GOLD COAST GEOSERVICES, INC.

Engineering Geologic and Geotechnical Consultants

June 5, 2020
File No. GC18-092902

LARRY MOSLER
OJAI QUARRY
15558 Maricopa Highway
Ojai, CA

SUBJECT: Updated Stability Analysis for Ojai Quarry, Mine ID #91-56-0025, Ojai, County of Ventura.

Dear Mr. Mosler:

In accordance with your request, and as required in a letter issued by the State of California Department of Conservation Division of Mine Reclamation, this report was prepared to provide baseline geologic and geotechnical conditions for the entire project area in the proposed Reclamation Plan Amendment (RPA) for the Ojai Quarry. The scope of work in preparation of this report included the following:

1. Site meetings with the quarry operator, Larry Mosler, to observe and review quarry operations and to review the proposed RPA provided by Jensen Design & Survey.

2. Review of previous geologic and geotechnical reports for the Ojai Quarry, prepared by Norfleet Consultants.

3. Review of pertinent geologic and geotechnical maps and documents for use in evaluation of slope design analysis and recommendations for the RPA.

4. Slope stability analysis to determine the static and pseudo-static (seismic) safety factors for the slope design for the RPA by Jensen Design & Survey.

DISCUSSION OF RPA

The RPA prepared by Jensen Design & Survey (see Appendix III with this report) proposes expanded mining limits that extend north-northeasterly from the mining limits that were evaluated by Norfleet Consultants in a report dated December 5, 2011. The cross-sections by Jensen Design & Survey (see Appendix III) show the proposed slope configurations within the expanded mining limits area and including the slope configurations within the lower current mining area. The RPA proposes 1h:v1 slope configurations, with maximum proposed slope height of 30 feet and intervening 10 feet wide benches. The RPA area has a maximum total slope relief of about 560 feet.

GEOLOGIC SETTING

The Ojai Quarry is located within Matilija Canyon in the southeast part of the Topatopa Mountains. The rock material within the quarry consists of light-colored sandstone and light to dark-colored siltstone, assigned to the Matilija Formation or Matilija Sandstone of marine origin and Eocene age. The geology of the Ojai Quarry is discussed in detail in the Norfleet report (2011), and the reader is therefore referred to that report for a thorough and detailed geologic discussion and analysis of the site conditions (see Appendix II).

The geologic conditions within the RPA are essentially the same as those discussed in the Norfleet report (2011). Norfleet subdivided the Matilija sandstone into three domains or geomechanical units (GMU's), as shown on the Geotechnical Map with this report. The rock domains or GMU's per Norfleet extend into the RPA to the north of the area mapped by Norfleet, as shown on the Geotechnical Map. The rock types are separated by very high angle, essentially vertical to overturned bedding structure across the quarry. Jointing planes are typically high angle, commonly developed parallel or subparallel to bedding. No daylighted bedding or daylighted jointing plane conditions are anticipated.

STABILITY ANALYSIS

In the detailed slope stability analysis of the Ojai Quarry design slopes as previously performed by Norfleet Consultants (see Appendix II), the Matilija Sandstone was separated into 3 predominant rock types, identified as Domain A, Domain B, and Domain C.

The rockmass exposed in the quarry slopes varies from GOOD to VERY GOOD rock quality.

Uniaxial compressive rock strength varies from MEDIUM STRONG to VERY STRONG (Domains B and C), and from STRONG to EXTREMELY STRONG (Domain A sandstone).

Rock structure is classified as varying from BLOCKY to VERY BLOCKY.

The Matilija Sandstone varies from INTACT to STRONGLY JOINTED. Jointing surfaces vary from widely spaced to close. Most jointing surfaces are classified as varying from FAIR (smooth, moderately weathered and altered) to VERY GOOD (very rough, fresh unweathered surfaces).

From the laboratory test data and rock characterization, the following rockmass properties were determined by Norfleet for Domain A sandstone:

Intact rock strength (sigma ci) = 2,000 Ksf (from uniaxial compression tests)
Hoek-Brown constant (mi) = 17 ± 5
Geological Strength Index (GSI) = 40 to 50
Mohr-Coulomb fit for sandstone: cohesion = 11 to 26 Ksf and friction angle = 45°- 51°
Mohr-Coulomb fit for siltstone: cohesion = 2.1 to 4 Ksf and friction angle = 18°- 30°

The GSI was estimated using charts from Hoek (2008).

ROCK SLOPE STABILITY ANALYSIS

The attached slope stability analysis has been performed using shear strength parameters as previously reported by Norfleet Consultants for Domain A and B. The shear strengths are based on the Hoek-Brown Criterion and the Geologic Strength Index, and are considered to be reasonable from an engineering geologic standpoint.

Stability data printout sheets generated using GSTABL are presented in Appendix I. Adequate factors of safety against slope failure were determined for all cases, assuming circular failure mode for all cases. Shear strength parameters determined from the Hoek-Brown Criterion and Geological Strength Index and as previously reported by Norfleet Consultants were used in the analysis, and are considered to be acceptable for the rock conditions at this quarry.

ROCKFALL

As noted in the report by Norfleet Consultants, rocks will occasionally fall from working slopes and finished rock slopes. The proposed benches between the proposed 1:1 cut slopes are intended to mitigate the rockfall hazard potential by effectively reducing the potential for rocks to roll beyond the benches.

CONCLUSIONS

The results of the stability analysis indicate that the mining reclamation plan slopes will possess adequate safety factors against large-scale slope failure under static conditions and in the event of an earthquake. It is noted that the geologic conditions at this quarry are characterized as geologically complex, so that it is recommended that excavations be evaluated annually (or more frequently if mining operations become accelerated) by the engineering geologist, to verify the continuity of the geologic conditions that are anticipated in the analysis, and to provide updated analysis and recommendations if conditions are encountered that are found to differ from those discussed in this report.

REMARKS

Please call this office at (805) 484-5070 if you have any questions regarding this report.

Respectfully submitted,

GOLD COAST GEOSERVICES, INC.

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REFERENCES CITED

Hoek, E. and Brown, E.T., 1980a, *Underground excavations in rock*, London: Institution of Mining and Metallurgy.

Hoek, E., and Bray, J., (1981), *Rock slope engineering*, London: Institution of Mining and Metalurgy, London.

Hoek, E., Caranza-Torres, CT, Corcum, B. (2002), Hoek-Brown failure criterion- 2002 edition. In: Bawden HRW, Curran J., Telsenicki, M. (eds), Proceedings of the North American Rock Mechanics Society (NARMS-TAC 2002) Mining Innovation and Technology, Toronto, pp 267-273.

Hoek, E. (2008), Course notes entitled Practical Rock Engineering.

Norfleet Consultants, Slope Stability Study For the Ojai Quarry Reclamation Plan, Ojai, CA, dated 12/5/2011.

Norfleet Consultants, Supplemental Slope Stability Review for the Ojai Quarry, Ojai, CA, dated 6/18/2015.

Norfleet Consultants, Geologic/Slope Review, Ojai Quarry, Ojai, CA, dated 01/15/2018.

Rocscience (2007), Roclab, v. 1.031, Computer software for analysis of rock mass strength.

APPENDIX I

SLOPE STABILITY ANALYSIS DATA SHEETS

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

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Analysis Run Date: 6/1/2020
Time of Run: 01:47PM
Run By: IM
Input Data Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-4, circular failure, static.in
Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-4, circular failure, static.OUT
Unit System: English

Plotted Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-4, circular failure, static.PLT

PROBLEM DESCRIPTION: 15558 Maricopa Hwy, Ojai: Section T-4
Circular, Static

BOUNDARY COORDINATES

11 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	70.00	50.00	45.00	1
2	50.00	45.00	85.00	50.00	1

3	85.00	50.00	110.00	90.00	1
4	110.00	90.00	140.00	90.00	1
5	140.00	90.00	220.00	150.00	1
6	220.00	150.00	340.00	150.00	1
7	340.00	150.00	1247.00	845.00	1
8	1247.00	845.00	1257.00	845.00	1
9	1257.00	845.00	1260.00	860.00	1
10	1260.00	860.00	1390.00	900.00	1
11	1390.00	900.00	1550.00	930.00	1

Default Y-Origin = 0.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	150.0	26000.0	45.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

10 Surface(s) Initiate(s) From Each Of 100 Points Equally Spaced Along The Ground Surface Between X = 340.00(ft) and X =1260.00(ft)

Each Surface Terminates Between X =1275.00(ft) and X =1550.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

30.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 1000

Number of Failed Attempts to Generate Trial Surface = 9

Number of Trial Surfaces With Valid FS = 991

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.9 %

Statistical Data On All Valid FS Values:
FS Max = 119.249 FS Min = 3.447 FS Ave = 8.639
Standard Deviation = 7.816 Coefficient of Variation = 90.47 %

Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	340.000	150.000
2	369.935	148.026
3	399.911	146.820
4	429.908	146.383
5	459.906	146.716
6	489.885	147.819
7	519.827	149.690
8	549.711	152.328
9	579.517	155.732
10	609.226	159.900
11	638.819	164.828
12	668.275	170.513
13	697.576	176.952
14	726.702	184.141
15	755.634	192.074
16	784.353	200.747
17	812.840	210.154
18	841.076	220.288
19	869.044	231.143
20	896.723	242.712
21	924.097	254.987
22	951.147	267.960
23	977.855	281.623
24	1004.204	295.966

25	1030.176	310.981
26	1055.755	326.657
27	1080.923	342.983
28	1105.665	359.950
29	1129.962	377.546
30	1153.801	395.759
31	1177.164	414.578
32	1200.038	433.990
33	1222.405	453.982
34	1244.253	474.541
35	1265.566	495.654
36	1286.330	517.307
37	1306.532	539.485
38	1326.159	562.174
39	1345.198	585.359
40	1363.635	609.025
41	1381.459	633.155
42	1398.659	657.736
43	1415.222	682.749
44	1431.138	708.178
45	1446.397	734.008
46	1460.988	760.221
47	1474.902	786.799
48	1488.130	813.725
49	1500.663	840.982
50	1512.492	868.551
51	1523.610	896.415
52	1534.011	924.554
53	1534.901	927.169

Factor of Safety
*** 3.447 ***

Individual data on the 56 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	29.9	55931.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	30.0	166365.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	30.0	273563.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	30.0	377239.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	30.0	477117.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	29.9	572942.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	29.9	664474.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	29.8	751489.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	29.7	833784.2	0.0	0.0	0.	0.	0.0	0.0	0.0

10	29.6	911176.3	0.0	0.0	0.	0.	0.0	0.0	0.0
11	29.5	983495.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	29.3	1050600.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	29.1	1112361.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	28.9	1168674.2	0.0	0.0	0.	0.	0.0	0.0	0.0
15	28.7	1219452.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	28.5	1264634.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	28.2	1304171.5	0.0	0.0	0.	0.	0.0	0.0	0.0
18	28.0	1338045.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	27.7	1366250.2	0.0	0.0	0.	0.	0.0	0.0	0.0
20	27.4	1388808.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	27.0	1405759.9	0.0	0.0	0.	0.	0.0	0.0	0.0
22	26.7	1417165.8	0.0	0.0	0.	0.	0.0	0.0	0.0
23	26.3	1423101.4	0.0	0.0	0.	0.	0.0	0.0	0.0
24	26.0	1423674.9	0.0	0.0	0.	0.	0.0	0.0	0.0
25	25.6	1418996.2	0.0	0.0	0.	0.	0.0	0.0	0.0
26	25.2	1409215.2	0.0	0.0	0.	0.	0.0	0.0	0.0
27	24.7	1394492.1	0.0	0.0	0.	0.	0.0	0.0	0.0
28	24.3	1374995.9	0.0	0.0	0.	0.	0.0	0.0	0.0
29	23.8	1350925.2	0.0	0.0	0.	0.	0.0	0.0	0.0
30	23.4	1322496.4	0.0	0.0	0.	0.	0.0	0.0	0.0
31	22.9	1289934.2	0.0	0.0	0.	0.	0.0	0.0	0.0
32	22.4	1253479.1	0.0	0.0	0.	0.	0.0	0.0	0.0
33	21.8	1213399.6	0.0	0.0	0.	0.	0.0	0.0	0.0
34	2.7	151663.8	0.0	0.0	0.	0.	0.0	0.0	0.0
35	10.0	544176.5	0.0	0.0	0.	0.	0.0	0.0	0.0
36	3.0	163730.4	0.0	0.0	0.	0.	0.0	0.0	0.0
37	5.6	307197.6	0.0	0.0	0.	0.	0.0	0.0	0.0
38	20.8	1116377.4	0.0	0.0	0.	0.	0.0	0.0	0.0
39	20.2	1038842.3	0.0	0.0	0.	0.	0.0	0.0	0.0
40	19.6	961240.7	0.0	0.0	0.	0.	0.0	0.0	0.0
41	19.0	883909.2	0.0	0.0	0.	0.	0.0	0.0	0.0
42	18.4	807167.9	0.0	0.0	0.	0.	0.0	0.0	0.0
43	17.8	731344.8	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.5	332361.5	0.0	0.0	0.	0.	0.0	0.0	0.0
45	8.7	323739.4	0.0	0.0	0.	0.	0.0	0.0	0.0
46	16.6	578721.5	0.0	0.0	0.	0.	0.0	0.0	0.0
47	15.9	503171.3	0.0	0.0	0.	0.	0.0	0.0	0.0
48	15.3	430413.8	0.0	0.0	0.	0.	0.0	0.0	0.0
49	14.6	360755.7	0.0	0.0	0.	0.	0.0	0.0	0.0
50	13.9	294501.7	0.0	0.0	0.	0.	0.0	0.0	0.0
51	13.2	231943.8	0.0	0.0	0.	0.	0.0	0.0	0.0
52	12.5	173366.5	0.0	0.0	0.	0.	0.0	0.0	0.0
53	11.8	119048.8	0.0	0.0	0.	0.	0.0	0.0	0.0
54	11.1	69256.7	0.0	0.0	0.	0.	0.0	0.0	0.0
55	10.4	24246.6	0.0	0.0	0.	0.	0.0	0.0	0.0
56	0.9	163.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 52 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	358.586	164.242
2	388.459	161.482
3	418.394	159.517
4	448.371	158.348
5	478.369	157.976
6	508.366	158.401
7	538.341	159.623
8	568.273	161.642
9	598.141	164.455
10	627.924	168.061
11	657.600	172.457
12	687.149	177.640
13	716.549	183.606
14	745.781	190.351
15	774.823	197.871
16	803.656	206.160
17	832.257	215.213
18	860.608	225.022
19	888.689	235.581
20	916.478	246.882
21	943.958	258.918
22	971.108	271.680
23	997.910	285.159
24	1024.344	299.345
25	1050.391	314.229
26	1076.034	329.800
27	1101.254	346.047
28	1126.033	362.958
29	1150.354	380.521
30	1174.200	398.725
31	1197.554	417.556
32	1220.399	437.001
33	1242.719	457.046
34	1264.499	477.677
35	1285.723	498.879
36	1306.376	520.638
37	1326.443	542.939
38	1345.911	565.764
39	1364.766	589.099
40	1382.993	612.927
41	1400.581	637.230
42	1417.517	661.993
43	1433.789	687.196
44	1449.385	712.823
45	1464.295	738.856
46	1478.508	765.276
47	1492.014	792.064
48	1504.803	819.201
49	1516.866	846.669
50	1528.196	874.447
51	1538.783	902.517
52	1548.206	929.664

Factor of Safety
*** 3.465 ***

Failure Surface Specified By 52 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	349.293	157.121
2	378.727	151.319
3	408.329	146.450
4	438.070	142.518
5	467.921	139.527
6	497.851	137.480
7	527.830	136.379
8	557.830	136.225
9	587.820	137.018
10	617.769	138.758
11	647.649	141.443
12	677.429	145.070
13	707.079	149.635
14	736.571	155.134
15	765.874	161.562
16	794.960	168.912
17	823.799	177.176
18	852.363	186.347
19	880.623	196.415
20	908.551	207.370
21	936.120	219.202
22	963.301	231.898
23	990.067	245.447
24	1016.392	259.833
25	1042.250	275.044
26	1067.615	291.063
27	1092.462	307.876
28	1116.765	325.464
29	1140.501	343.811
30	1163.645	362.899
31	1186.176	382.707
32	1208.069	403.218
33	1229.304	424.409
34	1249.860	446.260
35	1269.715	468.749
36	1288.850	491.854
37	1307.247	515.552
38	1324.885	539.819
39	1341.749	564.630
40	1357.821	589.962
41	1373.085	615.788

42	1387.526	642.084
43	1401.130	668.822
44	1413.883	695.977
45	1425.771	723.520
46	1436.785	751.426
47	1446.911	779.665
48	1456.141	808.210
49	1464.465	837.032
50	1471.875	866.102
51	1478.364	895.392
52	1482.504	917.344

Factor of Safety
*** 3.486 ***

Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	340.000	150.000
2	369.736	146.027
3	399.579	142.965
4	429.502	140.816
5	459.477	139.583
6	489.475	139.267
7	519.469	139.868
8	549.431	141.385
9	579.332	143.817
10	609.145	147.162
11	638.842	151.417
12	668.394	156.577
13	697.776	162.638
14	726.958	169.594
15	755.914	177.439
16	784.617	186.166
17	813.040	195.765
18	841.156	206.229
19	868.939	217.547
20	896.363	229.709
21	923.403	242.704
22	950.032	256.519
23	976.228	271.141
24	1001.964	286.557
25	1027.216	302.753
26	1051.962	319.713
27	1076.178	337.421
28	1099.842	355.861
29	1122.931	375.016

30	1145.423	394.868
31	1167.299	415.397
32	1188.536	436.586
33	1209.116	458.414
34	1229.020	480.861
35	1248.228	503.905
36	1266.722	527.526
37	1284.487	551.701
38	1301.504	576.408
39	1317.757	601.624
40	1333.233	627.324
41	1347.916	653.485
42	1361.792	680.083
43	1374.849	707.093
44	1387.074	734.489
45	1398.457	762.245
46	1408.985	790.337
47	1418.650	818.738
48	1427.443	847.420
49	1435.355	876.358
50	1442.378	905.524
51	1443.312	909.996

Factor of Safety
*** 3.495 ***

Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	367.879	171.362
2	397.487	166.528
3	427.228	162.598
4	457.076	159.577
5	487.001	157.466
6	516.977	156.269
7	546.976	155.986
8	576.969	156.617
9	606.930	158.162
10	636.829	160.620
11	666.639	163.987
12	696.333	168.262
13	725.883	173.440
14	755.261	179.516
15	784.441	186.484
16	813.394	194.339
17	842.095	203.072

18	870.516	212.676
19	898.631	223.142
20	926.414	234.460
21	953.840	246.620
22	980.881	259.609
23	1007.515	273.417
24	1033.715	288.030
25	1059.458	303.435
26	1084.719	319.618
27	1109.475	336.563
28	1133.704	354.254
29	1157.382	372.676
30	1180.487	391.810
31	1202.999	411.641
32	1224.895	432.148
33	1246.157	453.312
34	1266.763	475.115
35	1286.696	497.536
36	1305.935	520.555
37	1324.465	544.148
38	1342.266	568.296
39	1359.324	592.975
40	1375.621	618.162
41	1391.143	643.834
42	1405.875	669.968
43	1419.804	696.538
44	1432.917	723.521
45	1445.201	750.890
46	1456.645	778.622
47	1467.239	806.689
48	1476.972	835.066
49	1485.836	863.727
50	1493.823	892.644
51	1500.671	920.751

Factor of Safety
*** 3.498 ***

Failure Surface Specified By 50 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	349.293	157.121
2	379.211	154.909
3	409.180	153.543
4	439.176	153.022
5	469.174	153.348
6	499.151	154.520

7	529.083	156.537
8	558.946	159.398
9	588.717	163.100
10	618.372	167.640
11	647.886	173.015
12	677.237	179.221
13	706.402	186.252
14	735.356	194.103
15	764.078	202.767
16	792.543	212.238
17	820.730	222.509
18	848.617	233.571
19	876.180	245.415
20	903.398	258.031
21	930.249	271.411
22	956.712	285.543
23	982.766	300.415
24	1008.390	316.017
25	1033.563	332.335
26	1058.267	349.357
27	1082.480	367.069
28	1106.184	385.457
29	1129.360	404.506
30	1151.990	424.202
31	1174.054	444.528
32	1195.537	465.468
33	1216.420	487.006
34	1236.687	509.125
35	1256.323	531.807
36	1275.310	555.033
37	1293.635	578.786
38	1311.283	603.046
39	1328.239	627.795
40	1344.490	653.012
41	1360.024	678.677
42	1374.827	704.771
43	1388.888	731.271
44	1402.196	758.158
45	1414.741	785.409
46	1426.511	813.004
47	1437.499	840.919
48	1447.695	869.133
49	1457.090	897.624
50	1461.824	913.467

