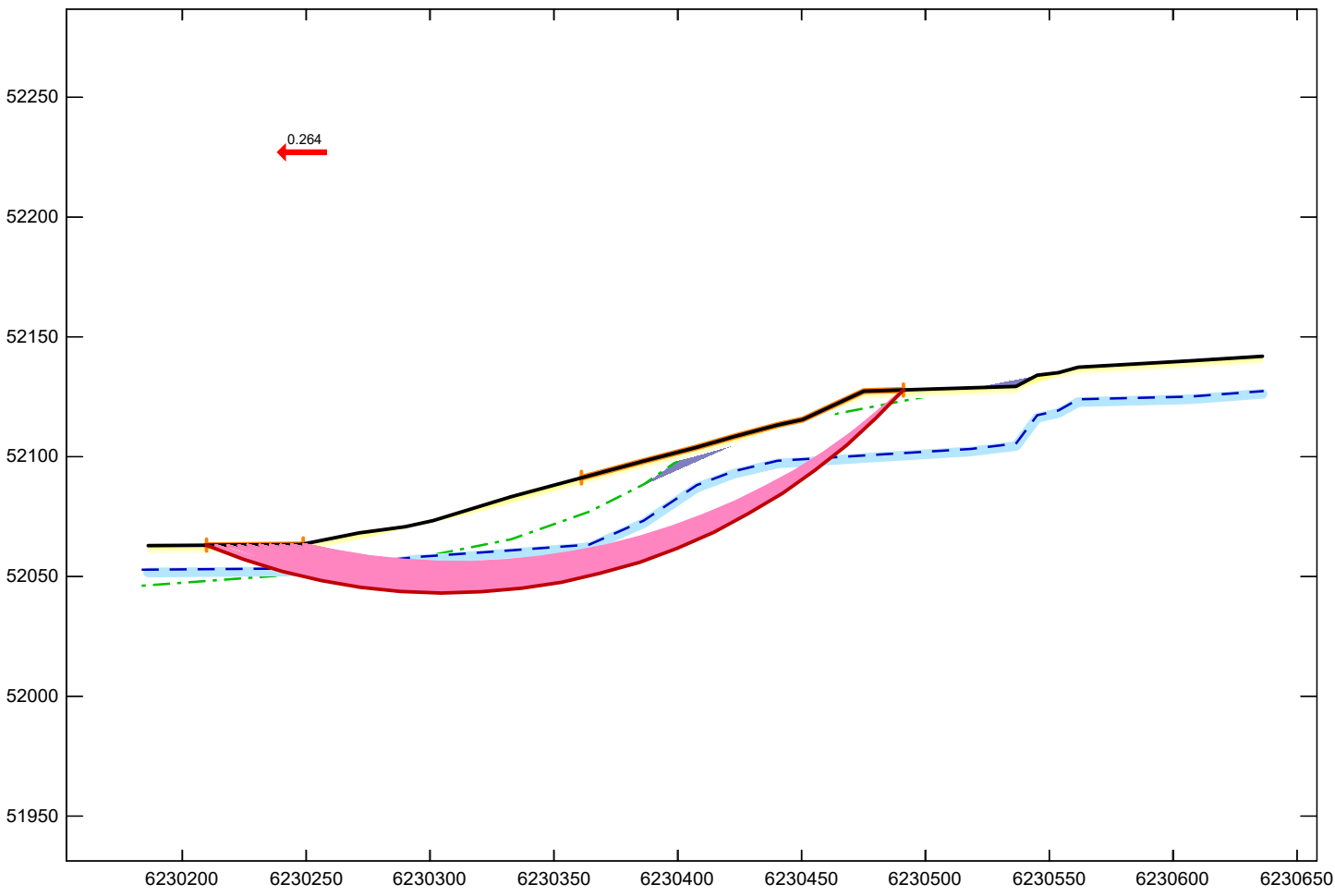
Slice	X-Left	X-S Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	PoreWater Force	--- Left Hand Side --- Side Force	l/h	l'/h
1	6230239.50	10.00	-15.7	8.00	8.31	3	872.00	11.0	1000.00	103.88	0.00	0.00	0.00
2	6230247.50	23.25	-16.3	6.00	6.25	3	872.00	11.0	2325.00	242.19	4430.20	0.83	0.33
3	6230253.50	48.12	-13.1	7.00	7.19	3	872.00	11.0	4812.50	494.05	8462.74	0.62	0.33
4	6230260.50	69.12	-12.1	7.00	7.16	3	872.00	11.0	6912.50	706.94	13532.87	0.54	0.33
5	6230267.50	42.00	-10.1	3.50	3.56	3	872.00	11.0	4200.00	426.64	19145.15	0.51	0.33
6	6230271.00	53.00	-8.9	4.00	4.05	3	872.00	11.0	5300.00	536.43	21974.09	0.50	0.33