Factor of Safety

*** 3.509 ***

Failure Surface Specified By 55 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	349.293	157.121
2	378.193	149.071
3	407.339	141.966
4	436.702	135.813
5	466.249	130.620
6	495.949	126.390
7	525.771	123.130
8	555.684	120.841
9	585.655	119.528
10	615.653	119.190
11	645.646	119.829
12	675.603	121.444
13	705.491	124.033
14	735.279	127.593
15	764.935	132.121
16	794.429	137.611
17	823.728	144.058
18	852.801	151.456
19	881.619	159.796
20	910.150	169.069
21	938.363	179.266
22	966.231	190.376
23	993.721	202.386
24	1020.807	215.286
25	1047.458	229.059
26	1073.646	243.693
27	1099.345	259.171
28	1124.526	275.478
29	1149.164	292.595
30	1173.231	310.505
31	1196.702	329.189
32	1219.553	348.627
33	1241.760	368.799
34	1263.298	389.682
35	1284.145	411.255
36	1304.279	433.495
37	1323.678	456.379
38	1342.322	479.882
39	1360.192	503.979
40	1377.268	528.645
41	1393.532	553.854
42	1408.967	579.579
43	1423.557	605.792
44	1437.286	632.466
45	1450.139	659.573
46	1462.104	687.084
47	1473.166	714.970
48	1483.316	743.201
49	1492.541	771.747
50	1500.832	800.579
51	1508.181	829.665

52	1514.579	858.975
53	1520.020	888.477
54	1524.497	918.141
55	1525.350	925.378

Factor of Safety
*** 3.513 ***

Failure Surface Specified By 55 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	340.000	150.000
2	368.743	141.407
3	397.756	133.774
4	427.006	127.109
5	456.461	121.418
6	486.090	116.710
7	515.858	112.988
8	545.733	110.257
9	575.683	108.519
10	605.674	107.778
11	635.673	108.033
12	665.646	109.284
13	695.562	111.530
14	725.387	114.768
15	755.088	118.996
16	784.631	124.207
17	813.986	130.397
18	843.119	137.559
19	871.997	145.684
20	900.590	154.764
21	928.866	164.788
22	956.793	175.747
23	984.340	187.627
24	1011.478	200.415
25	1038.176	214.097
26	1064.405	228.659
27	1090.136	244.084
28	1115.340	260.355
29	1139.990	277.454
30	1164.058	295.363
31	1187.519	314.061
32	1210.345	333.528
33	1232.512	353.743
34	1253.995	374.682
35	1274.771	396.324
36	1294.817	418.643

37	1314.110	441.617
38	1332.630	465.218
39	1350.355	489.422
40	1367.267	514.200
41	1383.346	539.527
42	1398.576	565.374
43	1412.938	591.713
44	1426.418	618.514
45	1439.000	645.748
46	1450.670	673.385
47	1461.416	701.394
48	1471.226	729.745
49	1480.089	758.406
50	1487.995	787.346
51	1494.935	816.532
52	1500.902	845.932
53	1505.889	875.515
54	1509.891	905.247
55	1511.664	922.812

Factor of Safety
*** 3.525 ***

Failure Surface Specified By 54 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	367.879	171.362
2	396.847	163.561
3	426.050	156.693
4	455.459	150.767
5	485.043	145.789
6	514.771	141.762
7	544.614	138.693
8	574.540	136.583
9	604.518	135.435
10	634.517	135.251
11	664.507	136.030
12	694.456	137.771
13	724.335	140.474
14	754.110	144.134
15	783.753	148.749
16	813.233	154.313
17	842.519	160.820
18	871.580	168.265
19	900.388	176.639
20	928.911	185.934

21	957.122	196.140
22	984.990	207.246
23	1012.488	219.242
24	1039.586	232.115
25	1066.256	245.850
26	1092.472	260.436
27	1118.206	275.855
28	1143.432	292.093
29	1168.123	309.133
30	1192.254	326.956
31	1215.801	345.546
32	1238.738	364.881
33	1261.043	384.944
34	1282.692	405.712
35	1303.663	427.165
36	1323.935	449.280
37	1343.485	472.034
38	1362.295	495.405
39	1380.345	519.367
40	1397.616	543.897
41	1414.091	568.969
42	1429.752	594.556
43	1444.583	620.634
44	1458.569	647.174
45	1471.696	674.150
46	1483.950	701.533
47	1495.318	729.296
48	1505.789	757.409
49	1515.352	785.844
50	1523.997	814.571
51	1531.715	843.562
52	1538.498	872.785
53	1544.339	902.211
54	1548.899	929.794

Factor of Safety
*** 3.528 ***

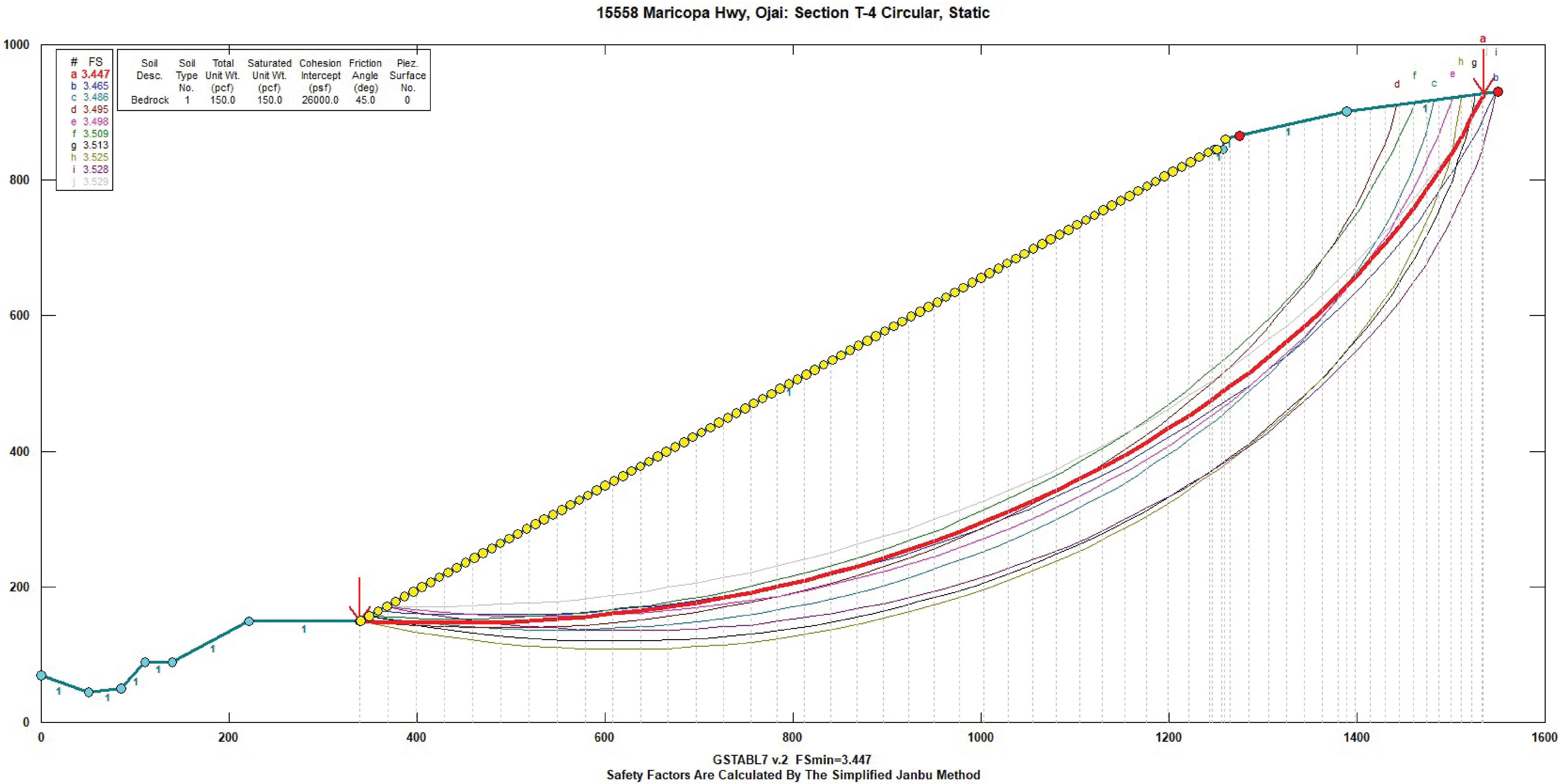
Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	367.879	171.362
2	397.874	170.799
3	427.873	170.971
4	457.859	171.877
5	487.814	173.517
6	517.720	175.891
7	547.559	178.996

8	577.313	182.831
9	606.964	187.394
10	636.494	192.682
11	665.886	198.691
12	695.122	205.419
13	724.185	212.861
14	753.056	221.012
15	781.719	229.868
16	810.157	239.423
17	838.352	249.672
18	866.287	260.608
19	893.947	272.225
20	921.313	284.517
21	948.370	297.475
22	975.102	311.091
23	1001.492	325.359
24	1027.525	340.268
25	1053.185	355.811
26	1078.456	371.977
27	1103.324	388.758
28	1127.774	406.142
29	1151.790	424.120
30	1175.359	442.681
31	1198.466	461.814
32	1221.098	481.507
33	1243.240	501.749
34	1264.880	522.526
35	1286.005	543.828
36	1306.601	565.640
37	1326.657	587.950
38	1346.161	610.745
39	1365.101	634.011
40	1383.465	657.734
41	1401.242	681.899
42	1418.422	706.492
43	1434.995	731.499
44	1450.951	756.905
45	1466.279	782.693
46	1480.971	808.849
47	1495.018	835.357
48	1508.411	862.202
49	1521.143	889.366
50	1533.206	916.834
51	1537.658	927.686

Factor of Safety
*** 3.529 ***

**** END OF GSTABL7 OUTPUT ****


15558 Maricopa Hwy, Ojai: Section T-4 Circular, Static
FS
a 3.447
b 3.465
c 3.486
d 3.495
e 3.498
f 3.509
g 3.513
h 3.525
i 3.528
j 3.529
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Bedrock | 1 | 150.0 | 150.0 | 26000.0 | 45.0 | 0
GSTABL7 v.2 FSmin=3.447
Safety Factors Are Calculated By The Simplified Janbu Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 6/1/2020
Time of Run: 12:17PM
Run By: IM
Input Data Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-5, circular failure, static.in
Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-5, circular failure, static.OUT
Unit System: English

Plotted Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-5, circular failure, static.PLT

PROBLEM DESCRIPTION: 15558 Maricopa Hwy, Ojai: Section T5
Circular, Static

BOUNDARY COORDINATES

55 Top Boundaries
55 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	60.00	50.00	40.00	1
2	50.00	40.00	90.00	60.00	1

3	90.00	60.00	100.00	80.00	1
4	100.00	80.00	125.00	80.00	1
5	125.00	80.00	220.00	150.00	1
6	220.00	150.00	330.00	150.00	1
7	330.00	150.00	375.00	195.00	1
8	375.00	195.00	385.00	215.00	1
9	385.00	215.00	425.00	235.00	1
10	425.00	235.00	440.00	235.00	1
11	440.00	235.00	465.00	265.00	1
12	465.00	265.00	475.00	265.00	1
13	475.00	265.00	505.00	295.00	1
14	505.00	295.00	515.00	295.00	1
15	515.00	295.00	525.00	305.00	1
16	525.00	305.00	535.00	305.00	1
17	535.00	305.00	565.00	335.00	1
18	565.00	335.00	575.00	335.00	1
19	575.00	335.00	605.00	365.00	1
20	605.00	365.00	615.00	365.00	1
21	615.00	365.00	645.00	395.00	1
22	645.00	395.00	655.00	395.00	1
23	655.00	395.00	685.00	425.00	1
24	685.00	425.00	695.00	425.00	1
25	695.00	425.00	725.00	455.00	1
26	725.00	455.00	735.00	455.00	1
27	735.00	455.00	765.00	485.00	1
28	765.00	485.00	775.00	485.00	1
29	775.00	485.00	805.00	515.00	1
30	805.00	515.00	815.00	515.00	1
31	815.00	515.00	845.00	545.00	1
32	845.00	545.00	855.00	545.00	1
33	855.00	545.00	885.00	575.00	1
34	885.00	575.00	895.00	575.00	1
35	895.00	575.00	925.00	605.00	1
36	925.00	605.00	935.00	605.00	1
37	935.00	605.00	965.00	635.00	1
38	965.00	635.00	975.00	635.00	1
39	975.00	635.00	1005.00	665.00	1
40	1005.00	665.00	1015.00	665.00	1
41	1015.00	665.00	1045.00	695.00	1
42	1045.00	695.00	1055.00	695.00	1
43	1055.00	695.00	1085.00	725.00	1
44	1085.00	725.00	1095.00	725.00	1
45	1095.00	725.00	1125.00	755.00	1
46	1125.00	755.00	1135.00	755.00	1
47	1135.00	755.00	1165.00	785.00	1
48	1165.00	785.00	1175.00	785.00	1
49	1175.00	785.00	1205.00	815.00	1
50	1205.00	815.00	1215.00	815.00	1
51	1215.00	815.00	1245.00	845.00	1
52	1245.00	845.00	1255.00	845.00	1
53	1255.00	845.00	1300.00	890.00	1
54	1300.00	890.00	1475.00	950.00	1
55	1475.00	950.00	1550.00	970.00	1

Default Y-Origin = 0.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	150.0	26000.0	45.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

10 Surface(s) Initiate(s) From Each Of 100 Points Equally Spaced Along The Ground Surface Between X = 330.00(ft)
and X =1300.00(ft)

Each Surface Terminates Between X =1305.00(ft)
and X =1550.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

30.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 1000

Number of Failed Attempts to Generate Trial Surface = 19

Number of Trial Surfaces With Valid FS = 981

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 1.9 %

Statistical Data On All Valid FS Values:
FS Max = 131.410 FS Min = 3.474 FS Ave = 8.040
Standard Deviation = 8.266 Coefficient of Variation = 102.82 %

Failure Surface Specified By 56 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.000	150.000
2	359.123	142.801
3	388.460	136.525
4	417.979	131.179
5	447.653	126.767
6	477.451	123.294
7	507.345	120.763
8	537.303	119.178
9	567.296	118.539
10	597.294	118.847
11	627.268	120.103
12	657.187	122.304
13	687.022	125.448
14	716.743	129.533
15	746.319	134.554
16	775.723	140.506
17	804.924	147.384
18	833.893	155.180
19	862.602	163.886
20	891.022	173.495
21	919.124	183.996
22	946.880	195.380
23	974.263	207.633
24	1001.246	220.745
25	1027.802	234.703
26	1053.903	249.492
27	1079.525	265.098
28	1104.641	281.504
29	1129.226	298.696
30	1153.257	316.655
31	1176.709	335.363
32	1199.558	354.803
33	1221.782	374.955
34	1243.359	395.798
35	1264.267	417.312

36	1284.486	439.475
37	1303.995	462.266
38	1322.774	485.661
39	1340.806	509.637
40	1358.072	534.171
41	1374.554	559.237
42	1390.237	584.811
43	1405.105	610.868
44	1419.142	637.381
45	1432.336	664.324
46	1444.672	691.671
47	1456.139	719.393
48	1466.725	747.463
49	1476.420	775.853
50	1485.213	804.535
51	1493.097	833.481
52	1500.062	862.661
53	1506.104	892.047
54	1511.214	921.608
55	1515.388	951.316
56	1516.444	961.052

Factor of Safety
*** 3.474 ***

Individual data on the 103 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	29.1	79337.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	15.9	109450.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	99997.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.5	40981.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	29.5	399657.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	7.0	108035.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	15.0	238455.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	7.7	128867.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	17.3	335234.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	10.0	211256.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.5	52506.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	27.5	657437.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.3	61241.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	7.7	200311.0	0.0	0.0	0.	0.	0.0	0.0	0.0
15	10.0	269859.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	10.0	278153.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.3	64559.8	0.0	0.0	0.	0.	0.0	0.0	0.0

18	27.7	840344.4	0.0	0.0	0.	0.	0.0	0.0	0.0
19	2.3	74537.4	0.0	0.0	0.	0.	0.0	0.0	0.0
20	7.7	250099.9	0.0	0.0	0.	0.	0.0	0.0	0.0
21	22.3	760507.0	0.0	0.0	0.	0.	0.0	0.0	0.0
22	7.7	279876.5	0.0	0.0	0.	0.	0.0	0.0	0.0
23	10.0	368430.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	12.3	462423.2	0.0	0.0	0.	0.	0.0	0.0	0.0
25	17.7	705852.9	0.0	0.0	0.	0.	0.0	0.0	0.0
26	10.0	409837.7	0.0	0.0	0.	0.	0.0	0.0	0.0
27	2.2	89851.2	0.0	0.0	0.	0.	0.0	0.0	0.0
28	27.8	1198694.5	0.0	0.0	0.	0.	0.0	0.0	0.0
29	2.0	90885.2	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.0	357819.0	0.0	0.0	0.	0.	0.0	0.0	0.0
31	21.7	1003963.2	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.3	397144.3	0.0	0.0	0.	0.	0.0	0.0	0.0
33	10.0	484825.0	0.0	0.0	0.	0.	0.0	0.0	0.0
34	11.3	555332.8	0.0	0.0	0.	0.	0.0	0.0	0.0
35	18.7	950508.6	0.0	0.0	0.	0.	0.0	0.0	0.0
36	10.0	518478.8	0.0	0.0	0.	0.	0.0	0.0	0.0
37	0.7	37408.7	0.0	0.0	0.	0.	0.0	0.0	0.0
38	29.2	1560991.4	0.0	0.0	0.	0.	0.0	0.0	0.0
39	0.1	4189.7	0.0	0.0	0.	0.	0.0	0.0	0.0
40	10.0	549375.5	0.0	0.0	0.	0.	0.0	0.0	0.0
41	18.9	1053706.0	0.0	0.0	0.	0.	0.0	0.0	0.0
42	11.1	637384.2	0.0	0.0	0.	0.	0.0	0.0	0.0
43	10.0	577403.2	0.0	0.0	0.	0.	0.0	0.0	0.0
44	7.6	440235.6	0.0	0.0	0.	0.	0.0	0.0	0.0
45	22.4	1330868.9	0.0	0.0	0.	0.	0.0	0.0	0.0
46	6.0	363575.1	0.0	0.0	0.	0.	0.0	0.0	0.0
47	4.0	239158.0	0.0	0.0	0.	0.	0.0	0.0	0.0
48	24.1	1474821.8	0.0	0.0	0.	0.	0.0	0.0	0.0
49	5.9	367442.3	0.0	0.0	0.	0.	0.0	0.0	0.0
50	10.0	624814.8	0.0	0.0	0.	0.	0.0	0.0	0.0
51	11.9	744881.8	0.0	0.0	0.	0.	0.0	0.0	0.0
52	18.1	1159232.1	0.0	0.0	0.	0.	0.0	0.0	0.0
53	9.3	596716.0	0.0	0.0	0.	0.	0.0	0.0	0.0
54	0.7	47194.3	0.0	0.0	0.	0.	0.0	0.0	0.0
55	26.2	1707667.2	0.0	0.0	0.	0.	0.0	0.0	0.0
56	3.8	248529.0	0.0	0.0	0.	0.	0.0	0.0	0.0
57	10.0	659480.3	0.0	0.0	0.	0.	0.0	0.0	0.0
58	12.8	845027.2	0.0	0.0	0.	0.	0.0	0.0	0.0
59	17.2	1152700.4	0.0	0.0	0.	0.	0.0	0.0	0.0
60	8.9	598327.2	0.0	0.0	0.	0.	0.0	0.0	0.0
61	1.1	73248.3	0.0	0.0	0.	0.	0.0	0.0	0.0
62	24.5	1654066.4	0.0	0.0	0.	0.	0.0	0.0	0.0
63	5.5	374001.3	0.0	0.0	0.	0.	0.0	0.0	0.0
64	10.0	679589.4	0.0	0.0	0.	0.	0.0	0.0	0.0
65	9.6	652868.9	0.0	0.0	0.	0.	0.0	0.0	0.0
66	20.4	1393177.9	0.0	0.0	0.	0.	0.0	0.0	0.0
67	4.2	290218.2	0.0	0.0	0.	0.	0.0	0.0	0.0
68	5.8	393306.6	0.0	0.0	0.	0.	0.0	0.0	0.0
69	18.3	1244117.6	0.0	0.0	0.	0.	0.0	0.0	0.0
70	11.7	806368.3	0.0	0.0	0.	0.	0.0	0.0	0.0
71	10.0	682482.7	0.0	0.0	0.	0.	0.0	0.0	0.0

72	1.7	115640.5	0.0	0.0	0.	0.	0.0	0.0	0.0
73	22.8	1552785.8	0.0	0.0	0.	0.	0.0	0.0	0.0
74	5.4	371416.3	0.0	0.0	0.	0.	0.0	0.0	0.0
75	10.0	676092.9	0.0	0.0	0.	0.	0.0	0.0	0.0
76	6.8	454259.2	0.0	0.0	0.	0.	0.0	0.0	0.0
77	21.6	1447360.6	0.0	0.0	0.	0.	0.0	0.0	0.0
78	1.6	110144.4	0.0	0.0	0.	0.	0.0	0.0	0.0
79	10.0	663553.4	0.0	0.0	0.	0.	0.0	0.0	0.0
80	9.3	607606.6	0.0	0.0	0.	0.	0.0	0.0	0.0
81	20.2	1322239.4	0.0	0.0	0.	0.	0.0	0.0	0.0
82	15.5	1009279.6	0.0	0.0	0.	0.	0.0	0.0	0.0
83	4.0	258112.4	0.0	0.0	0.	0.	0.0	0.0	0.0
84	18.8	1184873.9	0.0	0.0	0.	0.	0.0	0.0	0.0
85	18.0	1090689.0	0.0	0.0	0.	0.	0.0	0.0	0.0
86	17.3	997210.6	0.0	0.0	0.	0.	0.0	0.0	0.0
87	16.5	904970.8	0.0	0.0	0.	0.	0.0	0.0	0.0
88	15.7	814471.2	0.0	0.0	0.	0.	0.0	0.0	0.0
89	14.9	726242.8	0.0	0.0	0.	0.	0.0	0.0	0.0
90	14.0	640783.1	0.0	0.0	0.	0.	0.0	0.0	0.0
91	13.2	558599.5	0.0	0.0	0.	0.	0.0	0.0	0.0
92	12.3	480176.3	0.0	0.0	0.	0.	0.0	0.0	0.0
93	11.5	405990.9	0.0	0.0	0.	0.	0.0	0.0	0.0
94	10.6	336510.8	0.0	0.0	0.	0.	0.0	0.0	0.0
95	8.3	234593.3	0.0	0.0	0.	0.	0.0	0.0	0.0
96	1.4	37571.1	0.0	0.0	0.	0.	0.0	0.0	0.0
97	8.8	212832.5	0.0	0.0	0.	0.	0.0	0.0	0.0
98	7.9	159365.5	0.0	0.0	0.	0.	0.0	0.0	0.0
99	7.0	112513.8	0.0	0.0	0.	0.	0.0	0.0	0.0
100	6.0	72614.4	0.0	0.0	0.	0.	0.0	0.0	0.0
101	5.1	39974.3	0.0	0.0	0.	0.	0.0	0.0	0.0
102	4.2	14872.5	0.0	0.0	0.	0.	0.0	0.0	0.0
103	1.1	748.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	339.798	159.798
2	369.602	156.370
3	399.491	153.799
4	429.442	152.087
5	459.430	151.234
6	489.430	151.243
7	519.417	152.113
8	549.368	153.843
9	579.256	156.431
10	609.057	159.876
11	638.748	164.175
12	668.302	169.325
13	697.697	175.320
14	726.908	182.156
15	755.910	189.828

16	784.681	198.329
17	813.195	207.652
18	841.431	217.789
19	869.364	228.732
20	896.971	240.473
21	924.230	253.001
22	951.118	266.306
23	977.613	280.377
24	1003.694	295.203
25	1029.338	310.771
26	1054.526	327.068
27	1079.235	344.082
28	1103.445	361.797
29	1127.138	380.200
30	1150.292	399.276
31	1172.890	419.008
32	1194.912	439.380
33	1216.340	460.376
34	1237.157	481.978
35	1257.345	504.169
36	1276.889	526.930
37	1295.771	550.242
38	1313.976	574.087
39	1331.490	598.444
40	1348.298	623.294
41	1364.385	648.615
42	1379.739	674.388
43	1394.347	700.591
44	1408.198	727.203
45	1421.279	754.201
46	1433.579	781.563
47	1445.090	809.267
48	1455.801	837.290
49	1465.703	865.608
50	1474.788	894.200
51	1483.050	923.040
52	1490.480	952.105
53	1490.965	954.257

Factor of Safety
*** 3.489 ***

Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.000	150.000
2	359.928	147.922
3	389.902	146.682

4	419.900	146.281
5	449.896	146.718
6	479.869	147.994
7	509.795	150.108
8	539.649	153.057
9	569.410	156.840
10	599.053	161.454
11	628.556	166.895
12	657.894	173.158
13	687.047	180.240
14	715.990	188.133
15	744.700	196.833
16	773.157	206.333
17	801.336	216.624
18	829.217	227.699
19	856.777	239.549
20	883.996	252.166
21	910.850	265.538
22	937.321	279.656
23	963.386	294.509
24	989.026	310.085
25	1014.220	326.371
26	1038.949	343.356
27	1063.193	361.025
28	1086.934	379.365
29	1110.153	398.362
30	1132.832	418.001
31	1154.953	438.266
32	1176.498	459.142
33	1197.451	480.612
34	1217.796	502.660
35	1237.516	525.267
36	1256.597	548.418
37	1275.022	572.092
38	1292.779	596.273
39	1309.852	620.941
40	1326.229	646.076
41	1341.897	671.660
42	1356.844	697.671
43	1371.057	724.091
44	1384.526	750.897
45	1397.240	778.070
46	1409.190	805.587
47	1420.365	833.428
48	1430.758	861.570
49	1440.359	889.992
50	1449.162	918.672
51	1456.029	943.496

Factor of Safety
*** 3.527 ***

Failure Surface Specified By 52 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	359.394	179.394
2	389.393	179.163
3	419.389	179.650
4	449.365	180.855
5	479.303	182.776
6	509.187	185.413
7	538.999	188.765
8	568.723	192.829
9	598.341	197.603
10	627.836	203.084
11	657.191	209.270
12	686.390	216.156
13	715.416	223.739
14	744.252	232.014
15	772.882	240.977
16	801.289	250.622
17	829.457	260.944
18	857.370	271.938
19	885.013	283.596
20	912.368	295.912
21	939.421	308.879
22	966.155	322.490
23	992.557	336.736
24	1018.610	351.611
25	1044.299	367.104
26	1069.611	383.208
27	1094.530	399.912
28	1119.042	417.208
29	1143.133	435.086
30	1166.790	453.535
31	1189.998	472.545
32	1212.745	492.104
33	1235.017	512.203
34	1256.802	532.828
35	1278.088	553.969
36	1298.861	575.613
37	1319.110	597.748
38	1338.824	620.362
39	1357.992	643.440
40	1376.601	666.971
41	1394.643	690.940
42	1412.105	715.333
43	1428.979	740.138
44	1445.255	765.339
45	1460.922	790.923
46	1475.974	816.874
47	1490.399	843.178
48	1504.192	869.819

49	1517.343	896.783
50	1529.845	924.054
51	1541.691	951.616
52	1548.965	969.724

Factor of Safety
*** 3.557 ***

Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	339.798	159.798
2	369.653	156.856
3	399.583	154.801
4	429.560	153.636
5	459.559	153.361
6	489.553	153.976
7	519.515	155.481
8	549.419	157.875
9	579.239	161.155
10	608.949	165.319
11	638.522	170.363
12	667.932	176.283
13	697.154	183.072
14	726.161	190.726
15	754.928	199.238
16	783.430	208.599
17	811.642	218.803
18	839.538	229.839
19	867.094	241.698
20	894.286	254.370
21	921.091	267.844
22	947.483	282.107
23	973.441	297.147
24	998.940	312.951
25	1023.960	329.505
26	1048.477	346.794
27	1072.470	364.803
28	1095.918	383.516
29	1118.801	402.917
30	1141.097	422.989
31	1162.788	443.714
32	1183.854	465.073
33	1204.277	487.048
34	1224.039	509.619
35	1243.122	532.767
36	1261.510	556.471
37	1279.186	580.711

38	1296.135	605.464
39	1312.341	630.710
40	1327.792	656.426
41	1342.472	682.588
42	1356.369	709.175
43	1369.471	736.163
44	1381.767	763.528
45	1393.244	791.245
46	1403.894	819.291
47	1413.707	847.641
48	1422.674	876.270
49	1430.788	905.152
50	1438.041	934.262
51	1438.762	937.576

Factor of Safety
*** 3.565 ***

Failure Surface Specified By 56 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	349.596	169.596
2	378.290	160.841
3	407.262	153.054
4	436.479	146.244
5	465.908	140.420
6	495.516	135.588
7	525.270	131.752
8	555.136	128.918
9	585.080	127.089
10	615.069	126.266
11	645.068	126.451
12	675.044	127.643
13	704.964	129.842
14	734.792	133.044
15	764.497	137.246
16	794.043	142.443
17	823.398	148.630
18	852.529	155.799
19	881.402	163.943
20	909.986	173.051
21	938.248	183.114
22	966.156	194.121
23	993.678	206.059
24	1020.784	218.915
25	1047.443	232.674
26	1073.625	247.320

27	1099.300	262.837
28	1124.440	279.208
29	1149.015	296.414
30	1172.999	314.436
31	1196.364	333.253
32	1219.084	352.844
33	1241.133	373.187
34	1262.486	394.259
35	1283.120	416.036
36	1303.011	438.494
37	1322.136	461.608
38	1340.474	485.350
39	1358.004	509.695
40	1374.707	534.616
41	1390.563	560.083
42	1405.556	586.068
43	1419.667	612.542
44	1432.880	639.475
45	1445.182	666.837
46	1456.558	694.596
47	1466.995	722.722
48	1476.482	751.183
49	1485.008	779.946
50	1492.563	808.979
51	1499.138	838.250
52	1504.727	867.724
53	1509.322	897.370
54	1512.920	927.154
55	1515.515	957.041
56	1515.717	960.858

Factor of Safety
*** 3.569 ***

Failure Surface Specified By 52 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	388.788	216.894
2	418.375	211.935
3	448.097	207.861
4	477.928	204.674
5	507.840	202.378
6	537.807	200.974
7	567.802	200.464
8	597.800	200.848
9	627.773	202.126
10	657.694	204.297
11	687.537	207.358
12	717.276	211.308

13	746.884	216.142
14	776.335	221.856
15	805.602	228.446
16	834.660	235.905
17	863.483	244.227
18	892.045	253.404
19	920.321	263.428
20	948.285	274.290
21	975.913	285.981
22	1003.181	298.490
23	1030.063	311.807
24	1056.537	325.918
25	1082.579	340.813
26	1108.165	356.477
27	1133.272	372.896
28	1157.880	390.057
29	1181.965	407.943
30	1205.506	426.539
31	1228.482	445.828
32	1250.874	465.794
33	1272.660	486.418
34	1293.822	507.682
35	1314.341	529.568
36	1334.198	552.055
37	1353.377	575.124
38	1371.859	598.755
39	1389.629	622.926
40	1406.671	647.615
41	1422.969	672.802
42	1438.509	698.463
43	1453.278	724.576
44	1467.262	751.118
45	1480.448	778.064
46	1492.826	805.392
47	1504.384	833.076
48	1515.111	861.092
49	1524.999	889.416
50	1534.038	918.022
51	1542.221	946.885
52	1547.894	969.439

Factor of Safety
*** 3.576 ***

Failure Surface Specified By 59 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	330.000	150.000
2	358.175	139.696
3	386.679	130.340
4	415.479	121.942
5	444.545	114.512
6	473.842	108.058
7	503.339	102.587
8	533.002	98.104
9	562.799	94.617
10	592.695	92.127
11	622.658	90.638
12	652.654	90.152
13	682.650	90.669
14	712.612	92.188
15	742.505	94.708
16	772.298	98.226
17	801.957	102.739
18	831.448	108.240
19	860.739	114.724
20	889.797	122.184
21	918.589	130.611
22	947.083	139.996
23	975.248	150.329
24	1003.051	161.597
25	1030.462	173.788
26	1057.450	186.890
27	1083.985	200.886
28	1110.038	215.761
29	1135.578	231.499
30	1160.578	248.082
31	1185.010	265.492
32	1208.846	283.708
33	1232.059	302.712
34	1254.625	322.481
35	1276.516	342.993
36	1297.710	364.225
37	1318.182	386.155
38	1337.910	408.756
39	1356.870	432.005
40	1375.043	455.874
41	1392.408	480.338
42	1408.945	505.368
43	1424.637	530.937
44	1439.464	557.017
45	1453.411	583.578
46	1466.463	610.590
47	1478.604	638.023
48	1489.821	665.847
49	1500.102	694.031
50	1509.435	722.542
51	1517.809	751.350
52	1525.215	780.421
53	1531.646	809.724
54	1537.093	839.225

55	1541.551	868.892
56	1545.015	898.691
57	1547.480	928.590
58	1548.944	958.554
59	1549.117	969.764

Factor of Safety
*** 3.581 ***

Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	359.394	179.394
2	388.944	174.217
3	418.645	169.992
4	448.466	166.721
5	478.377	164.410
6	508.346	163.059
7	538.344	162.671
8	568.338	163.245
9	598.299	164.782
10	628.195	167.279
11	657.995	170.735
12	687.669	175.145
13	717.187	180.505
14	746.517	186.809
15	775.629	194.052
16	804.495	202.224
17	833.083	211.319
18	861.364	221.327
19	889.310	232.237
20	916.892	244.038
21	944.080	256.718
22	970.848	270.265
23	997.167	284.663
24	1023.010	299.898
25	1048.351	315.955
26	1073.164	332.817
27	1097.423	350.466
28	1121.104	368.885
29	1144.181	388.054
30	1166.630	407.953
31	1188.430	428.563
32	1209.557	449.862
33	1229.990	471.828
34	1249.708	494.438
35	1268.689	517.670
36	1286.916	541.498

37	1304.368	565.899
38	1321.029	590.848
39	1336.880	616.318
40	1351.906	642.284
41	1366.090	668.719
42	1379.419	695.595
43	1391.879	722.885
44	1403.457	750.561
45	1414.141	778.594
46	1423.919	806.956
47	1432.782	835.617
48	1440.721	864.547
49	1447.728	893.718
50	1453.795	923.098
51	1457.411	943.969

Factor of Safety
*** 3.581 ***

Failure Surface Specified By 58 Coordinate Points

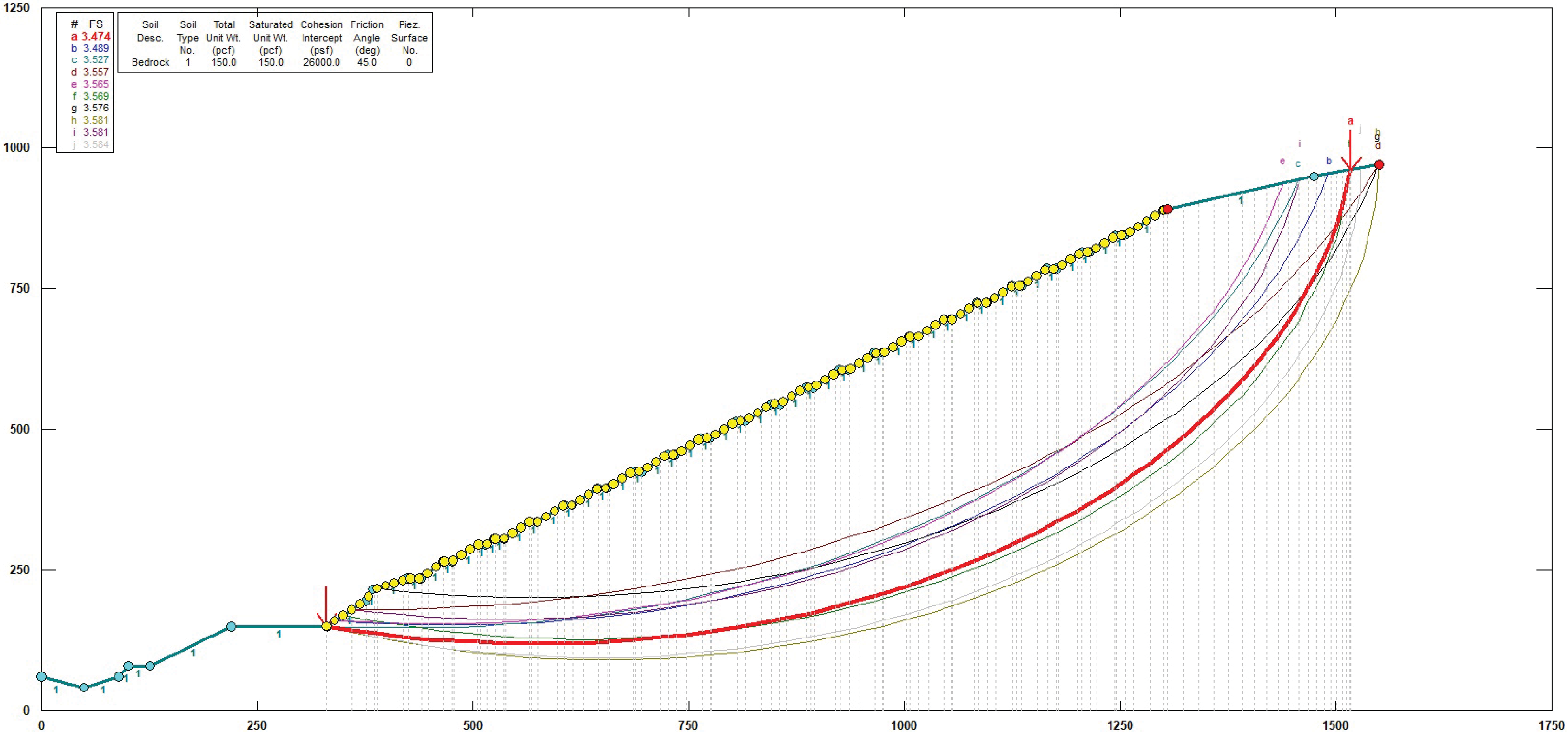
Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.000	150.000
2	358.276	139.977
3	386.875	130.914
4	415.763	122.823
5	444.908	115.711
6	474.276	109.587
7	503.834	104.459
8	533.549	100.332
9	563.386	97.210
10	593.312	95.098
11	623.292	93.997
12	653.291	93.909
13	683.277	94.834
14	713.215	96.771
15	743.069	99.718
16	772.808	103.672
17	802.396	108.627
18	831.800	114.578
19	860.986	121.519
20	889.921	129.442
21	918.572	138.337
22	946.906	148.194
23	974.891	159.002
24	1002.496	170.750
25	1029.688	183.422

26	1056.436	197.006
27	1082.711	211.485
28	1108.482	226.843
29	1133.719	243.062
30	1158.395	260.124
31	1182.480	278.010
32	1205.948	296.699
33	1228.771	316.169
34	1250.924	336.399
35	1272.381	357.366
36	1293.117	379.045
37	1313.110	401.412
38	1332.337	424.441
39	1350.774	448.107
40	1368.403	472.381
41	1385.201	497.237
42	1401.151	522.646
43	1416.233	548.579
44	1430.432	575.006
45	1443.729	601.898
46	1456.112	629.223
47	1467.564	656.951
48	1478.074	685.050
49	1487.629	713.488
50	1496.218	742.232
51	1503.832	771.250
52	1510.461	800.508
53	1516.099	829.973
54	1520.739	859.612
55	1524.375	889.391
56	1527.004	919.276
57	1528.622	949.232
58	1528.928	964.381

Factor of Safety
*** 3.584 ***

**** END OF GSTABL7 OUTPUT ****

15558 Maricopa Hwy, Ojai: Section T5 Circular, Static



GSTABL7 v.2 FSmin=3.474
Safety Factors Are Calculated By The Simplified Janbu Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 6/1/2020
Time of Run: 02:23PM
Run By: IM
Input Data Filename: C:\Users\Project Files\Slope Stability\18-092902 OJAI QUARRY)\Section T-6, circular failure, static.in
Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-6, circular failure, static.OUT
Unit System: English

Plotted Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section T-6, circular failure, static.PLT

PROBLEM DESCRIPTION: 15558 Maricopa Hwy, Ojai: Section T-6
Circular, Static

BOUNDARY COORDINATES

16 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	50.00	40.00	40.00	1
2	40.00	40.00	65.00	40.00	1

3	65.00	40.00	90.00	70.00	1
4	90.00	70.00	112.00	70.00	1
5	112.00	70.00	215.00	150.00	1
6	215.00	150.00	335.00	150.00	1
7	335.00	150.00	375.00	215.00	1
8	375.00	215.00	410.00	235.00	1
9	410.00	235.00	500.00	245.00	1
10	500.00	245.00	540.00	310.00	1
11	540.00	310.00	640.00	400.00	1
12	640.00	400.00	675.00	405.00	1
13	675.00	405.00	740.00	485.00	1
14	740.00	485.00	785.00	485.00	1
15	785.00	485.00	1295.00	895.00	1
16	1295.00	895.00	1550.00	980.00	1

Default Y-Origin = 0.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	150.0	26000.0	45.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

10 Surface(s) Initiate(s) From Each Of 100 Points Equally Spaced Along The Ground Surface Between X = 300.00(ft)
and X =1290.00(ft)

Each Surface Terminates Between X =1300.00(ft)
and X =1550.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y =   0.00(ft)

50.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 1000

Number of Failed Attempts to Generate Trial Surface =   32

Number of Trial Surfaces With Valid FS = 968

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted =   3.2 %

Statistical Data On All Valid FS Values:
FS Max = 66.727   FS Min =   3.616   FS Ave =   7.692
Standard Deviation =   6.044   Coefficient of Variation =   78.57 %