7	6230275.00	96.69	-9.8	6.50	6.60	1	589.00	15.0	9640.31	978.36	25183.58	0.50	0.33
8	6230281.50	74.25	-6.3	4.50	4.53	1	589.00	15.0	7363.12	740.84	30316.76	0.50	0.33
9	6230286.00	70.00	-5.4	4.00	4.02	1	589.00	15.0	6927.50	695.79	33485.40	0.51	0.33
10	6230290.00	104.50	-6.5	5.50	5.54	1	589.00	15.0	10312.50	1037.89	36239.68	0.51	0.33
11	6230295.50	113.44	-2.6	5.50	5.51	1	589.00	15.0	11171.88	1118.34	40434.89	0.50	0.33
12	6230301.00	111.25	-1.4	5.00	5.00	1	589.00	15.0	10934.38	1093.78	43920.09	0.49	0.33
13	6230306.00	107.44	-3.2	4.50	4.51	1	589.00	15.0	10546.88	1056.31	46962.77	0.47	0.33
14	6230310.50	194.06	1.0	7.50	7.50	1	589.00	15.0	19026.56	1902.92	50168.32	0.46	0.33
15	6230318.00	196.00	1.0	7.00	7.00	1	589.00	15.0	19201.88	1920.49	54245.68	0.44	0.33
16	6230325.00	225.94	3.8	7.50	7.52	1	589.00	15.0	22120.31	2216.94	58169.42	0.43	0.33
17	6230332.50	206.38	4.4	6.50	6.52	1	589.00	15.0	20174.38	2023.40	61378.20	0.42	0.33
18	6230339.00	229.25	8.1	7.00	7.07	1	589.00	15.0	22373.75	2260.09	63976.09	0.41	0.33
19	6230346.00	254.06	7.6	7.50	7.57	1	589.00	15.0	24750.00	2496.90	65262.44	0.41	0.33
20	6230353.50	189.75	11.6	5.50	5.61	1	589.00	15.0	18462.81	1884.51	66853.25	0.40	0.33
21	6230359.00	193.19	10.3	5.50	5.59	1	589.00	15.0	18775.62	1908.34	66727.43	0.40	0.33
22	6230364.50	106.12	11.8	3.00	3.06	1	589.00	15.0	10305.00	1052.63	66982.61	0.39	0.33
23	6230367.50	249.38	14.0	7.00	7.22	1	589.00	15.0	24163.12	2490.68	66855.69	0.39	0.33
24	6230374.50	250.25	14.0	7.00	7.22	1	589.00	15.0	24185.00	2492.93	65609.46	0.39	0.33
25	6230381.50	161.44	17.0	4.50	4.71	1	589.00	15.0	15567.19	1627.77	64360.32	0.39	0.33
26	6230386.00	177.50	18.0	5.00	5.26	1	589.00	15.0	17078.12	1795.74	62778.04	0.39	0.33
27	6230391.00	159.19	17.0	4.50	4.71	1	589.00	15.0	15274.69	1597.18	60770.70	0.39	0.33
28	6230395.50	209.25	21.6	6.00	6.45	1	589.00	15.0	20002.50	2151.25	59242.31	0.39	0.33
29	6230401.50	204.75	22.6	6.00	6.50	1	589.00	15.0	19492.50	2111.69	55740.12	0.39	0.33
30	6230407.50	248.44	23.4	7.50	8.17	1	589.00	15.0	23601.56	2572.22	52042.70	0.39	0.33
31	6230415.00	224.00	24.1	7.00	7.67	1	589.00	15.0	21280.00	2330.43	47321.45	0.39	0.33
32	6230422.00	184.50	28.4	6.00	6.82	1	589.00	15.0	17527.50	1993.37	42916.00	0.39	0.33
33	6230428.00	189.31	28.3	6.50	7.38	1	589.00	15.0	17984.69	2042.62	38100.03	0.39	0.33
34	6230434.50	163.50	31.1	6.00	7.01	1	589.00	15.0	15532.50	1814.72	33308.24	0.39	0.33
35	6230440.50	161.69	30.8	6.50	7.57	1	589.00	15.0	15360.31	1788.27	28575.72	0.40	0.33
36	6230447.00	80.06	35.5	3.50	4.30	1	589.00	15.0	7610.31	935.23	24163.88	0.40	0.33
37	6230450.50	170.00	35.1	8.00	9.78	1	589.00	15.0	16480.00	2014.60	21494.00	0.41	0.33
38	6230458.50	107.25	37.7	5.50	6.95	1	589.00	15.0	10725.00	1355.39	15970.76	0.37	0.33
39	6230464.00	106.50	38.4	6.00	7.65	1	589.00	15.0	10995.00	1402.34	12043.90	0.34	0.33
40	6230470.00	79.38	41.2	5.00	6.64	1	589.00	15.0	8515.62	1131.53	8035.27	0.30	0.33
41	6230475.00	75.00	40.5	6.00	7.89	1	589.00	15.0	8340.00	1096.83	4697.11	0.29	0.33
42	6230481.00	36.00	45.8	4.50	6.45	1	589.00	15.0	4213.12	604.16	1939.52	0.37	0.33
43	6230485.50	16.50	45.6	5.50	7.87	4	100.00	25.0	2062.50	295.01	883.43	0.41	0.33
RHS	6230491.00	-----		-----					-----		-15.79	0.00	0.00
	X-S Area:	5971.69		Path Length:	273.86				X-S Weight:	582628.12			