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.000	150.000
2	379.418	142.394
3	429.141	137.141
4	479.058	134.251
5	529.055	133.731
6	579.021	135.583
7	628.842	139.802
8	678.408	146.379
9	727.606	155.299
10	776.325	166.542
11	824.457	180.083
12	871.892	195.891
13	918.525	213.930
14	964.249	234.161
15	1008.963	256.537
16	1052.565	281.008
17	1094.958	307.519

18	1136.046	336.011
19	1175.736	366.419
20	1213.940	398.675
21	1250.572	432.707
22	1285.548	468.437
23	1318.791	505.786
24	1350.225	544.669
25	1379.780	584.999
26	1407.389	626.685
27	1432.990	669.633
28	1456.526	713.748
29	1477.944	758.928
30	1497.195	805.074
31	1514.236	852.080
32	1529.029	899.842
33	1541.540	948.251
34	1548.020	979.340

Circle Center At X = 515.111 ; Y = 1187.234 ; and Radius = 1053.623

Factor of Safety
*** 3.616 ***

Individual data on the 43 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	288.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	40.0	218085.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.4	48728.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	30.6	392137.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	19.1	281124.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	49.9	780226.5	0.0	0.0	0.	0.	0.0	0.0	0.0
7	20.9	344588.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	29.1	587167.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	10.9	274455.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	39.0	1127892.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	49.8	1717696.2	0.0	0.0	0.	0.	0.0	0.0	0.0
12	11.2	425835.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	35.0	1359200.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.4	133393.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	49.2	2130004.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	12.4	596116.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	36.3	1758053.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.7	412787.6	0.0	0.0	0.	0.	0.0	0.0	0.0
19	39.5	1931384.5	0.0	0.0	0.	0.	0.0	0.0	0.0

20	47.4	2474708.5	0.0	0.0	0.	0.	0.0	0.0	0.0
21	46.6	2578924.8	0.0	0.0	0.	0.	0.0	0.0	0.0
22	45.7	2652090.8	0.0	0.0	0.	0.	0.0	0.0	0.0
23	44.7	2694402.5	0.0	0.0	0.	0.	0.0	0.0	0.0
24	43.6	2706407.8	0.0	0.0	0.	0.	0.0	0.0	0.0
25	42.4	2689049.0	0.0	0.0	0.	0.	0.0	0.0	0.0
26	41.1	2643589.2	0.0	0.0	0.	0.	0.0	0.0	0.0
27	39.7	2571662.8	0.0	0.0	0.	0.	0.0	0.0	0.0
28	38.2	2475219.8	0.0	0.0	0.	0.	0.0	0.0	0.0
29	36.6	2356499.8	0.0	0.0	0.	0.	0.0	0.0	0.0
30	35.0	2218041.8	0.0	0.0	0.	0.	0.0	0.0	0.0
31	9.5	591867.6	0.0	0.0	0.	0.	0.0	0.0	0.0
32	23.8	1450791.5	0.0	0.0	0.	0.	0.0	0.0	0.0
33	31.4	1805620.5	0.0	0.0	0.	0.	0.0	0.0	0.0
34	29.6	1567151.0	0.0	0.0	0.	0.	0.0	0.0	0.0
35	27.6	1333607.5	0.0	0.0	0.	0.	0.0	0.0	0.0
36	25.6	1108174.2	0.0	0.0	0.	0.	0.0	0.0	0.0
37	23.5	893999.6	0.0	0.0	0.	0.	0.0	0.0	0.0
38	21.4	694167.4	0.0	0.0	0.	0.	0.0	0.0	0.0
39	19.3	511659.3	0.0	0.0	0.	0.	0.0	0.0	0.0
40	17.0	349331.1	0.0	0.0	0.	0.	0.0	0.0	0.0
41	14.8	209874.0	0.0	0.0	0.	0.	0.0	0.0	0.0
42	12.5	95803.5	0.0	0.0	0.	0.	0.0	0.0	0.0
43	6.5	14058.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	320.000	150.000
2	369.193	141.055
3	418.768	134.550
4	468.604	130.500
5	518.579	128.914
6	568.571	129.798
7	618.459	133.148
8	668.120	138.956
9	717.435	147.209
10	766.281	157.885
11	814.541	170.960
12	862.097	186.401
13	908.833	204.171
14	954.635	224.226
15	999.391	246.518
16	1042.992	270.991
17	1085.332	297.587
18	1126.307	326.240
19	1165.818	356.881
20	1203.769	389.435
21	1240.066	423.823
22	1274.622	459.960
23	1307.351	497.759

24	1338.175	537.128
25	1367.018	577.970
26	1393.810	620.186
27	1418.486	663.673
28	1440.985	708.325
29	1461.252	754.033
30	1479.238	800.686
31	1494.900	848.170
32	1508.199	896.369
33	1519.102	945.166
34	1523.582	971.194

Circle Center At X = 525.793 ; Y = 1140.991 ; and Radius = 1012.133

Factor of Safety
*** 3.651 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	310.000	150.000
2	359.780	145.320
3	409.722	142.912
4	459.722	142.781
5	509.676	144.928
6	559.480	149.349
7	609.031	156.033
8	658.227	164.968
9	706.964	176.135
10	755.142	189.510
11	802.660	205.065
12	849.421	222.769
13	895.327	242.585
14	940.282	264.472
15	984.194	288.383
16	1026.971	314.270
17	1068.524	342.079
18	1108.768	371.751
19	1147.618	403.226
20	1184.994	436.438
21	1220.818	471.318
22	1255.016	507.794
23	1287.518	545.790
24	1318.254	585.226
25	1347.163	626.022
26	1374.183	668.093
27	1399.258	711.350

28	1422.337	755.705
29	1443.372	801.065
30	1462.318	847.337
31	1479.137	894.423
32	1493.794	942.227
33	1499.155	963.052

Circle Center At X = 437.586 ; Y = 1239.916 ; and Radius = 1097.358

Factor of Safety
*** 3.653 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	310.000	150.000
2	359.401	142.287
3	409.119	136.979
4	459.035	134.090
5	509.033	133.625
6	558.995	135.587
7	608.802	139.970
8	658.339	146.764
9	707.487	155.953
10	756.131	167.516
11	804.158	181.425
12	851.453	197.647
13	897.906	216.145
14	943.406	236.874
15	987.847	259.787
16	1031.125	284.828
17	1073.136	311.939
18	1113.783	341.057
19	1152.970	372.112
20	1190.604	405.031
21	1226.596	439.738
22	1260.863	476.149
23	1293.323	514.180
24	1323.899	553.741
25	1352.521	594.739
26	1379.120	637.077
27	1403.633	680.656
28	1426.004	725.372
29	1446.179	771.121
30	1464.111	817.795
31	1479.758	865.283
32	1493.082	913.475

33	1504.053	962.257
34	1504.502	964.834

Circle Center At X = 493.626 ; Y = 1163.769 ; and Radius = 1030.265

Factor of Safety
*** 3.658 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	340.000	158.125
2	389.087	148.612
3	438.589	141.574
4	488.382	137.029
5	538.340	134.987
6	588.338	135.454
7	638.249	138.430
8	687.949	143.905
9	737.311	151.868
10	786.211	162.297
11	834.526	175.166
12	882.135	190.443
13	928.918	208.090
14	974.756	228.061
15	1019.534	250.307
16	1063.140	274.772
17	1105.464	301.394
18	1146.398	330.105
19	1185.841	360.834
20	1223.692	393.504
21	1259.856	428.031
22	1294.243	464.330
23	1326.765	502.307
24	1357.340	541.869
25	1385.893	582.915
26	1412.350	625.342
27	1436.645	669.043
28	1458.716	713.907
29	1478.509	759.823
30	1495.974	806.674
31	1511.066	854.342
32	1523.747	902.707
33	1533.986	951.647
34	1537.807	975.936

Circle Center At X = 554.127 ; Y = 1130.594 ; and Radius = 995.764

Factor of Safety
*** 3.666 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	340.000	158.125
2	389.965	159.984
3	439.820	163.788
4	489.490	169.532
5	538.897	177.206
6	587.968	186.800
7	636.628	198.298
8	684.803	211.684
9	732.420	226.936
10	779.406	244.032
11	825.691	262.946
12	871.204	283.649
13	915.875	306.109
14	959.637	330.292
15	1002.424	356.163
16	1044.171	383.681
17	1084.814	412.804
18	1124.291	443.489
19	1162.542	475.689
20	1199.510	509.354
21	1235.138	544.435
22	1269.373	580.876
23	1302.161	618.624
24	1333.454	657.621
25	1363.204	697.808
26	1391.365	739.123
27	1417.896	781.504
28	1442.755	824.886
29	1465.904	869.204
30	1487.310	914.391
31	1506.938	960.377
32	1509.242	966.414

Circle Center At X = 317.397 ; Y = 1440.658 ; and Radius = 1282.732

Factor of Safety
*** 3.696 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	360.000	190.625
2	409.653	184.747
3	459.527	181.190
4	509.511	179.959
5	559.499	181.058
6	609.382	184.486
7	659.050	190.233
8	708.397	198.288
9	757.315	208.633
10	805.698	221.246
11	853.441	236.099
12	900.440	253.161
13	946.593	272.393
14	991.800	293.755
15	1035.963	317.200
16	1078.985	342.677
17	1120.774	370.130
18	1161.239	399.501
19	1200.291	430.724
20	1237.846	463.734
21	1273.823	498.457
22	1308.143	534.818
23	1340.731	572.739
24	1371.518	612.136
25	1400.436	652.926
26	1427.422	695.018
27	1452.417	738.322
28	1475.368	782.743
29	1496.225	828.185
30	1514.942	874.550
31	1531.479	921.736
32	1545.799	969.641
33	1548.230	979.410

Circle Center At X = 510.918 ; Y = 1252.906 ; and Radius = 1072.948

Factor of Safety
*** 3.701 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	300.000	150.000
2	348.357	137.288
3	397.304	127.081
4	446.711	119.405
5	496.448	114.283
6	546.383	111.726
7	596.383	111.741
8	646.316	114.330
9	696.050	119.484
10	745.452	127.190
11	794.393	137.428
12	842.742	150.170
13	890.371	165.383
14	937.155	183.027
15	982.968	203.055
16	1027.691	225.413
17	1071.204	250.043
18	1113.392	276.879
19	1154.143	305.850
20	1193.350	336.880
21	1230.908	369.885
22	1266.718	404.780
23	1300.686	441.471
24	1332.720	479.861
25	1362.737	519.848
26	1390.657	561.327
27	1416.405	604.188
28	1439.914	648.316
29	1461.121	693.596
30	1479.971	739.907
31	1496.412	787.126
32	1510.403	835.129
33	1521.905	883.788
34	1530.888	932.974
35	1536.407	975.469

Circle Center At X = 571.079 ; Y = 1082.852 ; and Radius = 971.441

Factor of Safety
*** 3.708 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.000	150.000
2	379.017	140.132

3	428.493	132.912
4	478.285	128.363
5	528.250	126.495
6	578.244	127.316
7	628.120	130.823
8	677.737	137.005
9	726.949	145.845
10	775.615	157.317
11	823.594	171.388
12	870.748	188.018
13	916.940	207.157
14	962.036	228.752
15	1005.906	252.739
16	1048.424	279.049
17	1089.467	307.607
18	1128.915	338.328
19	1166.655	371.126
20	1202.578	405.905
21	1236.580	442.564
22	1268.562	480.997
23	1298.432	521.094
24	1326.105	562.738
25	1351.499	605.810
26	1374.541	650.184
27	1395.166	695.732
28	1413.312	742.323
29	1428.928	789.821
30	1441.969	838.091
31	1452.397	886.991
32	1460.181	936.382
33	1461.639	950.546

Circle Center At X = 537.984 ; Y = 1056.421 ; and Radius = 929.977

Factor of Safety
*** 3.715 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.000	150.000
2	378.996	140.031
3	428.461	132.736
4	478.249	128.138
5	528.214	126.250
6	578.207	127.077
7	628.081	130.618

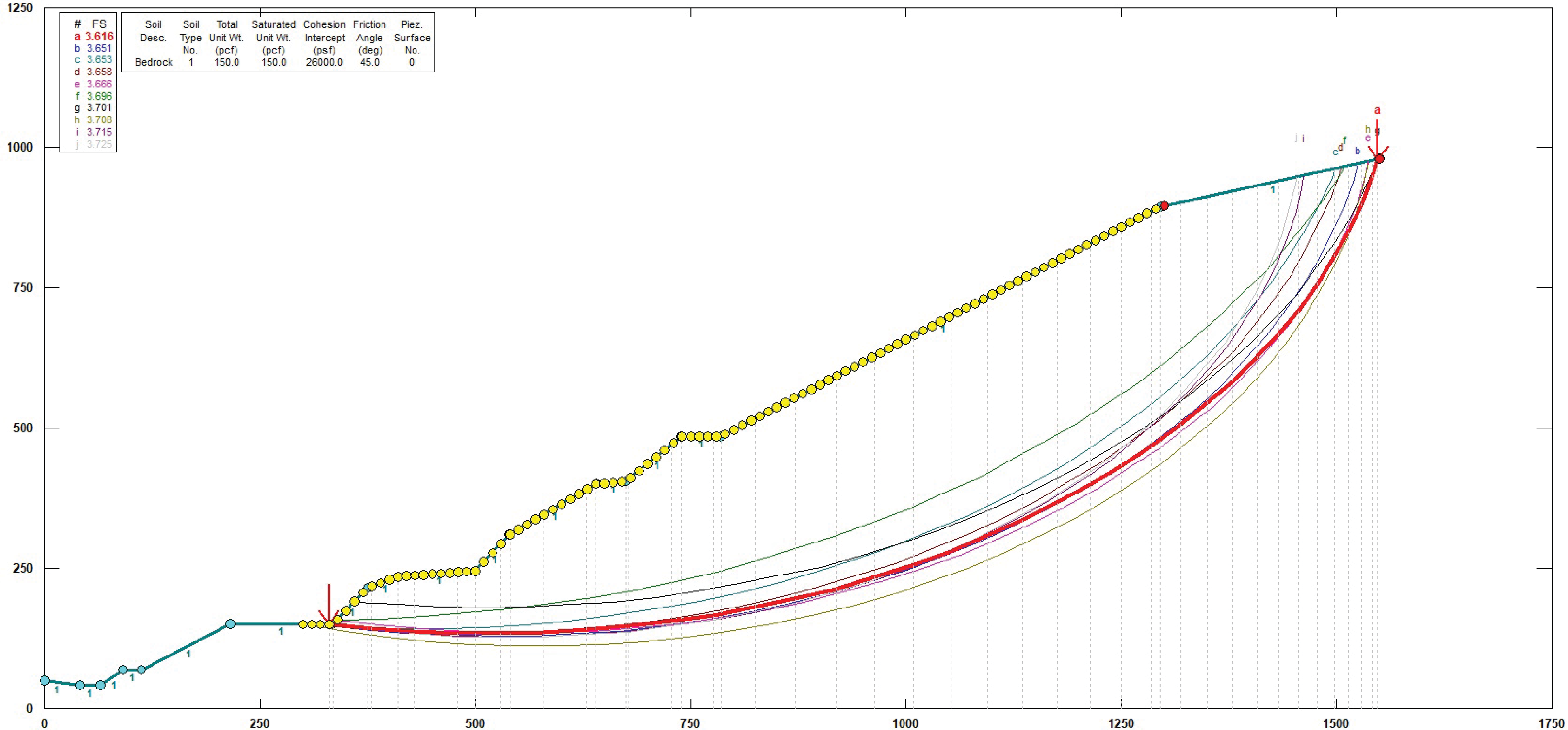
8	677.690	136.861
9	726.887	145.788
10	775.526	157.373
11	823.464	171.582
12	870.561	188.373
13	916.676	207.696
14	961.674	229.494
15	1005.423	253.704
16	1047.792	280.252
17	1088.657	309.062
18	1127.898	340.048
19	1165.399	373.119
20	1201.049	408.178
21	1234.743	445.120
22	1266.381	483.837
23	1295.871	524.215
24	1323.125	566.134
25	1348.063	609.471
26	1370.611	654.098
27	1390.703	699.883
28	1408.279	746.692
29	1423.288	794.386
30	1435.686	842.825
31	1445.435	891.865
32	1452.507	941.363
33	1453.063	947.688

Circle Center At X = 537.982 ; Y = 1046.779 ; and Radius = 920.581

Factor of Safety
*** 3.725 ***

**** END OF GSTABL7 OUTPUT ****

15558 Maricopa Hwy, Ojai: Section T-6 Circular, Static



GSTABL7 v.2 FSmin=3.616

Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 6/2/2020
Time of Run: 09:18AM
Run By: IM
Input Data Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\section a-1, circular failure, static.in
Output Filename: C:\Users\Project Files\Slope Stability\18-092902 OJAI QUARRY)\section a-1, circular failure, static.OUT
Unit System: English

Plotted Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\section a-1, circular failure, static.PLT

PROBLEM DESCRIPTION: 15558 Maricopa Hwy, Ojai: Section A-1
Circular, Static

BOUNDARY COORDINATES

6 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	178.00	5.00	176.00	1
2	5.00	176.00	80.00	180.00	1

3	80.00	180.00	260.00	320.00	1
4	260.00	320.00	310.00	320.00	1
5	310.00	320.00	540.00	500.00	1
6	540.00	500.00	600.00	545.00	1

Default Y-Origin = 0.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	150.0	26000.0	45.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

10 Surface(s) Initiate(s) From Each Of 100 Points Equally Spaced Along The Ground Surface Between X = 80.00(ft)
and X = 535.00(ft)

Each Surface Terminates Between X = 540.00(ft)
and X = 600.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

30.00(ft) Line Segments Define Each Trial Failure Surface.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 1000

Number of Trial Surfaces with Misleading FS = 1

Number of Failed Attempts to Generate Trial Surface = 49

Number of Trial Surfaces With Valid FS = 950

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 5.0 %

Statistical Data On All Valid FS Values:
FS Max = 437.843 FS Min = 6.452 FS Ave = 18.998
Standard Deviation = 24.850 Coefficient of Variation = 130.80 %

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.000	180.000
2	108.934	172.075
3	138.384	166.356
4	168.181	162.875
5	198.157	161.652
6	228.138	162.694
7	257.956	165.995
8	287.440	171.536
9	316.422	179.286
10	344.736	189.200
11	372.222	201.223
12	398.722	215.285
13	424.086	231.306
14	448.169	249.195
15	470.833	268.850
16	491.950	290.159
17	511.399	313.001
18	529.069	337.244
19	544.860	362.752
20	558.681	389.379
21	570.454	416.972
22	580.112	445.375
23	587.599	474.426
24	592.873	503.959
25	595.904	533.805
26	596.117	542.088

Circle Center At X = 199.404 ; Y = 558.681 ; and Radius = 397.060

Factor of Safety
*** 6.452 ***

Individual data on the 28 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	28.9	66034.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	29.4	197645.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	29.8	323520.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	30.0	440540.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	30.0	545909.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	29.8	637224.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.0	46909.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	27.4	621692.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	22.6	492193.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	6.4	138792.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	28.3	644981.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	27.5	670904.7	0.0	0.0	0.	0.	0.0	0.0	0.0
13	26.5	678981.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	25.4	669849.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	24.1	644663.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	22.7	605066.9	0.0	0.0	0.	0.	0.0	0.0	0.0
17	21.1	553141.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	19.4	491359.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	17.7	422519.4	0.0	0.0	0.	0.	0.0	0.0	0.0
20	10.9	245366.0	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.9	104247.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	13.8	275242.6	0.0	0.0	0.	0.	0.0	0.0	0.0
23	11.8	203526.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	9.7	138039.9	0.0	0.0	0.	0.	0.0	0.0	0.0
25	7.5	81974.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	5.3	38356.8	0.0	0.0	0.	0.	0.0	0.0	0.0
27	3.0	9960.9	0.0	0.0	0.	0.	0.0	0.0	0.0
28	0.2	129.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.596	183.575
2	113.417	175.247
3	142.799	169.189
4	172.563	165.436
5	202.529	164.010
6	232.516	164.922
7	262.340	168.165
8	291.821	173.719
9	320.781	181.551
10	349.043	191.613
11	376.436	203.845

12	402.794	218.171
13	427.957	234.506
14	451.773	252.749
15	474.096	272.791
16	494.791	294.510
17	513.733	317.774
18	530.807	342.441
19	545.909	368.363
20	558.948	395.381
21	569.845	423.332
22	578.532	452.047
23	584.959	481.350
24	589.085	511.065
25	590.706	538.029

Circle Center At X = 205.830 ; Y = 549.138 ; and Radius = 385.141

Factor of Safety
*** 6.548 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.000	180.000
2	108.757	171.453
3	138.106	165.239
4	167.859	161.397
5	197.824	159.951
6	227.809	160.912
7	257.620	164.273
8	287.066	170.013
9	315.957	178.094
10	344.107	188.464
11	371.336	201.057
12	397.468	215.792
13	422.335	232.574
14	445.777	251.296
15	467.643	271.835
16	487.793	294.061
17	506.096	317.830
18	522.436	342.990
19	536.706	369.379
20	548.816	396.826
21	558.687	425.156
22	566.256	454.185
23	571.473	483.728

24	574.307	513.594
25	574.483	525.862

Circle Center At X =   200.846 ; Y =   533.955 ; and Radius =   374.016

Factor of Safety
*** 6.649 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	102.980	197.873
2	131.596	188.867
3	160.850	182.219
4	190.549	177.975
5	220.494	176.162
6	250.487	176.792
7	280.330	179.861
8	309.823	185.349
9	338.773	193.219
10	366.986	203.419
11	394.274	215.881
12	420.459	230.524
13	445.364	247.248
14	468.826	265.944
15	490.688	286.488
16	510.806	308.743
17	529.045	332.562
18	545.286	357.785
19	559.419	384.247
20	571.352	411.772
21	581.006	440.177
22	588.315	469.272
23	593.232	498.867
24	595.724	528.763
25	595.746	541.810

Circle Center At X =   227.762 ; Y =   544.384 ; and Radius =   368.294

Factor of Safety
*** 6.659 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	89.192	187.149
2	118.588	181.159
3	148.343	177.338
4	178.299	175.708
5	208.294	176.277
6	238.166	179.042
7	267.755	183.989
8	296.903	191.090
9	325.452	200.307
10	353.248	211.592
11	380.144	224.883
12	405.993	240.108
13	430.657	257.187
14	454.003	276.027
15	475.907	296.527
16	496.249	318.576
17	514.921	342.057
18	531.823	366.843
19	546.863	392.800
20	559.961	419.790
21	571.047	447.667
22	580.059	476.281
23	586.952	505.479
24	591.686	535.103
25	592.020	539.015

Circle Center At X = 185.541 ; Y = 584.821 ; and Radius = 409.177

Factor of Safety
*** 6.706 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	98.384	194.299
2	127.311	186.346
3	156.781	180.733
4	186.606	177.495
5	216.594	176.653
6	246.553	178.213
7	276.292	182.165
8	305.619	188.483
9	334.347	197.126

10	362.291	208.040
11	389.273	221.155
12	415.119	236.386
13	439.664	253.635
14	462.750	272.793
15	484.230	293.736
16	503.966	316.331
17	521.831	340.431
18	537.710	365.884
19	551.503	392.525
20	563.121	420.184
21	572.488	448.684
22	579.546	477.842
23	584.249	507.471
24	586.364	534.773

Circle Center At X = 212.120 ; Y = 551.220 ; and Radius = 374.605

Factor of Safety
*** 6.772 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	98.384	194.299
2	126.898	184.974
3	156.095	178.080
4	185.769	173.666
5	215.708	171.762
6	245.702	172.383
7	275.537	175.524
8	305.002	181.162
9	333.889	189.258
10	361.993	199.754
11	389.115	212.576
12	415.062	227.634
13	439.652	244.820
14	462.709	264.013
15	484.071	285.076
16	503.586	307.861
17	521.116	332.207
18	536.536	357.940
19	549.739	384.879
20	560.629	412.833
21	569.130	441.603
22	575.182	470.986
23	578.741	500.774

24	579.751	529.813

Circle Center At X = 223.341 ; Y = 528.090 ; and Radius = 356.414

Factor of Safety
*** 6.789 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.000	180.000
2	109.780	176.374
3	139.735	174.735
4	169.733	175.090
5	199.641	177.436
6	229.327	181.765
7	258.660	188.055
8	287.511	196.281
9	315.751	206.405
10	343.256	218.383
11	369.905	232.161
12	395.579	247.680
13	420.166	264.869
14	443.557	283.655
15	465.647	303.952
16	486.341	325.672
17	505.546	348.719
18	523.178	372.991
19	539.158	398.381
20	553.416	424.776
21	565.889	452.060
22	576.522	480.113
23	585.268	508.810
24	592.089	538.024
25	592.284	539.213

Circle Center At X = 149.404 ; Y = 625.967 ; and Radius = 451.336

Factor of Safety
*** 6.789 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.364	212.172
2	149.971	203.136
3	179.235	196.535
4	208.951	192.414
5	238.908	190.804
6	268.894	191.716
7	298.698	195.142
8	328.108	201.060
9	356.918	209.426
10	384.923	220.182
11	411.926	233.253
12	437.736	248.545
13	462.171	265.950
14	485.058	285.346
15	506.234	306.596
16	525.552	329.549
17	542.873	354.043
18	558.076	379.905
19	571.054	406.953
20	581.714	434.995
21	589.982	463.833
22	595.798	493.264
23	599.122	523.079
24	599.707	544.780

Circle Center At X = 243.105 ; Y = 547.359 ; and Radius = 356.611

Factor of Safety
*** 6.830 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.364	212.172
2	149.884	202.866
3	179.092	196.020
4	208.777	191.685
5	238.724	189.892
6	268.714	190.654
7	298.531	193.965
8	327.958	199.802
9	356.781	208.121

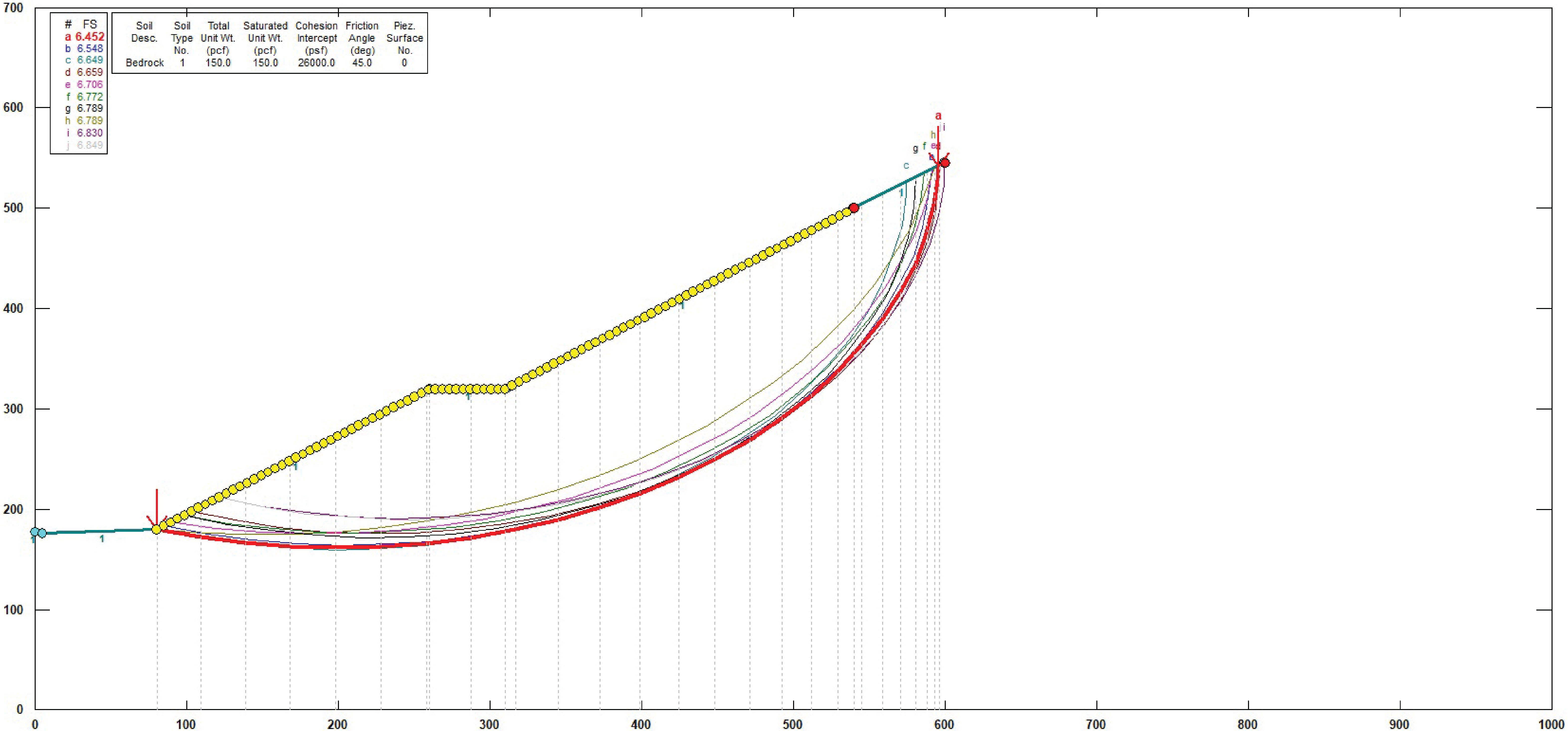
10	384.792	218.863
11	411.787	231.950
12	437.571	247.287
13	461.955	264.762
14	484.765	284.248
15	505.833	305.605
16	525.008	328.678
17	542.149	353.298
18	557.133	379.288
19	569.851	406.459
20	580.211	434.614
21	588.138	463.547
22	593.573	493.051
23	596.478	522.910
24	596.709	542.532

Circle Center At X = 244.824 ; Y = 541.689 ; and Radius = 351.886

Factor of Safety
*** 6.849 ***

**** END OF GSTABL7 OUTPUT ****

15558 Maricopa Hwy, Ojai: Section A-1 Circular, Static



GSTABL7 v.2 FSmin=6.452

Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 6/2/2020
Time of Run: 09:25AM
Run By: IM
Input Data Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section A-2, circular failure, static.in
Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section A-2, circular failure, static.OUT
Unit System: English

Plotted Output Filename: C:\Users\Project Files\Slope Stability\18-092902 (OJAI QUARRY)\Section A-2, circular failure, static.PLT

PROBLEM DESCRIPTION: 15558 Maricopa Hwy, Ojai: Section A-2
Circular, Static

BOUNDARY COORDINATES

6 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	12.00	20.00	12.00	1
2	20.00	12.00	220.00	170.00	1

3	220.00	170.00	230.00	170.00	1
4	230.00	170.00	280.00	180.00	1
5	280.00	180.00	310.00	210.00	1
6	310.00	210.00	500.00	280.00	1

Default Y-Origin = 0.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	150.0	26000.0	45.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

10 Surface(s) Initiate(s) From Each Of 100 Points Equally Spaced
Along The Ground Surface Between X = 20.00(ft)
and X = 220.00(ft)

Each Surface Terminates Between X = 225.00(ft)
and X = 500.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)

20.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 1000

Number of Failed Attempts to Generate Trial Surface = 57

Number of Trial Surfaces With Valid FS = 943

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 5.7 %

Statistical Data On All Valid FS Values:
FS Max = 210.011 FS Min = 7.708 FS Ave = 22.331
Standard Deviation = 22.185 Coefficient of Variation = 99.34 %

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.000	12.000
2	39.662	8.338
3	59.488	5.703
4	79.423	4.103
5	99.416	3.540
6	119.410	4.018
7	139.352	5.535
8	159.189	8.086
9	178.866	11.665
10	198.330	16.263
11	217.530	21.865
12	236.412	28.459
13	254.925	36.024
14	273.021	44.543
15	290.649	53.990
16	307.762	64.341
17	324.314	75.567
18	340.260	87.639
19	355.556	100.524
20	370.163	114.186
21	384.039	128.589
22	397.148	143.694
23	409.454	159.460
24	420.923	175.844
25	431.526	192.802
26	441.232	210.289
27	450.017	228.257
28	457.855	246.657
29	464.726	265.439

30 465.270 267.205

Circle Center At X = 100.240 ; Y = 388.048 ; and Radius = 384.513

Factor of Safety
*** 7.708 ***

Individual data on the 33 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	19.7	28305.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	19.8	84289.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	19.9	138056.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	20.0	188985.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	20.0	236502.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	19.9	280094.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	19.8	319309.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	19.7	353763.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	19.5	383144.9	0.0	0.0	0.	0.	0.0	0.0	0.0
10	19.2	407217.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.5	54370.0	0.0	0.0	0.	0.	0.0	0.0	0.0
12	10.0	218289.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	6.4	137820.1	0.0	0.0	0.	0.	0.0	0.0	0.0
14	18.5	391265.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	18.1	370532.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	7.0	139121.9	0.0	0.0	0.	0.	0.0	0.0	0.0
17	10.6	214339.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	17.1	359478.2	0.0	0.0	0.	0.	0.0	0.0	0.0
19	2.2	48270.7	0.0	0.0	0.	0.	0.0	0.0	0.0
20	14.3	304718.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	15.9	326749.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	15.3	298022.8	0.0	0.0	0.	0.	0.0	0.0	0.0
23	14.6	267558.4	0.0	0.0	0.	0.	0.0	0.0	0.0
24	13.9	235899.4	0.0	0.0	0.	0.	0.0	0.0	0.0
25	13.1	203614.9	0.0	0.0	0.	0.	0.0	0.0	0.0
26	12.3	171292.8	0.0	0.0	0.	0.	0.0	0.0	0.0
27	11.5	139531.6	0.0	0.0	0.	0.	0.0	0.0	0.0
28	10.6	108934.0	0.0	0.0	0.	0.	0.0	0.0	0.0
29	9.7	80100.2	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.8	53620.3	0.0	0.0	0.	0.	0.0	0.0	0.0
31	7.8	30066.9	0.0	0.0	0.	0.	0.0	0.0	0.0
32	6.9	9988.1	0.0	0.0	0.	0.	0.0	0.0	0.0
33	0.5	63.8	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.101	19.980
2	49.251	14.213
3	68.689	9.502
4	88.355	5.862
5	108.190	3.303
6	128.136	1.833
7	148.133	1.456
8	168.120	2.175
9	188.038	3.985
10	207.827	6.883
11	227.428	10.859
12	246.781	15.901
13	265.831	21.994
14	284.518	29.121
15	302.787	37.259
16	320.584	46.385
17	337.855	56.471
18	354.548	67.486
19	370.613	79.398
20	386.003	92.172
21	400.671	105.768
22	414.573	120.146
23	427.667	135.263
24	439.915	151.074
25	451.280	167.532
26	461.727	184.586
27	471.225	202.187
28	479.746	220.281
29	487.265	238.814
30	493.758	257.730
31	499.207	276.974
32	499.877	279.955

Circle Center At X = 145.020 ; Y = 366.751 ; and Radius = 365.318

Factor of Safety
*** 7.716 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	32.121	21.576
2	51.565	16.890
3	71.225	13.220
4	91.049	10.575
5	110.984	8.964
6	130.976	8.390
7	150.971	8.854
8	170.914	10.356
9	190.753	12.892
10	210.433	16.454
11	229.902	21.034
12	249.106	26.618
13	267.995	33.192
14	286.517	40.737
15	304.622	49.234
16	322.262	58.660
17	339.388	68.989
18	355.955	80.193
19	371.918	92.242
20	387.234	105.104
21	401.861	118.744
22	415.760	133.125
23	428.894	148.208
24	441.227	163.953
25	452.726	180.317
26	463.360	197.256
27	473.099	214.724
28	481.919	232.674
29	489.795	251.058
30	496.705	269.826
31	499.844	279.943

Circle Center At X = 132.031 ; Y = 393.445 ; and Radius = 385.057

Factor of Safety
*** 7.757 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.182	26.364
2	57.666	21.851
3	77.361	18.371
4	97.212	15.933
5	117.164	14.543
6	137.161	14.206

7	157.148	14.922
8	177.070	16.689
9	196.871	19.503
10	216.496	23.355
11	235.892	28.236
12	255.003	34.131
13	273.778	41.023
14	292.163	48.895
15	310.109	57.724
16	327.565	67.486
17	344.483	78.153
18	360.816	89.696
19	376.518	102.083
20	391.546	115.280
21	405.859	129.250
22	419.416	143.953
23	432.180	159.351
24	444.116	175.399
25	455.190	192.053
26	465.372	209.267
27	474.634	226.993
28	482.949	245.183
29	490.296	263.785
30	495.130	278.206

Circle Center At X = 133.587 ; Y = 393.729 ; and Radius = 379.551

Factor of Safety
*** 7.916 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	34.141	23.172
2	53.871	19.897
3	73.739	17.598
4	93.696	16.281
5	113.693	15.950
6	133.682	16.605
7	153.615	18.244
8	173.442	20.864
9	193.117	24.458
10	212.590	29.017
11	231.815	34.531
12	250.745	40.986
13	269.334	48.366

14	287.536	56.653
15	305.308	65.827
16	322.605	75.866
17	339.388	86.746
18	355.613	98.439
19	371.242	110.918
20	386.237	124.153
21	400.562	138.110
22	414.181	152.756
23	427.062	168.056
24	439.172	183.972
25	450.484	200.466
26	460.969	217.498
27	470.602	235.025
28	479.359	253.006
29	487.219	271.397
30	488.888	275.906

Circle Center At X = 110.443 ; Y = 421.364 ; and Radius = 405.437

Factor of Safety
*** 7.923 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	36.162	24.768
2	55.498	19.660
3	75.092	15.649
4	94.881	12.750
5	114.802	10.971
6	134.791	10.318
7	154.785	10.792
8	174.721	12.393
9	194.535	15.115
10	214.164	18.950
11	233.546	23.885
12	252.618	29.904
13	271.321	36.989
14	289.595	45.118
15	307.382	54.263
16	324.624	64.396
17	341.269	75.486
18	357.261	87.495
19	372.551	100.388
20	387.091	114.121
21	400.832	128.653

22	413.733	143.936
23	425.752	159.921
24	436.851	176.559
25	446.994	193.796
26	456.150	211.578
27	464.288	229.847
28	471.384	248.546
29	477.414	267.615
30	478.559	272.101

Circle Center At X = 136.397 ; Y = 364.798 ; and Radius = 354.497

Factor of Safety
*** 7.942 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.202	27.960
2	59.292	21.994
3	78.692	17.132
4	98.338	13.388
5	118.167	10.776
6	138.112	9.303
7	158.110	8.975
8	178.093	9.792
9	197.997	11.753
10	217.756	14.850
11	237.305	19.073
12	256.580	24.408
13	275.518	30.839
14	294.056	38.344
15	312.135	46.897
16	329.694	56.472
17	346.676	67.037
18	363.025	78.556
19	378.688	90.993
20	393.613	104.307
21	407.751	118.453
22	421.056	133.386
23	433.484	149.056
24	444.994	165.411
25	455.549	182.399
26	465.114	199.964
27	473.657	218.048
28	481.151	236.591
29	487.570	255.532
30	492.895	274.810

31	493.497	277.604

Circle Center At X = 153.838 ; Y = 358.082 ; and Radius = 349.133

Factor of Safety
*** 7.962 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.202	27.960
2	58.950	20.995
3	78.078	15.153
4	97.518	10.452
5	117.201	6.910
6	137.060	4.539
7	157.025	3.347
8	177.025	3.339
9	196.990	4.514
10	216.851	6.869
11	236.538	10.394
12	255.982	15.079
13	275.114	20.906
14	293.868	27.855
15	312.178	35.901
16	329.980	45.017
17	347.211	55.170
18	363.811	66.325
19	379.722	78.443
20	394.888	91.481
21	409.256	105.394
22	422.775	120.133
23	435.399	135.646
24	447.082	151.878
25	457.785	168.774
26	467.468	186.273
27	476.100	204.314
28	483.649	222.835
29	490.088	241.770
30	495.396	261.053
31	499.373	279.769

Circle Center At X = 167.164 ; Y = 341.029 ; and Radius = 337.834

Factor of Safety
*** 7.975 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.101	19.980
2	49.985	17.825
3	69.947	16.593
4	89.944	16.286
5	109.935	16.904
6	129.875	18.447
7	149.723	20.911
8	169.435	24.290
9	188.970	28.578
10	208.286	33.766
11	227.340	39.841
12	246.094	46.792
13	264.505	54.603
14	282.536	63.258
15	300.146	72.738
16	317.300	83.022
17	333.959	94.089
18	350.087	105.915
19	365.652	118.475
20	380.619	131.742
21	394.955	145.686
22	408.631	160.280
23	421.618	175.490
24	433.886	191.285
25	445.411	207.631
26	456.166	224.493
27	466.130	241.834
28	475.281	259.618
29	481.483	273.178

Circle Center At X = 86.582 ; Y = 448.384 ; and Radius = 432.111

Factor of Safety
*** 7.981 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	34.141	23.172
2	54.037	21.129
3	74.003	19.972