FoS Ranges <=1.00 >1.00 <=1.20 >1.20 <=1.40 >1.40

Material Keys

- 1: Jos
- 3: Qls



Analysis 2

Multiple Stability Analysis
 Method: Spencer-Wright
 Surface: Circular

Results

Critical Factor of Safety: 1.01
 Interslice Force (Final) Angle: 8.2°

GALENA Version 7.2

Edited: 27 Jul 2023 Processed: 27 Jul 2023

Project Parmar 280611
 Engineering Geologic Cross Section C-C' with Proposed Grading

File: C:\Users\katie\Dropbox\ATC\Galena mStab Files\Model Files\Parmar\CC Update.gmf

Associated Terra Consultants, Inc.

DATA: Analysis 2 - Engineering Geologic Cross Section C-C' with Proposed Grading

Material Properties (4 materials)

Material:	Cohesion	Phi	PI	UnitWeight	Ru	
1 (Mohr-Coulomb Cu increases with depth) - Jos	589.00	15.0	15	95.00	0.10	
2 (Mohr-Coulomb Cu increases with depth) - fm	674.00	23.0	15	95.00	0.10	
3 (Mohr-Coulomb Cu increases with depth) - Qls	872.00	11.0	15	100.00	0.10	
4 (Mohr-Coulomb Cu increases with depth) - Qaf	100.00	25.0	15	125.00	0.10	

Water Properties

Unit weight of water: 62.430 Unit weight of water/medium above ground: 0.000

Material Profiles (3 profiles)

Profile: 1 (3 points)	Material beneath: 4 - Qaf								
6230450.50	1852115.50	6230475.00	1852127.25	6230518.50	1852128.62				
Profile: 2 (16 points)	Material beneath: 1 - Jos								
6230184.00	1852046.12	6230250.50	1852051.12	6230295.50	1852057.75	6230333.00	1852065.50	6230364.50	1852077.00
6230386.00	1852088.38	6230407.50	1852103.88	6230422.50	1852108.25	6230440.50	1852113.25	6230518.50	1852128.62
6230536.50	1852129.25	6230545.00	1852133.88	6230553.50	1852135.00	6230561.50	1852137.25	6230606.50	1852140.00
6230636.00	1852141.88								
Profile: 3 (2 points)	Material beneath: 3 - Qls								
6230166.00	1852175.00	6230645.00	1852172.00						

Slope Surface (18 points)

6230186.00	1852062.75	6230247.50	1852063.25	6230271.00	1852068.12	6230290.00	1852070.75	6230301.00	1852073.25
6230332.50	1852083.25	6230386.00	1852098.12	6230407.50	1852103.88	6230422.50	1852108.25	6230440.50	1852113.25
6230450.50	1852115.50	6230475.00	1852127.25	6230536.50	1852129.25	6230545.00	1852133.88	6230553.50	1852135.00
6230561.50	1852137.25	6230606.50	1852140.00	6230636.00	1852141.88				

Phreatic Surface (16 points)

6230184.00	1852052.75	6230250.50	1852053.25	6230295.50	1852058.12	6230333.00	1852060.75	6230364.50	1852063.25
6230386.00	1852073.25	6230407.50	1852088.12	6230422.50	1852093.88	6230440.50	1852098.25	6230518.50	1852103.25
6230536.50	1852105.50	6230545.00	1852117.25	6230553.50	1852119.25	6230561.50	1852123.88	6230606.50	1852125.00
6230636.00	1852127.25								

Failure Surface

Initial circular surface for critical search defined by: XL, XR, R

Intersects: XL: 6230229.00 YL: 1852063.12 XR: 6230426.00 YR: 1852109.25
 Centre: XC: 6230274.50 YC: 1852313.00 Radius: R: 254.00

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.264

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	39.00	130.00	20.00
Trial positions within range:	10	10	10

RESULTS: Analysis 2 - Engineering Geologic Cross Section C-C' with Proposed Grading

Spencer-Wright Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 1.833 Final Angle of Interslice Forces (Theta): 7.7 degrees

Analysis Summary

There were: 969 successful analyses from a total of 1001 trial failure surfaces (Theta filter applied)
32 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety: 1.01 Final Angle of Interslice Forces: 8.2 degrees

Negative interslice forces exist on one or more slices; examine slice data and consult the GALENA Help utility

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	Theta	
1	6230209.50	1852063.00	6230491.00	1852127.75	6230306.00	1852287.00	244.00	1.008	8.2	<-- Critical Surface
2	6230213.50	1852063.00	6230491.00	1852127.75	6230307.00	1852288.25	244.00	1.012	8.3	
3	6230209.50	1852063.00	6230491.00	1852127.75	6230305.50	1852289.75	246.22	1.013	8.2	
4	6230213.50	1852063.00	6230491.00	1852127.75	6230306.50	1852290.88	246.22	1.015	8.4	
5	6230218.00	1852063.00	6230491.00	1852127.75	6230308.50	1852289.62	244.00	1.016	8.5	
6	6230209.50	1852063.00	6230491.00	1852127.75	6230305.00	1852292.38	248.44	1.017	8.2	
7	6230222.50	1852063.00	6230491.00	1852127.75	6230309.50	1852290.88	244.00	1.019	8.7	
8	6230218.00	1852063.00	6230491.00	1852127.75	6230308.00	1852292.25	246.22	1.020	8.5	
9	6230209.50	1852063.00	6230491.00	1852127.75	6230304.50	1852295.00	250.67	1.021	8.2	
10	6230213.50	1852063.00	6230491.00	1852127.75	6230306.00	1852293.62	248.44	1.022	8.4	
11	6230222.50	1852063.00	6230491.00	1852127.75	6230309.00	1852293.50	246.22	1.024	8.7	
12	6230226.50	1852063.12	6230491.00	1852127.75	6230310.50	1852292.12	244.00	1.025	9.0	
13	6230218.00	1852063.00	6230491.00	1852127.75	6230307.00	1852294.88	248.44	1.026	8.5	
14	6230213.50	1852063.00	6230491.00	1852127.75	6230305.50	1852296.25	250.67	1.027	8.4	
15	6230209.50	1852063.00	6230491.00	1852127.75	6230303.50	1852297.62	252.89	1.027	8.3	
16	6230222.50	1852063.00	6230491.00	1852127.75	6230308.50	1852296.12	248.44	1.028	8.9	
17	6230231.00	1852063.12	6230491.00	1852127.75	6230312.00	1852293.38	244.00	1.028	9.2	
18	6230226.50	1852063.12	6230491.00	1852127.75	6230310.00	1852294.75	246.22	1.030	9.0	
19	6230213.50	1852063.00	6230491.00	1852127.75	6230305.00	1852298.88	252.89	1.030	8.4	