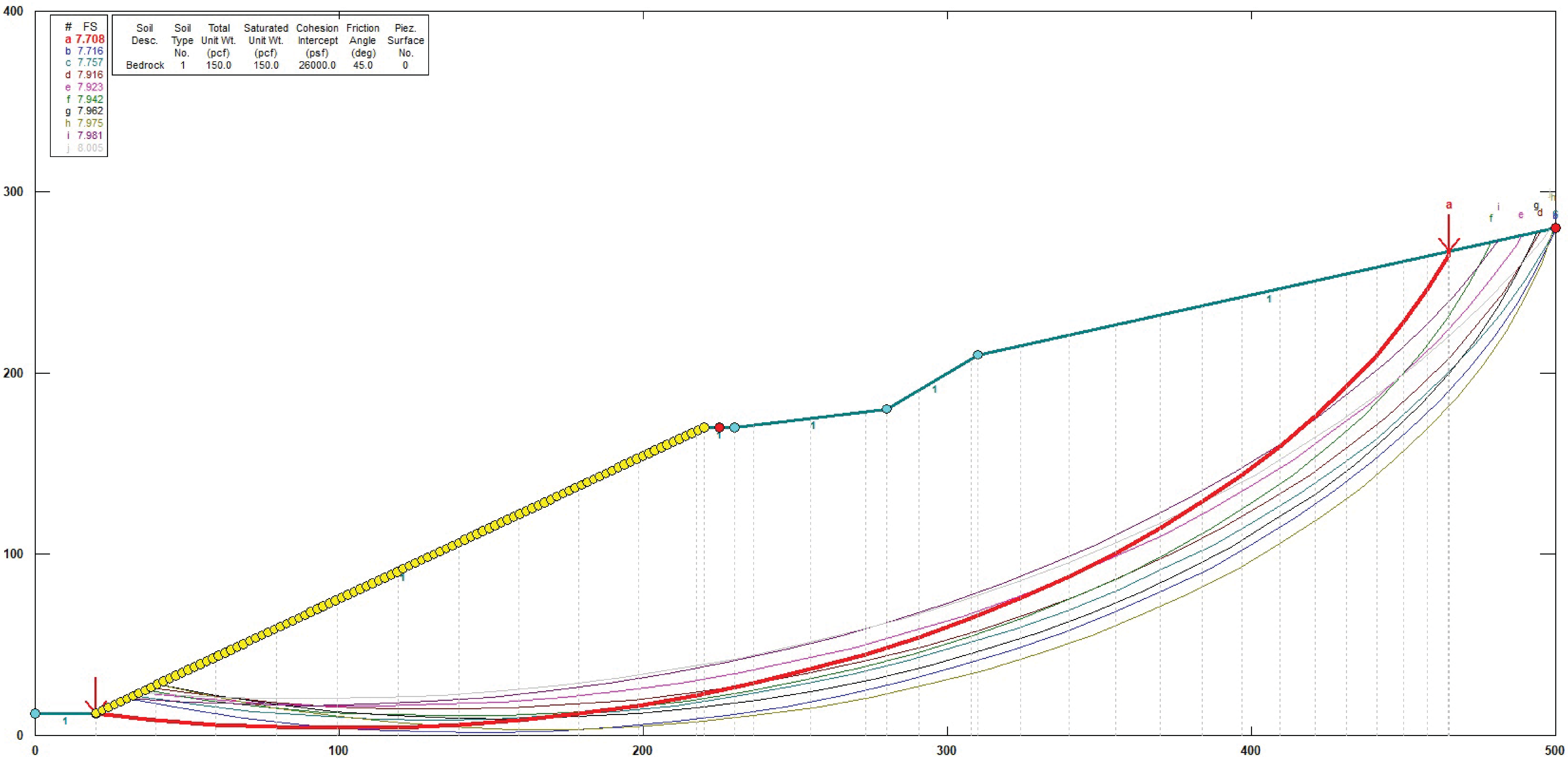
4	94.002	19.701
5	113.992	20.318
6	133.935	21.820
7	153.793	24.206
8	173.524	27.470
9	193.092	31.607
10	212.457	36.607
11	231.581	42.462
12	250.426	49.159
13	268.956	56.685
14	287.134	65.026
15	304.923	74.165
16	322.290	84.084
17	339.200	94.764
18	355.620	106.184
19	371.516	118.320
20	386.859	131.150
21	401.617	144.648
22	415.763	158.787
23	429.267	173.539
24	442.103	188.877
25	454.246	204.768
26	465.673	221.183
27	476.360	238.088
28	486.287	255.450
29	495.433	273.236
30	498.243	279.353

Circle Center At X = 90.155 ; Y = 470.175 ; and Radius = 450.499

Factor of Safety
*** 8.005 ***

**** END OF GSTABL7 OUTPUT ****

15558 Maricopa Hwy, Ojai: Section A-2 Circular, Static



GSTABL7 v.2 FSmin=7.708
Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX II

NORFLEET CONSULTANTS REPORT DATED DECEMBER 5, 2011

NORFLEET CONSULTANTS

Engineering
Geology
Hydrogeology
Geophysics

6430 Preston Ave.
Suite A
Livermore, CA 94551
(925) 606-8595

December 5, 2011

Mr. L. Mosler
Mosler Rock Ojai Quarry
Box 502
Newbury Park, CA 91319

Proj. No. 111882

RE: Slope Stability Study
For the Ojai Quarry
Reclamation Plan
Ojai, CA

Dear Mr. Mosler,

At your request, we have completed our slope stability evaluation for the Reclamation Plan for the Mosler Rock Ojai Quarry Project in Ojai, California. This study evaluates the stability of the final reclaimed slope geometry.

Our scope of work included:

- Site meetings with quarry personnel and site visits to the quarry.
- Compilation, review and summary of available pertinent geologic and geotechnical documents, to support slope design analysis and recommendations for a quarry Reclamation Plan.
- Numerical evaluation of cross-sections for slope stability in static and pseudo-static loading conditions of the proposed reclamation slope geometry.
- Discussions with quarry personnel about the implications of the findings of this study.
- Preparation of this report.

The intent and purpose of this report is to provide a summary of the geologic and geotechnical issues as they pertain to long-term, global slope stability of the final slope geometries at reclamation (after quarrying has ceased) consistent with SMARA requirements. Working and interim slope stability were not evaluated. We understand that an engineering firm currently provides those services. Our fieldwork was performed in November, 2011.

GEOLOGIC SETTING

The quarry is located on undeveloped land of the Los Padres National Forest within the Topatopa range, and is adjacent to State Highway 33 (Rt 33) and the north fork of Matilija Creek (Figures 1 and 2). It is about 4 miles north of the city of Ojai in Ventura County. Eocene sandstones of the Matilija formation are mined in the quarry.

The area was mapped in 1928 by Kerr and Schenck and again by Dibblee (1982). Dibblee’s structural mapping is general only. It does not show the detailed structural complexities within the ramp zone. The depostional environment of the sandstone was discussed by Link (1975). Squires (1999) did a detailed stratigraphic analysis of the Matilija sandstone at the Matalija Hot Springs with an auxiliary section opposite the quarry.

The quarry is located in the core of large thrust ramp (called the Matilija Overturn by Kerr and Schenck). The thrust ramp extends diagonally (southeast-to-northwest) across the range, forming a large fold. The ramp fold axis is quasi-vertical, exposing a cross-section of the ramp (in plan view). Ramp development caused rotation, faulting, fracturing, shearing, and bedding plane slip along the sandstone/siltstone beds.

SITE GEOLOGY

Field descriptions are based on the exposures in the quarry at the time of our site visits in late 2011. This is an active quarry. As mining progress, features described in this report may be destroyed while new geologic features will become visible. With a few exceptions, the quarry beds dip steeply (80 to 85 degrees SE) and strike ~N30E. The beds young to the southeast. The quarry face has an approximate bearing of N40W.

The quarry is located on the lower part of a southwest sloping steep ridge (Photos 1 and 2). The current quarry (active and reclaimed) is about 650 feet wide and long with an elevation change of about 500 feet. The undisturbed ground above the quarry slopes 33 to 36 degrees (1.54-1.4 to 1) while the ground surface adjacent to the north side of the lower part of the quarry slopes about 45 degrees (1 to 1). There were no obvious indications of large-scale slope failures in the surrounding natural slopes.

In the quarry, the Matilija formation consists of interbedded sandstones and siltstones (Photo 3). Sandstone beds vary from a foot or so thick to massive beds more than 30 feet thick. The sandstones are fine- to coarse-grained and contain few obvious depositional features. The siltstones are thin bedded (an inch or less) and form zones a few inches thick to more than 20 feet thick. The sandstones are light brown in color while the siltstones are dark brown (blackish looking). The sandstones are hard enough that they have to be blasted.

The stratigraphy of the Matilija formation was evaluated by Link (1975). The lower Matilija formation crops out in the quarry and consists of two lithofacies: distal and proximal turbidites. The distal turbidite lithofacies is a deep water flysch sequence. It consists of thin-bedded, graded sandstones with thin siltstone/silty clay interbeds. They exhibit a classic fining-upwards Bouma sequence. The sandstone beds typically have sharp lower boundaries and can contain mudstone clasts. They are blanket-like turbidites. The proximal turbidite lithofacies overlies the distal zone. The proximal turbidites contain thick lower sandstone beds (3 to 45 feet thick) with a slight internal coarsening upward in grain size. This zone resembles channel-like turbidites and are thought to have formed within a submarine-fan complex. See Link(1975) for further details.

For mapping purposes, the rocks within the pit were separated into three domains (A, B, and C, Figure 2). Domains are used as geomechanical units (GMU's). Domains A and B are part of the distal turbidite lithofacies and Domain C is part of the proximal turbidite lithofacies.

Domain A is located at the northern side of the quarry (Photo 1). It consists of thick (3 to 30 feet) sandstone beds and thin siltstone beds (most under 1 foot thick; Photo 3). It appears to contain two fining upward sequences (from north to south), each about 150 feet thick. The upper part of each sequence contains thicker and more numerous siltstone beds while the basal part contains thick sandstone beds with scattered, thin siltstone beds. Domain B is a narrow zone (~100 ft wide) near the middle of the quarry (Photos 2 and 4). It consists mainly of siltstone beds less than 1 inch wide with occasional sandstone beds up to a few feet wide. It is more erodable than the other domains and forms a broad gully that extends up and down the slope. The siltstones are easily broken apart with a rock hammer (and sometimes by hand) and can be excavated with machinery. Domain C is located at the southern side of the quarry (Photos 2 and 5). It consists of massive sandstone units with few, thin siltstone beds. It is about 200 feet thick. In this area, bedding can be difficult to identify even in fresh exposures. At the ground surface, these sandstones erode into large boulders.

There is a sub-domain at the uphill end of Domain A. This area consists of extensively fractured sandstone that appears to be part of a fault/shear zone. It has a triangular shape and is informally called the triangle zone (TZ in Figure 2, Photo 6). No siltstones were visible within this zone. The sandstone has fractured into large blocks of all sizes, ranging from a foot on a side to blocks 10 feet or more on a side. It has the characteristics of a large gravel pile and has about a 70 foot high steep face (45 to 60 degree slope). This is the only sandstone area that can be excavated without blasting. This area was mapped by PML and is identified on their geologic map as a "scattered boulder" zone.

Rocks in the quarry are fractured/jointed/sheared/faulted to varying levels. All of these features will be referred to as joints unless specifically described otherwise. It appears that bedding plane slip was concentrated in the siltstone beds. It is not known how much stratigraphic shortening occurred. The thickness of the main siltstone bed on the west side of Rt 33 is more than double the thickness of the main siltstone zone (Domain B) in the quarry (Photo 13). Structural relationships on either side of Rt 33 suggests that a fault extends partially through the north end of the river valley, and it may be difficult to project stratigraphic correlations across Rt 33.

We observed a fault at the upper part of Domain A (above bench 3, Photo 7). The fault is exposed in a naturally occurring gully that existed prior to any quarrying. The strike and dip of the fault is N25W 55SW. About 200 feet of the fault plane exposed in a gully. The gully is 20 to 30 feet deep and the fault plane forms the south side of the gully. We do not know the uphill extension of the fault. The fault could be traced down into the upper road (part of bench 3) that cuts across the quarry, but not further. The structural orientation of the fault suggests that it extends downhill into the siltstone zone (Domain B).

We observed bedding plane slip (a fault) in the middle of Domain A (Photos 3 and 8). The upper part of this fault appeared to widen out into a triangular shape at the base of the triangle zone. The structural relationship between this fault and the triangle zone is unknown.

We observed one and possibly two faults in Domain C, and there are likely others. These faults are quasi-parallel to bedding. These faults have weather into deep crevasses filled with sand (Photo 5). We did not observe faults that cut across bedding.

Residual soils a few feet thick overlie bedded sandstones and siltstones in Domains A and B. In the fractured rock (sub-domain A) and massive sandstones (Domain C), bedrock is overlain by sands and sandstone corestones forming a zone that is 10 to 50 feet thick (a saprolite[1]; Photos 9). The boundaries between soil, saprolite, and bedrock are gradational, but thin. We did not observe visibly weathered bedrock even though weathering on a microscopic level exists. We did not observe obvious alteration/mineralization of bedrock. One of the weathering effects on both the sandstones and siltstones is that as weathering increases, joint spacing and persistence is reduced and joint density increases. The above descriptions are based on our visual field observations.

We measured joints along the quarry roads at various locations throughout the quarry. Data collected included joint orientation, termination, spacing, persistence, type, width, shape, roughness, and filling. The poles to the joint orientation data were plotted on stereonets to evaluate the potential for wedge and planar failures daylighting in the quarry walls. This data was used to estimate strength envelopes for the sandstones and siltstones.

The majority of the joints are thin (most less than 1/8 inch wide to tight; Photos 5, 10, 11, and 12). Most joints were not filled, but some contained a thin fill. Occasional slickenslides were observed. Virtually all of the sandstone units have been blasted. Blasting widened many of the joints and locally increased joint density. The majority of the observed joints dipped out of the quarry faces. Most dip between 30 and 45 degrees. The dip direction of most joints is perpendicular (± 20 degrees) to the quarry face. No bedding parallel joints within the sandstones were observed. No free/flowing water was observed in the quarry. No indications of long-term, historic water flow were observed in the quarry.

Schmidt hammer (type N) readings were taken at several locations in the sandstone units. The readings were corrected as described in Basu and Ayding (2004). The compressive strength ranged from 7,000 to 8,000 psi (48 to 70MPa). These values are consistent with hammer tests (Brown, 1981). Hammer strikes indicate that the intact rock has a grade of R4 to R5 (Hoek and Brown, 1997; Hack and Huisman, 2002). The Schmidt hammer readings have an inherent, sample bias towards testing larger, stronger rocks. We performed a few Schmidt hammer tests on the siltstones. The compressive strength is in the range of 1000 psi (144,000 pcf). These

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[1] Saprolite traditionally refers to weathered rock that has lost much of its mechanical strength, but retains its original rock fabric. The primary minerals have altered and clay has developed (Anand and Paine, 2002, p 16-20; Graham and Rossi, 2010). Saprock is included within our usage of Saprolite. We use the term in this study to describe deeply weathered rock that contains sands and sandstone corestones.

values should be considered an approximation only. The values were at the low end of the scale of the hammer and the siltstones were loose and finely fractured, making it difficult to find good surfaces to test.

RQD values vary with the Domain. The RQD of Domain B (the siltstone zone) horizontally and vertically is 0 to 10. The RQD of Domain C (the massive sandstone) horizontally and vertically is 80 to 100. The RQD would be less in a fault/shear zone. The RQD of Domain A (interbedded sandstones and siltstones) is variable because of the anisotropic nature of the zone. The overall RQD is between 40 and 60, with higher and lower values depending on the location. In a horizontal direction, RQD is controlled by sandstone/siltstone bed thicknesses, joint density and minor changes in the scan line orientation and location. In a vertical direction, RQD values are controlled by joint density within a single sandstone bed. RQD would be close to 0 in the siltstones.

The California Geological Survey (CGS) Seismic Hazard Zone Report for Matilija quadrangle contains material properties. The Matilija sandstone was not directly tested, but the phi angle was estimated at 38 degrees. No cohesion value was listed. These values represent near-surface, weathered sandstone (10 to 40 feet from the ground surface) instead of less weathered (stronger) sandstones. No landslides were shown within the Matilija sandstone units in the vicinity of the quarry.

No historic air photographs were evaluated.

Seismicity

The Matilija Quadrangle was evaluated by the California Geological Survey for earthquake-induced landslides and liquefaction potential (CGS, 2003). No direct physical properties for the Matililja Sandstone were listed. CGS assumed a phi angle of 38 degrees, but no cohesion value was listed. For a 1.5:1 slope (66% grade), the earthquake induced landslide hazard was considered medium. The CGS estimated that the quarry area has a 10 percent chance in 50 years of experiencing a PGA of 0.51 to 0.53g (firm rock conditions).

Groundwater

The quarry is on the side of a steep hill. No springs are known in the surrounding hillside. We did not observe damp zones in the quarry rock exposures or indications of historic water flow from the rock faces. The geologic setting of the quarry indicates that it is not susceptible to liquefaction.

The term “saturated zone” or groundwater table is commonly applied to soils and sedimentary basin fill material in which there is a porous, granular matrix (silt, sand, gravel) where water can fill open, interconnected pores. The sandstones are somewhat porous but do not have a sufficiently open pore structure that would allow the development of a widespread “saturated zone”. Groundwater flow through pores or microfractures within the intact rock mass is considered minimal. The primary flow paths are through the joints and fractures (a dual porosity model).

There is likely deep groundwater (below the elevation of the North Fork of the Matilija stream), but there is no indication of a long-term groundwater table in the quarry area at elevations that would affect slope stability. The majority of rainfall seeps into the ground. It flows in unsaturated conditions though the saprolite and then into joints within bedrock. Temporary, localized perched water tables likely develop. They cause rock falls of all sizes, but no large-scale landslides have occurred. Large rock falls occur during heavy rains but not during the dry season. For this reason, groundwater was not included within the slope stability models.

Historic Stability Evaluation

The previous slope stability report was issued on July 25, 1988, by Pacific Materials Laboratory (hereinafter referred to as PML), their file no. 88-6253-3. At that time, the disturbed area was about 3 acres, and a steep rock cut (~0.8:1 slope, with a maximum height of ~285 feet) had been made at the lower northwest corner of the quarry (adjacent to the north end of the current bench 1). That face still exists and has not been significantly modified by the current operator. The PML report evaluated the potential slope stability of “future rock quarry areas” (PML, p. 2). Quarried slopes existing at the time were not evaluated.

PML measured the orientation of 157 joints and plotted the joint data on a stereonet (PI diagram, Figure 3) and contoured the data with a 1 percent counting circle. They identified three primary joint sets (Table 1) and several minor joint sets. All their data appears to have measured uphill of the current bench 2. Their geologic map suggests that little joint data was collected from cuts/exposed rock within areas that had been mined.

Table 1 Primary joint sets identified in the PML report

Set Number	Dip bearing	Strike and Dip
1	110/35SW	N70W 35SW
2	104/44SW	N76W 44SW
3	118/37SW	N62W 39SW

PML indicated that these joint sets were systematic, had a spacing of 1 to 5 feet, and were traceable for 5 to 75 feet. They used the first two joint sets in their slope stability analysis.

PML performed unconfined compressive strength tests on three sandstone samples. The unit weight of the samples varied from 157.2 to 159.7 pcf and the UCS varied from 14,649 to 16,164 psi (~2,000,000 psf/ ~96 MPa)

PML performed direct shear tests on joints in four sandstone samples. Each sample was tested under saturated conditions at confining loads of 1000, 2000, and 4000 psf. The joint friction angles varied from 48 to 67 degrees and cohesion was 0, except for one sample that had a cohesion of 500 pcf(?). This sample had the largest friction angle (67 degrees).

Based on their analysis, PML believed that the critical stability factor was translational failure along persistent rock joints. In their slope stability analysis, they assumed that joint set numbers

1 and 2 (Table 1) extended the full height and width of the slope (cutting across the siltstone beds), creating two potential planar failure surfaces along which translational failure could occur (35 and 44 degrees). Material properties assigned to these potential failure surfaces were C=0, and a friction angle (Phi) of 48 degrees. They ignored effects of the siltstone beds and they did not evaluate non-planar failure mechanisms. They modeled the failure surfaces separately, ignoring cross-cutting effects of the two joint sets. They placed the joints at critical locations in the cross sections. It is not known if joints were actually mapped at those locations.

They modeled four slope profiles (from north to south): H-K, D-G, A-C, and L-M. Table 2 is a summary of the modeling results for each cross-section.

Table 2 Results of PML slope stability analyses. All models used C=0, Phi =48, rock unit weight of 158 pcf, and dry conditions (no water)

Section	Joint Dip	FS (Factor of Safety)
H-K	35	not modeled
H-K	46	1.07
D-G	35	1.59 (two depths modeled-same FS for each depth)
D-G	44	not modeled
A-C	35	not modeled
A-C	44	1.15 (three depths modeled-same FS for each depth)
L-M	no failure surfaces modeled	

Profiles D-G and A-C are adjacent to each other and are semi-parallel. It appears that profile D-G was used to model the 35 degree failure surface and profile A-C was used to model the 44 degree failure surface. On their 1994 maps, cross-section T (on the map) appears to be the same as cross-section A-B in the 1988 report, and cross-section J (on the map) appears to be the same as cross-section H-K in the 1998 report. Both assumed failure surfaces shown on the 1994 maps dip at 44 degrees, but the assumed failure surface F is shallower than the assumed failure surface C.