20	6230218.00	1852063.00	6230491.00	1852127.75	6230306.50	1852297.50	250.67	1.031	8.5
21	6230235.50	1852063.12	6230491.00	1852127.75	6230313.00	1852294.50	244.00	1.031	9.3
22	6230209.50	1852063.00	6230491.00	1852127.75	6230303.00	1852300.38	255.11	1.033	8.3
23	6230231.00	1852063.12	6230491.00	1852127.75	6230311.00	1852295.88	246.22	1.034	9.2
24	6230239.50	1852063.12	6230491.00	1852127.75	6230314.00	1852295.50	244.00	1.034	9.6
25	6230218.00	1852063.00	6230491.00	1852127.75	6230306.00	1852300.12	252.89	1.035	8.7
26	6230226.50	1852063.12	6230491.00	1852127.75	6230309.50	1852297.38	248.44	1.035	9.0
27	6230222.50	1852063.00	6230491.00	1852127.75	6230307.50	1852298.75	250.67	1.036	8.8
28	6230213.50	1852063.00	6230491.00	1852127.75	6230304.00	1852301.50	255.11	1.037	8.4
29	6230209.50	1852063.00	6230491.00	1852127.75	6230302.50	1852303.00	257.33	1.038	8.3
30	6230226.50	1852063.12	6230491.00	1852127.75	6230309.00	1852299.88	250.67	1.039	9.0
31	6230231.00	1852063.12	6230491.00	1852127.75	6230310.50	1852298.50	248.44	1.039	9.2
32	6230235.50	1852063.12	6230491.00	1852127.75	6230312.00	1852297.12	246.22	1.039	9.3
33	6230218.00	1852063.00	6230491.00	1852127.75	6230305.50	1852302.75	255.11	1.040	8.7
34	6230209.50	1852063.00	6230491.00	1852127.75	6230302.00	1852305.50	259.56	1.040	8.3
35	6230222.50	1852063.00	6230491.00	1852127.75	6230307.00	1852301.38	252.89	1.040	8.9
36	6230213.50	1852063.00	6230491.00	1852127.75	6230303.50	1852304.00	257.33	1.041	8.6
37	6230244.00	1852063.25	6230491.00	1852127.75	6230315.00	1852296.75	244.00	1.041	9.7
38	6230239.50	1852063.12	6230491.00	1852127.75	6230313.00	1852298.12	246.22	1.042	9.5
39	6230231.00	1852063.12	6230491.00	1852127.75	6230310.00	1852301.00	250.67	1.043	9.2
40	6230235.50	1852063.12	6230491.00	1852127.75	6230311.50	1852299.62	248.44	1.043	9.4
41	6230222.50	1852063.00	6230491.00	1852127.75	6230306.50	1852303.88	255.11	1.044	8.9
42	6230244.00	1852063.25	6230491.00	1852127.75	6230314.50	1852299.25	246.22	1.045	9.8
43	6230209.50	1852063.00	6230491.00	1852127.75	6230301.50	1852308.12	261.78	1.045	8.5
44	6230213.50	1852063.00	6230491.00	1852127.75	6230303.00	1852306.62	259.56	1.046	8.6
45	6230226.50	1852063.12	6230491.00	1852127.75	6230308.00	1852302.50	252.89	1.046	9.0
46	6230218.00	1852063.00	6230491.00	1852127.75	6230304.50	1852305.25	257.33	1.046	8.7
47	6230239.50	1852063.12	6230491.00	1852127.75	6230312.50	1852300.62	248.44	1.047	9.5
48	6230235.50	1852063.12	6230491.00	1852127.75	6230311.00	1852302.12	250.67	1.047	9.4
49	6230248.50	1852063.50	6230491.00	1852127.75	6230316.00	1852297.88	244.00	1.048	9.9
50	6230231.00	1852063.12	6230491.00	1852127.75	6230309.50	1852303.62	252.89	1.049	9.2
51	6230222.50	1852063.00	6230491.00	1852127.75	6230306.00	1852306.50	257.33	1.049	8.9
52	6230226.50	1852063.12	6230491.00	1852127.75	6230307.50	1852305.00	255.11	1.050	9.0
53	6230239.50	1852063.12	6230491.00	1852127.75	6230312.00	1852303.12	250.67	1.051	9.6
54	6230213.50	1852063.00	6230491.00	1852127.75	6230302.50	1852309.25	261.78	1.051	8.6
55	6230248.50	1852063.50	6230491.00	1852127.75	6230315.50	1852300.38	246.22	1.051	9.9
56	6230218.00	1852063.00	6230491.00	1852127.75	6230304.00	1852307.88	259.56	1.051	8.7
57	6230244.00	1852063.25	6230491.00	1852127.75	6230313.50	1852301.75	248.44	1.052	9.8
58	6230209.50	1852063.00	6230491.00	1852127.75	6230300.50	1852310.75	264.00	1.053	8.5
59	6230235.50	1852063.12	6230491.00	1852127.75	6230310.50	1852304.75	252.89	1.053	9.4
60	6230218.00	1852063.00	6230491.00	1852127.75	6230303.50	1852310.38	261.78	1.055	8.7
61	6230231.00	1852063.12	6230491.00	1852127.75	6230308.50	1852306.12	255.11	1.055	9.2
62	6230222.50	1852063.00	6230491.00	1852127.75	6230305.00	1852309.00	259.56	1.056	8.9
63	6230248.50	1852063.50	6230491.00	1852127.75	6230315.00	1852302.88	248.44	1.056	10.0
64	6230226.50	1852063.12	6230491.00	1852127.75	6230307.00	1852307.62	257.33	1.057	9.1
65	6230244.00	1852063.25	6230491.00	1852127.75	6230313.00	1852304.25	250.67	1.057	9.8
66	6230213.50	1852063.00	6230491.00	1852127.75	6230301.50	1852311.88	264.00	1.058	8.6
67	6230231.00	1852063.12	6230491.00	1852127.75	6230308.00	1852308.62	257.33	1.059	9.2
68	6230239.50	1852063.12	6230491.00	1852127.75	6230311.00	1852305.62	252.89	1.059	9.5
69	6230218.00	1852063.00	6230491.00	1852127.75	6230303.00	1852313.00	264.00	1.060	8.8
70	6230235.50	1852063.12	6230491.00	1852127.75	6230309.50	1852307.25	255.11	1.060	9.4
71	6230226.50	1852063.12	6230491.00	1852127.75	6230306.50	1852310.12	259.56	1.061	9.1