Their stability analysis of section H-K is misleading. This cross-section modeled the stability of undisturbed ground just north of the quarry. The FS was 1.07. This indicates that the slope is marginally stable and could fail at any time. This is correct, because the undisturbed ground in this area is failing. However, only the rock near the ground surface is failing, and it is failing with a toppling mechanism with movement to the north away from the quarry (out of the plane of the cross-section). There is no failure (actual or incipient) along persistent joint surface as shown in the model. The large rock face just south of this cross-section is still there, and no persistent, continuous joints or global failure are visible.

PML made a fundamental assumption: that joint surfaces extend both across and up the slope as single, continuous features. For their modeling purposes, they assumed that both 35 and 44 degree joints dipped out of the slope at a specific location. They knew that joints with these orientations occurred throughout the quarry face and that the assumed failure surfaces shown on their cross-sections were just one of many quasi-parallel joints that existed both above and below their assumed failure surfaces. There was nothing unique about their assumed failure surfaces.

We observed similarly orientated joints, but those joints are not persistent. They did not extend long distances either up or cross-slope. Cross-slope, the joints are confined to one or two beds (in the range of 3 to 10 feet wide). The up-slope length can be much longer (up to 50-100 feet) but most are much shorter. Instead of there being widespread planar surfaces (as assumed by PML), there are numerous shorter, discontinuous joints separated by intact rock bridges. These rock bridges provide additional support that increases rock slope stability.

PML recognized the effect that these joints might have on the quarry slope stability, but techniques were not available at that time to allow them to evaluate slope stability in a structurally complex, jointed rock mass. Their analyses were done in 1988 with a combination of hand calculations and a simple Fortran/Basic computer program. They preformed the only analyses they could at the time, which was a simple, planar failure analysis. They recognized the limitations of their analysis and their modeled joint surfaces were always clearly marked "assumed geologic failure planes".

The PML slope stability analysis is a friction angle analysis (C=0). If the friction on the joint surface is larger than the joint dip, no movement will occur on the joint. The greater the joint friction angle (with respect to the joint dip), the greater the FS. PML assumed a joint friction angle of 48 degrees. This is why the FS for a 35 degree joint dip is larger than the FS for a 44 degree joint dip. It also means that there is little margin for error in estimating the joint friction angle. Small variations in the joint friction angle when it is near to the joint dip can cause the calculated FS to quickly go to 1 or less.

Slope Stability Considerations

The final quarry will have a triangular shape, with the upper point of the final quarry being at the high point (about 1900 foot elevation) and the base at about 1100 foot elevation. The triangular shape of the quarry means that the final reclaimed rock slopes will have a variable height that ranges from about 200 feet to about 650 feet with from 4 to 20 benches. The 1994 plans stated that benches will be 10 feet wide with bench faces having a 30 foot maximum height and a maximum slope of 45 degrees (1:1). The overall slope cannot exceed 1.5 to 1.

Potential rock slope failure modes include:

Raveling, rock falls;
Structural failure along geologic discontinuities (joints, faults, and active-passive wedges);
Rock mass controlled – failure through intact rock or across the rock mass fabric;
Toppling, and composite modes, involving two or more of the above.

Raveling

Raveling is the widespread degradation of a rock slope face by progressive, long-term loss of smaller sized material. This material eventually collects at the base of the slope in debris piles. There is a gradation between raveling, rock falls, and structurally controlled failures. In this report, we restrict the term raveling to the random, widespread loss of smaller sized material (a few inches to a few feet) throughout a slope face over time.

We observed raveling throughout the slope face. Raveling was common in exposed siltstone beds. The fallen material ranged from less than an inch to several feet in size, with the majority of the material appearing to be under a foot in size. The fallen material was angular and did not appear to roll long distances. The current condition of the face could provide a reasonable estimate of the future raveling potential of the final quarry slopes.

Structural Failure

Structural failures are small to larger-scale failures such as wedge and planar failures along existing discontinuities (joints and faults) rather than through the rock mass itself. Long-term raveling of a weak zones within saprolite can leave wedge-shaped scars that mimic structural wedge failures, but this concentration of raveling are not be considered a structural failure for the purposes of this report.

PML measured and plotted over 150 joint measurements, Figure 3. The raw data is not available. We spot measured joints throughout the quarry and observed the same primary joint sets that PML did. The data indicate that the joint/cut face orientation will be conducive for planar and wedge failures. A stereonet analysis (such as the PML graph) is only a geometric analysis of possible wedge failures. It does not provide information about factors of safety or probabilities of failure. Key factors such as joint persistence, spacing, or material properties cannot be included in a stereonet analysis. The existing data (PML and others) is a subset of the overall joint population. That data was contoured, but the contours are not statistically significant. It would require a much larger number of joints measurements (700 or more) to allow a statistical evaluation of joint sets.

On cut slopes steeper than about 33 degrees (1.5 to 1) in Domain A, wedge and block failures will occur in the sandstone beds. These types of failure are typically confined to one or two beds, and the size of the failure will be related to bed thickness. The siltstones fail by raveling. The sandstone beds in Domain C are thick with few siltstone beds. We did not observe noticeable wedge or planar failures in Domain C. An equipment operator indicated that it was difficult to pull blocks from a fresh, blasted sandstone face. We did not observe large scale structural failures in the quarry. The observed small-scale/size failure style is consistent with low joint persistence.

We reviewed the joint data for the potential for toppling failure but did not perform a specific toppling analysis. The orientation of the beds with respect to the quarry face is not conducive to toppling failure (the quarry face is perpendicular to the strike of the beds). Naturally occurring toppling failure may occur in undisturbed ground north of the at the lower part of the quarry

(Photo 3). The upper sandstone beds appear to topple north, away from the quarry. This movement is not related to quarrying activities. Indications of this movement were mapped as an extension fracture zone on the PML map. It is possible that the apparent toppling is related to structural deformation, and is not related to near-surface gravity induced movement.

Rock Mass Failure

In this failure mode, the rock mass fails along circular or quasi-circular paths through intact rock or across the jointed rock mass, not along discontinuities. In this failure mode, the rock mass is evaluated using Mohr-Coloumb (MC) parameters derived from a Hoek-Brown (HB) analysis. Slope stability was evaluated using conventional Limit Equilibrium Method (LEM) analysis. This analysis assumes that the rock behaves as a homogeneous, isotropic mass even though the rock contains numerous, random, intersecting joints. When modelling rock slopes, the phi and cohesion values are estimated, average, non-directional parameters and we will refer to these as equivalent parameters. Depending on the number and nature of the discontinuities, intact rock pieces will translate, rotate, or crush in response to stresses imposed on the rock mass. The conditions for circular failure are more satisfied in heavily-jointed rock masses.

GSTABL7 was used to evaluate the Factor of Safety (FS) for various slope orientations and material properties. We performed both static and pseudo-static (seismic) slope evaluations. Bishop's method of slices was used to evaluate circular failure modes. We used a PGA of 0.53g to evaluate slope stability for seismic loading (pseudo-static analysis).

Under the Uniform Building Code (UBC), the minimum static FS for slopes where human occupancy is planned is 1.5, and 1.1 for pseudo-static conditions. Based on the use of the site after reclamation as open space, with no engineered structures or concentrated public access, we propose that a static FS between 1.3 and 1.5 is adequate for the proposed open space end use. Table 3 lists the significance of various Factors of Safety according to Sowers (1979, p. 587).

Table 3
Significance of the Factor of Safety (Sowers, 1979, p. 587)

Factor of Safety	**Significance**
Less than 1.0	Unsafe
1.0 to 1.2	Questionable safety
1.3 – 1.4	Satisfactory for cuts and fills
1.5- 1.75	Safe for dams

For LEM stability evaluation purposes, a single rock type (sandstone) was used in the stability analyses. The soil and saprolite layers were ignored in the analysis because they are either too thin or localized to have a significant effect on global slope stability. We do not know the thickness of the saprolite above the existing cuts. If a thick (> 50 feet) saprolite layer is encountered, that layer would have to be individually evaluated for local stability.

The final quarry shape will be triangular in shape with the peak of the triangle being at the highest elevation. This means that slope length is dependent on where the slope profile in defined. In this study, the longest/highest slope was modeled (approximately at cross-section A in the 1988 PML report, cross-section J in the 1994 plans, and cross-section A in the 2011 plans). If this slope is stable, the shorter slopes should also be stable (with respect to a LEM analysis). For the most part, the undisturbed ground surface adjacent to the top of the quarry slopes uphill from the quarry. It appears that all spoils will be stored within the quarry, not above the top of the quarry.

Three general rock types (Domains A, B, and C) are exposed in the quarry. It appears that the highest slope will be cut in Domain A (interbedded sandstones and siltstones). The beds in all domains strike quasi-perpendicular, out of the quarry face. In Domain A, sandstones make up roughly more than about 70 percent of the unit (the percentage decreases from north to south). Domain C is a massive sandstone unit, and sandstone appears to make up more than 80 to 90 percent of the unit. Domain B contains 70 to 90 percent siltstone, depending on location.

In the LEM analysis, we modeled Domain A. The overall mechanical strength of the units in Domain C is greater than those in Domain A because of the lack of siltstones and greater joint spacing. If Domain A is stable, Domain C should also be stable. Domain C was not modeled. The natural slope of the siltstones is currently about 1.5:1. We did not observe obvious slope failures in Domain B and none have been reported in previous studies. Since the final slopes are projected to be 1.5:1, the existing siltstone slopes should be stable from a global slope stability perspective.

Table 4 lists the various sandstone rock mass parameters determined for Domain A. These parameters are based on data collected in the quarry.

Table 4: Sandstone rock mass parameters[2].

RQD = 40 to 60 (based on scan line measurements)
GSI = 40 to 50 (good quality; Hoek and Brown [1997, table 5] or Marinos and Hoek, [2000, table 9])
(Mi=17 ±5, from Hoek [2000, table 11.3] or Cai [2010])
Rmi =3 to 5 (high)
RMR_{basic} = 68 to 78 (good)
SMR = 30[3] (bad).

Duran and Douglas (2000) compiled slope height verses slope angle charts for rock slope correlated with GSI and RMR values (their figure 4a). For a 200 meter high slope[4] and a GSI of 30 to 40, the chart shows that both benched slope angles (overall slope dip of ~45 degrees [1:1]

[2] There is a fundamental difference between the GSI parameter and the other rock mass parameters. The GSI parameter was designed to be used as part of an overall Hoek-Brown strength envelope evaluation. It is not intended to be a stand alone rock mass parameter. It does not include joint parameters except for an estimate of joint sets and spacing. It does not include groundwater or intact rock strength. The other parameters were designed to be stand alone rock mass parameters. Most were designed to evaluate underground workings.

[3] SMR is a Slope Mass Rating. This parameter was designed to evaluate a slope for planar and wedge failures. The SMR rating does not take into account joint persistence and provides little information about the potential for global slope instability. Widespread small/localized block and planar failure occur though out the Ojai quarry slope faces.

[4] The overall slope has a maximum height of 850 feet (~260 meters). The charts are only valid for GSI's between 30 and 40.

and overall slope dip of ~39 degrees [1.5:1]) would be stable. These charts are preliminary and only provide a general guide to slope stability. In the paper, there is no discussion about groundwater or what 'moderate pressure' means (their figure 4b).

Table 5 lists the initial strength properties used in this analysis. The rock slope was analyzed by the generalized Hoek-Brown (HB) strength relationships using the program RocLab (RocScience, 2007). The HB strength relationship uses various parameters (GSI, mi, uniaxial rock compressive strength, jointing parameters) to determine a strength envelope for the jointed rock mass. Then based on the stresses applied to the slope (height dependent), equivalent Mohr-Coulomb (MC) phi angle and cohesion values were calculated (Hoek, et al, 2002). The PML report measured the unconfined compressive strength of the sandstones at about 15000 psi (~2,000,000 pcf). Our Schmidt hammer evaluation suggested that the unconfined compressive strength (USC) was about half this value (~1,000,000). We used the lower USC value in our sandstone analysis to be conservative. The Schmidt hammer based USC for the siltstone is estimated to be in the range of 1000 psi (144,000 pcf).

Other parameters used in the HB evaluation were either developed from data from the PML report, measured during our fieldwork or from tables/diagrams provided in Hoek and Brown (1997 and 2000). Hoek (1983, p. 11) discusses the parameters[5]. There are two sets of initial MC values in Table 5. Both assume 100 percent of either sandstone or siltstone. The high sandstone values were calculated for a full slope failure (650 foot disturbed height) and the low values were calculated for a bench failure (200 foot height). The high and low siltstone values are based on 200 and 100 foot slope heights.

Table 5
Assumed Initial Shear Strength Properties
The GSI values in bold were used as the initial starting values
The Mohr-Coulomb values are equivalent values only.

Material Type (Layer)	MC Values low slope	MC Values high slope	Hoek-Brown Strength values	Unit Weight (pcf)
Sandstone	200 ft height 11 ksf (C_{eqv}) 51^0 (ϕ_{eqv})	650 ft height 26 ksf (C_{eqv}) 45^0 (ϕ_{eqv})	UCS=1,000,000 psf (~48 MPa) GSI=**40**-55 Mi =17	150
Siltstone	100 ft height 2.1 ksf (C_{eqv}) $30\ ^0$ (ϕ_{eqv})	650 ft height 4 ksf (C_{eqv}) $18\ ^0$ (ϕ_{eqv})	UCS=144,000 psf (~4.8 MPa) GSI=**25**-30 Mi =7	130
Fill	C=0 Phi= 35^0		N/A	120

[5] Other papers that discuss these parameters include: Colak and Unlu (2004); Read, Perrin, and Richards (2006); Suorineni, Chinnasane, and Kaiser (2009); Cai (2010); and Saroglou and Tsimabaos (2008). For reference, the UCS of concrete is about 720,000 psf (5000 psi).

LEM Results

Two slope configurations were modeled. The first was 750 foot high total slope (containing a disturbed slope height of 650 feet) with an overall 1.5:1 slope. This included the proposed benches (10 ft wide) and cut slopes (30 height, 1:1 slope). The second included various face angles in 100 and 200 foot high slopes.

In both configurations, the cross-section extended above the highest elevation of interest. Then, a series of stability analyses were run with varying rock material values to evaluate overall slope stability. The geologic/structural complexities of this site make it impossible to test for or model the actual rock properties/geometry. Instead, representative rock mass properties were initially determined, then an evaluation of a variation of those properties was made.

The intent was to evaluate a range of material values to find lower-bounds for the material values that would meet the required FS. If the lower-bound material values that met the minimum FS became unrealistic (reducio ad absurdem), then reasonable, higher range material values would be acceptable. This method also provides an estimate of the robustness of the strength values. Both C and Phi values were varied. This method follows after Hamman and Curran (2009) and Stewart (2000).

Full Slope Configuration Evaluation

The results of our LEM slope stability analyses for the full slope are listed in Table 6. The LEM results (slope configuration, material properties, and critical failure surfaces) are shown in Figures 4 to 9. We assumed total stress conditions and groundwater levels were below the base of potential failure surfaces. Static and Pseudostatic Factors of Safety were calculated using a Bishop simplified method. A PGA of 0.53 was used in the pseudostatic evaluation.

Table 6
FS values for 1.5:1 slope.
Overall Slope height is 750 feet

Value Levels	Material properties		Static FS	Pseudostatic FS	Figure
	HB values	Equiv. MC values			
Sandstone value	UCS=1,000,000 psf GSI=50 Mi =17	26000 psf (C_{eqv}) 45 ^{0} (ϕ_{eqv})	4.0	3.0	4, 5
SS-SltSS Value	1,000,000 psf GSI=30 Mi =17	14000 psf (C_{eqv}) 31 ^{0} (ϕ_{eqv})	2.3	1.7	6, 7
Theoretical Low SS-Slt Values	400,000 psf GSI=40 Mi =17	7000 (2000) psf (C_{eqv}) 44 ^{0} (40^0) (ϕ_{eqv})	2.3 (1.6)	1.7 (1.1)	8
Siltstone	UCS=144,000 psf GSI=25 Mi =7	4000 psf (C_{eqv}) 17 ^{0} (ϕ_{eqv})	0.94	-	9

The sandstone strength values in Table 6 are for a 100 percent sandstone jointed rock mass. The sandstone-siltstone values are an estimate of a 70-30 percent sandstone to siltstone jointed rock mass. The theoretically low sandstone-siltstone values were used to evaluate lower limit FS for short slopes. The siltstone strength values are for a 100 percent siltstone. In the field, the siltstones are interbedded with sandstones of varying thickness. The sandstones will increase the overall strength of Domain B siltstones.

Figure 10 is a graph of a full slope, FS stability field for Domain A rock types. It is based on a LEM failure analysis. The axes are Phi and C values, and the 1.5 and 1.0 FS lines are plotted. This graph indicates that for a 1.5 to 1 slope, pure sandstone and siltstone-sandstone rock masses will be stable for this slope height. It suggests that the inherent strength of these rocks means that there is a wide range of Phi and C values for which the slope is stable. There are also ranges of Phi and C values that cannot exist for this rock type (a high C, low Phi value range and a low C and low Phi value range). The siltstones have a low FS. This is consistent with field observations. The siltstones form valleys that rarely exceed a 1.5 to 1 slope. It is likely that the natural FS of Domain B is in the range of 1.1 to 1.5

The FS from the PML translational failure analysis (C=0 and Phi =48 degrees) plots just below the 1.5 FS line. The PML FS is slightly lower than a FS from the LEM analysis (for a C=0, Phi=48) because the LEM analysis failure surface is slightly curved and longer.

Bench Configuration Evaluation

Several specific slope geometries were evaluated using the SS-Slt material properties.

Figure 11 shows a model of the full slope with a 200 foot high, 0.5 to 1 cut at the toe of the slope. It has a FS of 2 using the SS-Slt material values shown in Table 6.

Figures 12 is a model of a 250 foot high slope with a 150 foot high 0.75 toe cut. This models the existing cut slope at the lower part of the north end of the quarry. The initial slope has a FS of over 3. Figure 13 shows the same slope with a 50 foot high, 1 to 1 toe buttress. The buttress increases the FS of the slope by about 0.03.

Figures 14 and 15 are models of a 200 foot high slope that has a 1 to 1 slope face. The FS in Figure 14 is 4.1 for SS-Slt material values. The FS in Figure 15 is 1.85 using theoretically very low SS-Slt material values.

Figures 16, 17, and 18 are models of the a 75 foot high slope that has a 0.7 slope face. Theoretically very low SS-Slt material values are used in these models. The FS for Figure 16 is 2.28. Figure 17 is a model of the same slope with a 50 foot toe buttress. The buttress increases the FS about 0.25. Figure 18 is a model of the same buttress, but the modeling limits were restricted to the buttress. It shows that the FS of the buttress itself is 1.23.

These models suggest that the existing rock can sustain cuts with slopes steeper than 1.5 to 1. The addition of a structural buttress adds little to the overall slope stability. In fact, the buttress will have the lower FS than the adjacent rock cut. Unless extensive sub-surface drainage systems are installed in a buttress, the buttress could have a much higher failure probability that the rock slopes.

Composite Mode Failure

A composite mode failure assumes that there is a series of persistent, high-angle joints/beds that dip parallel to the slope. The failure couples movement along appropriately orientated, persistent joint/bed planes with failure across intact rock between the joints/beds. This failure method is well known in bedded sedimentary units (Aydan et al, 1992; Stead and Eberhardt, 1997) where beds dip out of a slope (bedding plane failure). This is what PML modeled.

This failure mode is based on a specific slope-joint/bed geometric relationship. The joints/beds dip 10 to 20 degrees steeper than the slope face and the joint/bed strike is ±20 degrees of the slope face strike. Many joints in the Ojai quarry meet this criteria. The criteria also requires individual joints to extend hundreds of feet (for a slope the size of the Ojai quarry). We did not observe any indication that widespread persistent joints exist in the Ojai quarry. Bedrock has well defined bedding, but bedding strike is perpendicular to the quarry face.

With persistent joints, a block search method can be used in the LEM models. However, the lack of persistent joints means that the strength reduction technique discussed in the previous section simulates the effect of numerous small joints.

CONCLUSIONS

It is our opinion that the planned reclamation slope configurations (1.5:1) will result in permanent slopes which will have an acceptable stability for the proposed open space end use. The slopes stability analyses indicate that using reasonable lower bound strength values for the various rock and soil types, the static factors of safety exceed 1.3. Since the strength values used in the analyses are considered to be representative strengths, we believe that the calculated Factors of Safety (in the 3 to 4 range for global stability) are acceptable. These high FS values suggests that the inherent strength of these rocks is large enough that there is a wide range of strength (Phi and C values) for which the slope is stable and our analysis is robust. The siltstone beds in Domain B likely have a long-term FS of 1.1 to 1.5. This is consistent with field observations. If the long-term intended use of the reclaimed site changes from open space use, performing additional studies relating to in-situ rock and soil strengths may be warranted to better define the final, as-constructed Factors of Safety.