72	6230244.00	1852063.25	6230491.00	1852127.75	6230312.50	1852306.75	252.89	1.061	9.8
73	6230222.50	1852063.00	6230491.00	1852127.75	6230304.50	1852311.62	261.78	1.062	8.9
74	6230248.50	1852063.50	6230491.00	1852127.75	6230314.00	1852305.38	250.67	1.063	10.0
75	6230239.50	1852063.12	6230491.00	1852127.75	6230310.50	1852308.12	255.11	1.063	9.6
76	6230235.50	1852063.12	6230491.00	1852127.75	6230309.00	1852309.75	257.33	1.064	9.4
77	6230231.00	1852063.12	6230491.00	1852127.75	6230307.50	1852311.25	259.56	1.066	9.3
78	6230226.50	1852063.12	6230491.00	1852127.75	6230305.50	1852312.62	261.78	1.066	9.1
79	6230222.50	1852063.00	6230491.00	1852127.75	6230304.00	1852314.12	264.00	1.066	9.0
80	6230239.50	1852063.12	6230491.00	1852127.75	6230310.00	1852310.62	257.33	1.067	9.6
81	6230244.00	1852063.25	6230491.00	1852127.75	6230311.50	1852309.25	255.11	1.068	9.8
82	6230248.50	1852063.50	6230491.00	1852127.75	6230313.50	1852307.88	252.89	1.069	10.0
83	6230235.50	1852063.12	6230491.00	1852127.75	6230308.50	1852312.25	259.56	1.070	9.4
84	6230226.50	1852063.12	6230491.00	1852127.75	6230305.00	1852315.12	264.00	1.070	9.1
85	6230231.00	1852063.12	6230491.00	1852127.75	6230306.50	1852313.75	261.78	1.071	9.3
86	6230239.50	1852063.12	6230491.00	1852127.75	6230309.50	1852313.12	259.56	1.072	9.6
87	6230244.00	1852063.25	6230491.00	1852127.75	6230311.00	1852311.75	257.33	1.073	9.8
88	6230235.50	1852063.12	6230491.00	1852127.75	6230308.00	1852314.75	261.78	1.074	9.5
89	6230248.50	1852063.50	6230491.00	1852127.75	6230313.00	1852310.38	255.11	1.074	10.0
90	6230244.00	1852063.25	6230491.00	1852127.75	6230310.50	1852314.12	259.56	1.075	9.9
91	6230231.00	1852063.12	6230491.00	1852127.75	6230306.00	1852316.25	264.00	1.077	9.3
92	6230239.50	1852063.12	6230491.00	1852127.75	6230308.50	1852315.62	261.78	1.079	9.7
93	6230244.00	1852063.25	6230491.00	1852127.75	6230310.00	1852316.62	261.78	1.081	9.9
94	6230248.50	1852063.50	6230491.00	1852127.75	6230312.00	1852312.88	257.33	1.081	10.1
95	6230235.50	1852063.12	6230491.00	1852127.75	6230307.00	1852317.25	264.00	1.081	9.5
96	6230239.50	1852063.12	6230491.00	1852127.75	6230308.00	1852318.12	264.00	1.083	9.7
97	6230248.50	1852063.50	6230491.00	1852127.75	6230311.50	1852315.25	259.56	1.084	10.0
98	6230244.00	1852063.25	6230491.00	1852127.75	6230309.00	1852319.12	264.00	1.089	9.9
99	6230248.50	1852063.50	6230491.00	1852127.75	6230311.00	1852317.75	261.78	1.090	10.1

Critical Failure Surface (circle 1)

Intersects: XL: 6230209.50 YL: 1852063.00 XR: 6230491.00 YR: 1852127.75
Centre: XC: 6230306.00 YC: 1852287.00 Radius: R: 244.00

Generated failure surface: (20 points)

6230209.50	1852063.00	6230224.50	1852057.00	6230240.00	1852052.12	6230256.00	1852048.25	6230272.00	1852045.38
6230288.00	1852043.62	6230304.50	1852043.00	6230320.50	1852043.50	6230337.00	1852045.00	6230353.00	1852047.50
6230368.50	1852051.25	6230384.50	1852055.88	6230399.50	1852061.62	6230414.50	1852068.38	6230428.50	1852076.12
6230442.50	1852084.75	6230455.50	1852094.25	6230468.00	1852104.62	6230480.00	1852115.88	6230491.00	1852127.75

Slice Geometry and Properties - Critical Failure Surface (circle 1, 47 slices)

Slice	X-Left	X-S Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	PoreWater Force	--- Left Hand Side	l/h	l'/h
1	6230209.50	10.31	-21.8	7.50	8.08	3	872.00	11.0	1031.25	111.07	0.00	0.00	0.00
2	6230217.00	34.69	-21.8	7.50	8.08	3	872.00	11.0	3468.75	373.60	9479.09	0.68	0.33
3	6230224.50	47.12	-17.1	6.50	6.80	3	872.00	11.0	4712.50	493.05	19918.65	0.65	0.33
4	6230231.00	54.75	-17.4	6.00	6.29	3	872.00	11.0	5475.00	573.61	28339.68	0.65	0.33
5	6230237.00	31.50	-18.4	3.00	3.16	3	872.00	11.0	3150.00	332.04	36480.08	0.65	0.33
6	6230240.00	65.31	-14.0	5.50	5.67	3	872.00	11.0	6531.25	673.23	40793.08	0.65	0.33
7	6230245.50	25.50	-14.0	2.00	2.06	1	589.00	15.0	2546.25	262.46	47660.49	0.65	0.33
8	6230247.50	40.50	-11.8	3.00	3.06	1	589.00	15.0	4035.00	412.16	49755.26	0.66	0.33
9	6230250.50	84.56	-14.0	5.50	5.67	1	589.00	15.0	8387.50	864.56	52651.12	0.64	0.33

10	6230256.00	137.81	-10.4	7.50	7.62	1	589.00	15.0	13593.75	1382.03	58662.93	0.61	0.33
11	6230263.50	157.50	-10.4	7.50	7.62	1	589.00	15.0	15478.12	1573.61	65949.95	0.58	0.33
12	6230271.00	200.81	-6.7	8.50	8.56	1	589.00	15.0	19666.88	1980.25	73486.62	0.56	0.33
13	6230279.50	219.94	-5.9	8.50	8.54	1	589.00	15.0	21478.44	2159.19	80707.50	0.55	0.33
14	6230288.00	54.00	-3.6	2.00	2.00	1	589.00	15.0	5268.75	527.90	87700.76	0.54	0.33
15	6230290.00	154.00	-1.3	5.50	5.50	1	589.00	15.0	15015.00	1501.89	89127.19	0.54	0.33
16	6230295.50	161.56	-2.6	5.50	5.51	1	589.00	15.0	15743.75	1576.00	92448.98	0.53	0.33
17	6230301.00	108.06	-2.0	3.50	3.50	1	589.00	15.0	10521.88	1052.86	96136.81	0.51	0.33
18	6230304.50	260.00	1.8	8.00	8.00	1	589.00	15.0	25310.00	2532.24	98387.62	0.50	0.33
19	6230312.50	278.00	1.8	8.00	8.00	1	589.00	15.0	27050.00	2706.32	101868.06	0.48	0.33
20	6230320.50	219.75	4.8	6.00	6.02	1	589.00	15.0	21382.50	2145.66	105239.28	0.46	0.33
21	6230326.50	227.25	5.9	6.00	6.03	1	589.00	15.0	22113.75	2223.34	106641.84	0.44	0.33
22	6230332.50	176.06	4.8	4.50	4.52	1	589.00	15.0	17125.31	1718.47	107515.14	0.43	0.33
23	6230337.00	320.00	8.9	8.00	8.10	1	589.00	15.0	31090.00	3146.72	108413.69	0.43	0.33
24	6230345.00	328.00	8.9	8.00	8.10	1	589.00	15.0	31820.00	3220.61	107818.97	0.42	0.33
25	6230353.00	249.00	14.0	6.00	6.18	1	589.00	15.0	24131.25	2487.39	106985.66	0.41	0.33
26	6230359.00	230.31	12.8	5.50	5.64	1	589.00	15.0	22302.50	2287.12	104235.60	0.40	0.33
27	6230364.50	168.00	14.0	4.00	4.12	1	589.00	15.0	16255.00	1675.53	101984.48	0.40	0.33
28	6230368.50	336.00	15.7	8.00	8.31	1	589.00	15.0	32445.00	3370.38	99946.34	0.39	0.33
29	6230376.50	335.00	16.5	8.00	8.35	1	589.00	15.0	32270.00	3366.20	94785.40	0.39	0.33
30	6230384.50	62.62	22.6	1.50	1.62	1	589.00	15.0	6024.38	652.64	89149.41	0.38	0.33
31	6230386.00	288.75	20.6	7.00	7.48	1	589.00	15.0	27715.62	2960.03	87512.11	0.38	0.33
32	6230393.00	263.25	21.0	6.50	6.96	1	589.00	15.0	25175.31	2697.32	80945.16	0.38	0.33
33	6230399.50	315.00	24.4	8.00	8.78	1	589.00	15.0	29995.00	3293.07	74873.05	0.38	0.33
34	6230407.50	266.88	24.1	7.00	7.67	1	589.00	15.0	25353.12	2776.48	66225.69	0.37	0.33
35	6230414.50	292.00	28.7	8.00	9.12	1	589.00	15.0	27740.00	3161.72	59189.18	0.37	0.33
36	6230422.50	207.75	29.4	6.00	6.88	1	589.00	15.0	19736.25	2264.43	49754.65	0.37	0.33
37	6230428.50	196.50	32.0	6.00	7.08	1	589.00	15.0	18667.50	2201.36	43040.58	0.37	0.33
38	6230434.50	184.50	31.1	6.00	7.01	1	589.00	15.0	17527.50	2047.81	36180.16	0.36	0.33
39	6230440.50	58.75	32.0	2.00	2.36	1	589.00	15.0	5581.25	658.17	30203.45	0.36	0.33
40	6230442.50	216.00	36.3	8.00	9.93	1	589.00	15.0	20530.00	2547.13	28291.22	0.36	0.33
41	6230450.50	121.88	35.9	5.00	6.18	1	589.00	15.0	11728.12	1448.61	20492.99	0.36	0.33
42	6230455.50	146.25	39.6	6.50	8.43	1	589.00	15.0	14430.00	1872.46	16400.59	0.33	0.33
43	6230462.00	122.25	39.8	6.00	7.81	1	589.00	15.0	12401.25	1614.28	10964.63	0.29	0.33
44	6230468.00	124.25	43.4	7.00	9.64	1	589.00	15.0	13116.25	1805.92	6578.21	0.24	0.33
45	6230475.00	69.38	42.8	5.00	6.81	1	589.00	15.0	7621.88	1038.26	1957.93	0.21	0.33
46	6230480.00	50.25	47.3	6.00	8.85	1	589.00	15.0	5831.25	859.71	83.19	2.75	0.33
47	6230486.00	13.75	47.1	5.00	7.34	4	100.00	25.0	1703.12	250.05	465.21	0.44	0.33
RHS	6230491.00	-----		-----					-----		-55.63	0.00	0.00
	X-S Area:	7715.31	Path Length:	309.05			X-S Weight:	750277.19					

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