The intact rock has a high strength, and local face stability will be controlled by joint patterns. Small-scale wedge failures should be expected to develop on the cut rock faces. Based on field observations and measured joint orientations, we do not anticipate large-scale wedge failures (50 to 100 feet in size). If slope parallel, persistent joints are encountered as quarrying proceeds, large-scale failure (wedge or planar) of benches could occur.

It appears that if a soil buttresses is used to provide structural support for a cut, it will only provide a minor increase in slope FS. Unless subsurface drainage provisions are installed in the buttresses, the buttress will have a much lower FS that the rock slope itself and will tend to fail before the rock slopes fail.

This was a global evaluation, based on estimated rock properties for a benched, overall 35 to 45 degree slope. The slope configurations were provided by the client and supporting data were from publicly available sources and a limited field investigation and mapping program. No physical rock testing/analysis was preformed. If slope angle variations are desired, they can be individually evaluated when the excavation nears the final quarry boundary. It is likely that rock properties would have to refined either by testing or additional studies. Such an evaluation would have to be performed by appropriately licensed professionals experienced in rock slope evaluation and analysis.

LIMITATIONS

This study and conclusions assume that the material properties and the nature of bedrock and the observed orientations of joints and shears on the existing quarry slopes described in this report are representative of the actual conditions on the proposed final cut slopes. This study assumes that groundwater conditions will remain as observed and will have no impact on the overall stability of the final slopes.

As quarry excavation progresses, we recommend that rock and groundwater conditions should be monitored to confirm the assumed conditions. We also recommend that joint/fault mapping be conducted as needed.

This analysis was based on the materials observed in the field and listed in Table 1. If shear zones or additional rock types are encountered, the effect of these units on both interim and final slope stability should be evaluated in a timely manner. This analysis is not valid for other rock types or other areas.

The Public Resources Code (PRC), Title14, Article 9, Section 3704, states that lead regulatory agencies shall require formal slope stability investigations whenever design-slopes approach or exceed *critical gradient*. Critical gradient is defined as the maximum unsupported slope which can be maintained under the most adverse conditions. The term “most adverse conditions” is not an engineering term and it is not defined in the regulations. Our calculations were performed using conservative, reasonable assumptions about adverse natural conditions. The final design slopes are considered not to approach or exceed the critical gradient.

The express purpose of this slope stability investigation is to provide for public safety. The regulations do not require that the final design slopes be brought into compliance with Uniform Building Code (UBC) requirements for engineered slopes.

The analysis, conclusions, and Factors of Safety are not valid for evaluation of working slopes.

The analysis, conclusions, and Factors of Safety determined in this report are based on the final slope geometries that were provided to us by Mosler Rock Ojai Quarry. If changes are made to the final slope geometry, then the conclusions and recommendations presented in this report should be considered invalid by all parties. We should be allowed to review and prepare written responses to comments to this report or to changes in the final slope geometry. If necessary, we will prepare modified recommendations after a review of the proposed changes. Additional field and laboratory testing work may be required for us to develop any modifications to our recommendations.

This report was prepared at the request of, and for the exclusive use of the addressee. Release to any other company, concern, or individual is solely the responsibility of the addressee. We have employed generally accepted geological, engineering geology, and civil engineering procedures for this type of study. Our observations, professional opinions and conclusions were made using that degree of care and skill ordinarily exercised, under similar conditions, by engineering geologists, and civil engineers practicing in this area at this time. The opinions and/or recommendations presented in this report could be subject to revision should additional information become available. Norfleet consultants expressly denies any third party liability arising from the unauthorized use of this report.

The opinions and/or recommendations presented in this report could be subject to revision should additional information become available. The timing and location of events reported to us by the owners or their representatives were not independently confirmed.

Yours Truly,

S. Figuers

NORFLEET CONSULTANTS
Dr. Sands Figuers, PE, CEG, CHG, PGp
Principal Geological Engineer

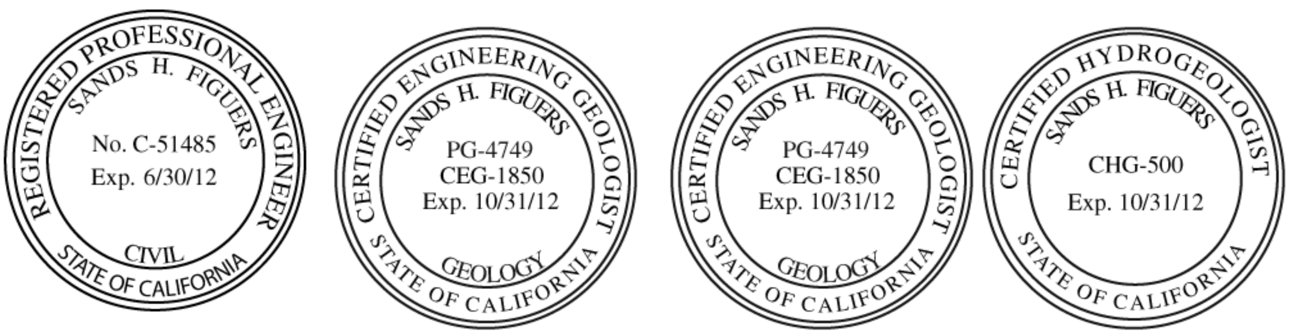

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Photo 1: The northern part of the quarry, Domain A (looking north).

Photo 2: The southern part of the quarry (looking east). Siltstone beds of Domain B form the valley in the upper part of the photograph. Domain C sandstones are being mined in the area to the right.

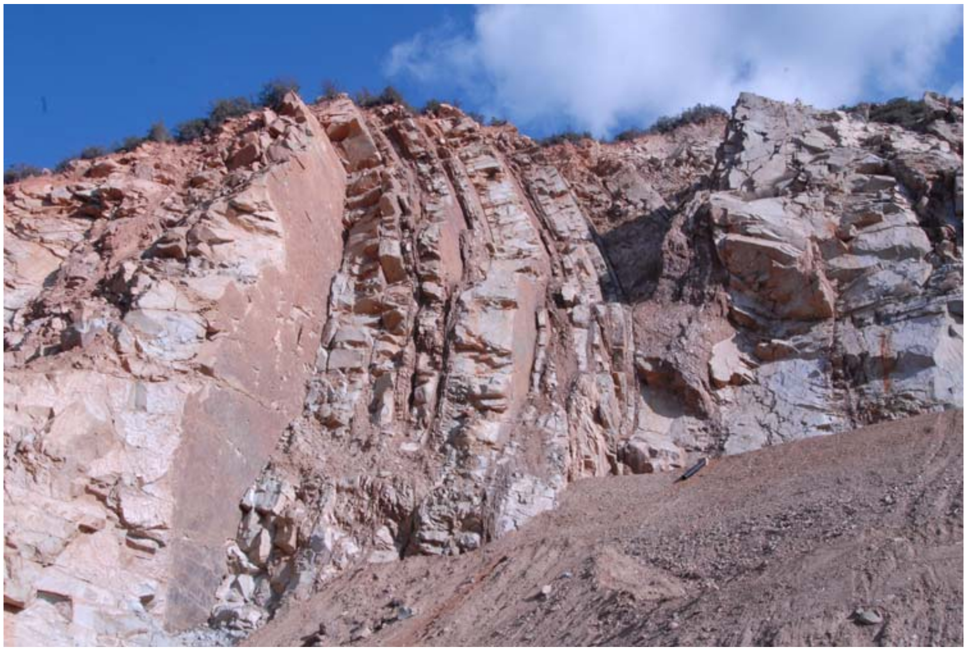

Photo 3: Sandstone beds at the northern end of the quarry (Domain A). There are thin siltstone beds between most of the sandstone beds. Even though jointing is pervasive, few joints extend across multiple beds.

Photo 4: The siltstone beds in Domain B. Note the interbedding of siltstone and sandstone.

Photo 5: Thick sandstone beds in Domain C (at the south end of the quarry). This area was blasted. Note the wider spacing of the joints. The valley on the left is likely a fault zone. It is unknown if it is a bedding plane fault.

Photo 6: The triangle zone at the top of Domain A. This is the natural condition of the rock (structurally fractured). It has not been blasted.

Photo 7: The fault plane at the top of the quarry. This is a naturally occurring gully. It has not been mined. The triangle zone (Photo 6) is located just to the left of this photograph.

Photo 8: A fault zone in the upper part of Domain A (triangle shape). The Triangle Zone (Photo 6) is located up-slope of this area.

Photo 9: A typical weathering profile above the sandstones in Domain A.

Photo 10: Jointing patterns in Domain A sandstones.

Photo 11: A joint surface in Domain C sandstones.

Photo 12: Jointing patterns in thicker sandstone beds in Domain A.

Photo 13: The siltstone bed on the other (west) side of Rt 33 from the quarry. This bed is more than double the thickness of the siltstone bed in the quarry. This may be the result of structural thickening. The sandstones on the right have rotated about 40 degrees counter-clockwise with respect to the sandstones on the left. The sandstones on the left have a strike and dip similar to the sandstones in the quarry.

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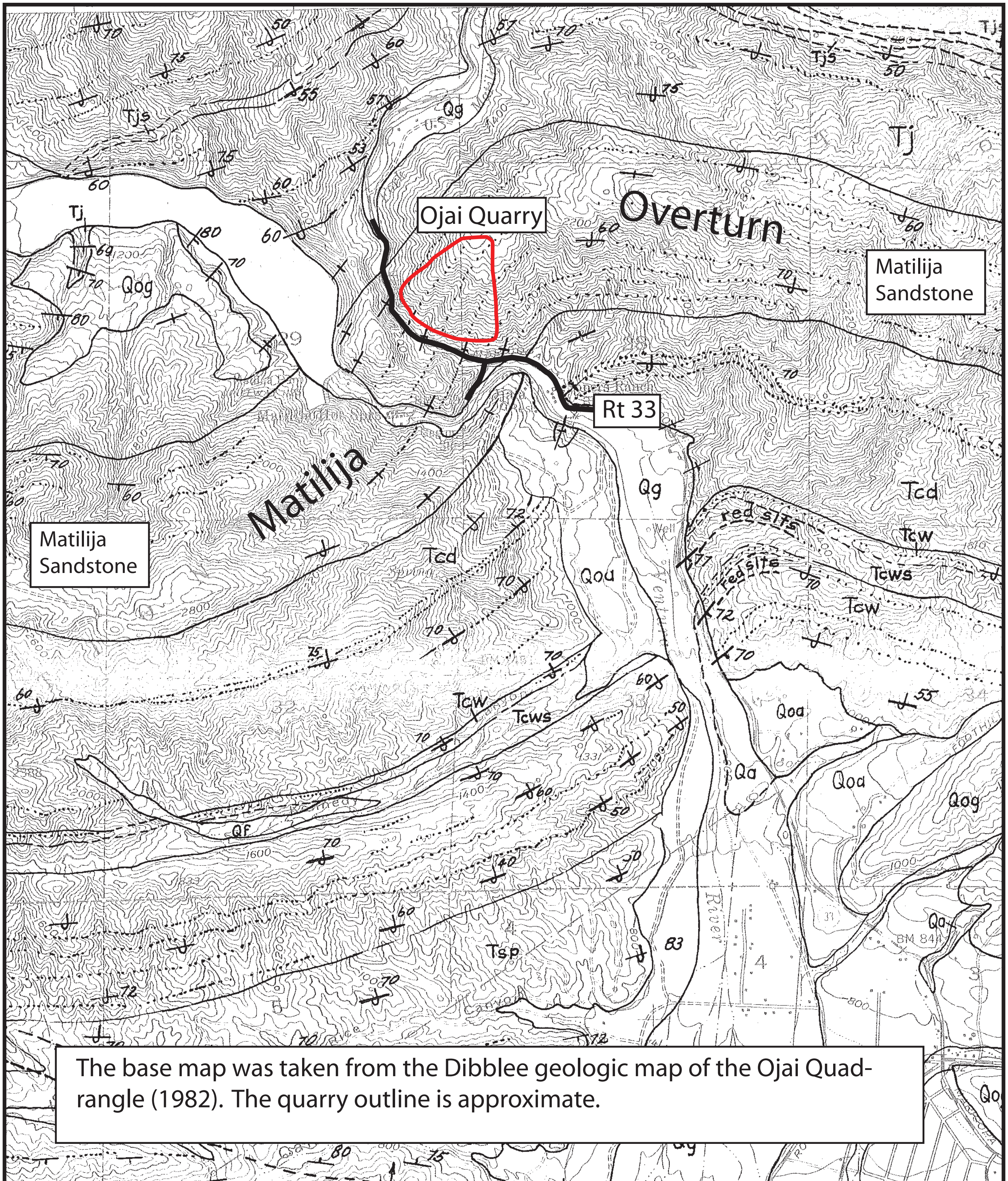
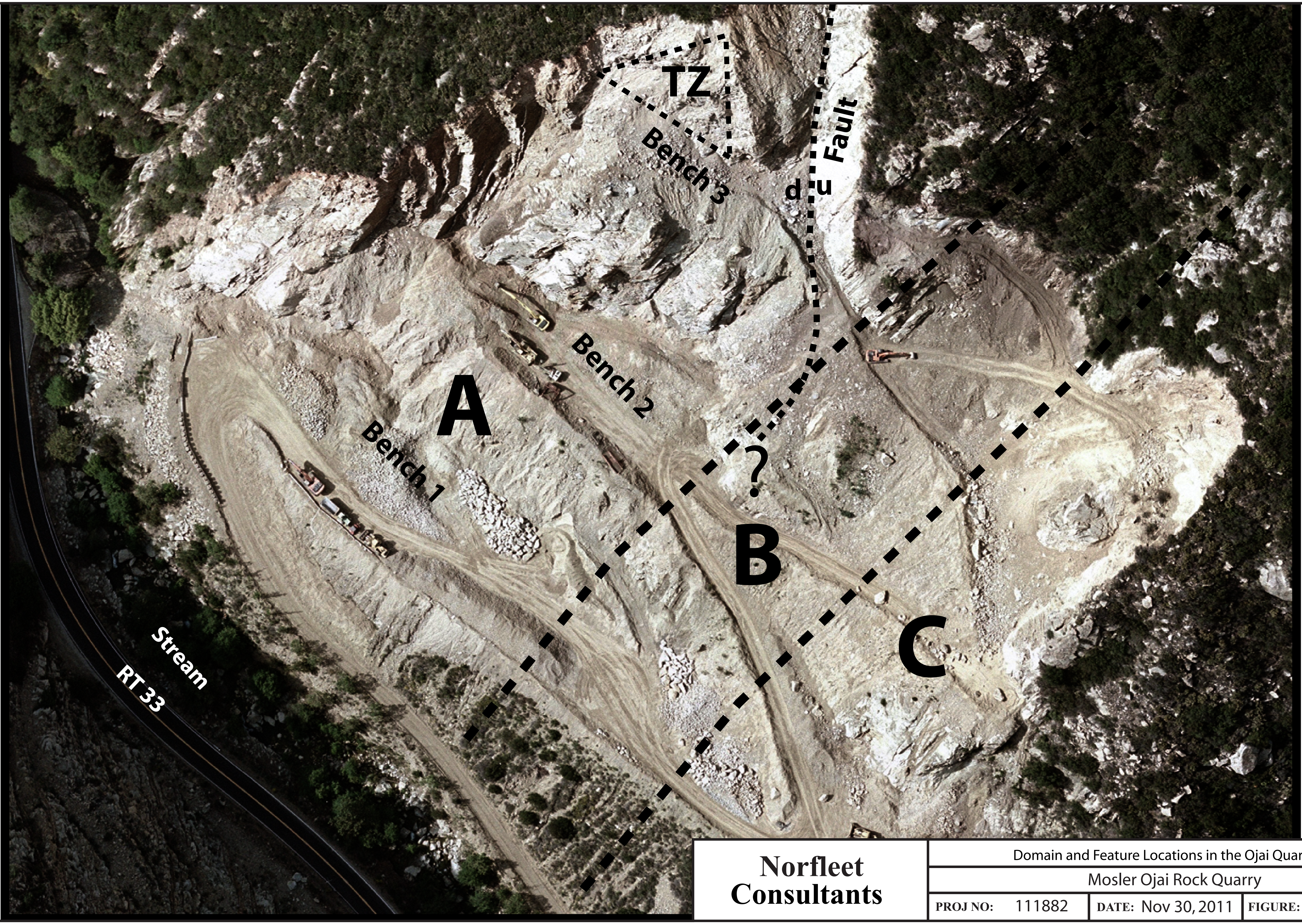
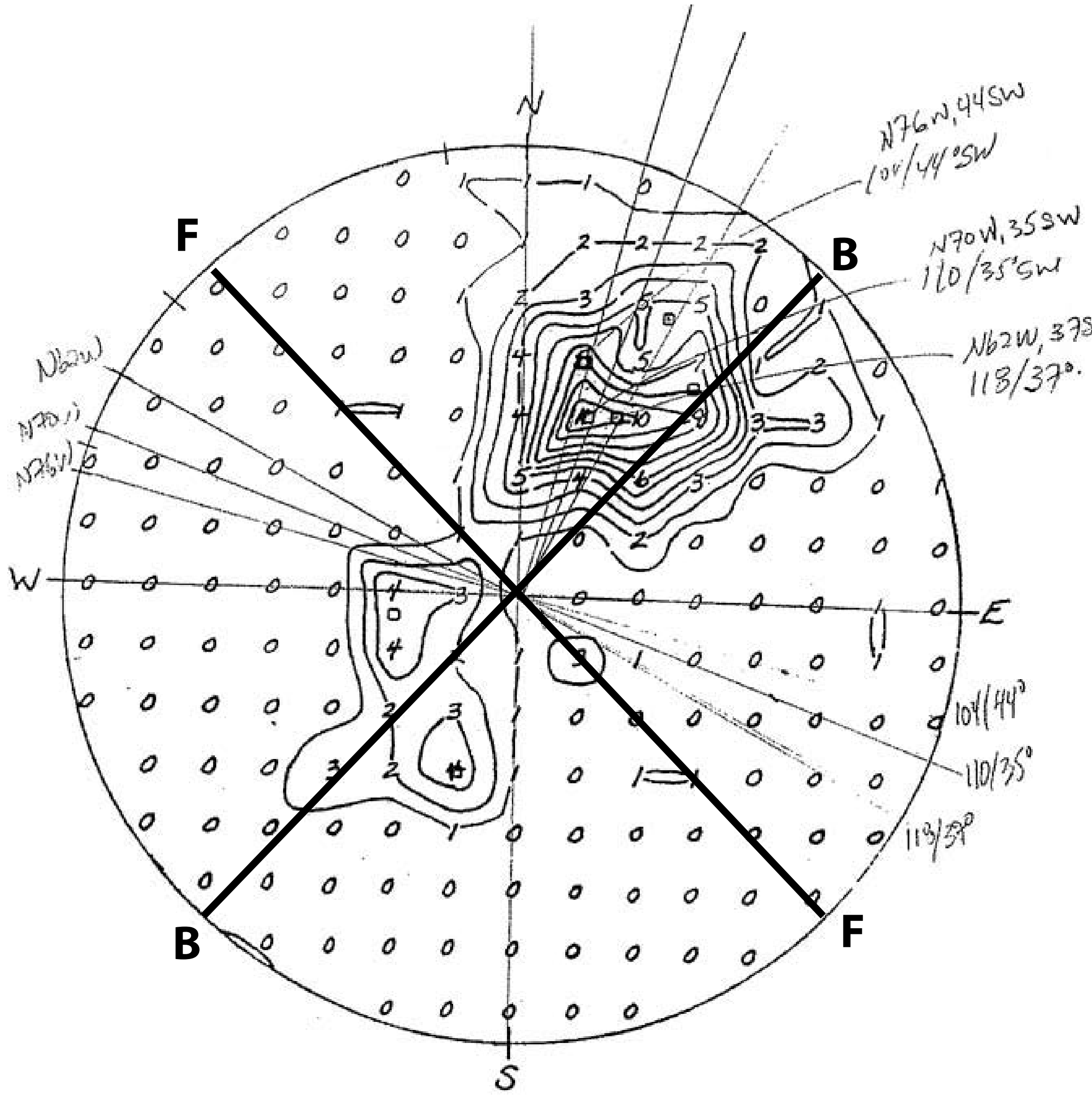


The base map was taken from the Dibblee geologic map of the Ojai Quadrangle (1982). The quarry outline is approximate.

Norfleet Consultants	Location and Geologic Map of the Quarry Area				
	Mosler Ojai Rock Quarry				
	PROJ NO: 111882	DATE:	Nov 30, 2011	FIGURE:	1



Norfleet Consultants	Domain and Feature Locations in the Ojai Quarry				
	Mosler Ojai Rock Quarry				
	PROJ NO: 111882		DATE: Nov 30, 2011		FIGURE: 2



The PML plot of joint data on a stereonet (poles to the planes). The approximate bearing of the quarry face (F, ~N40W) and the strike of bedding (B, ~N40E) are shown. Note that the strike of bedding is close to perpendicular with the quarry face, and the strike of most joints is within 20 degrees of parallel to the quarry face.

Norfleet Consultants	PML Stereonet Showing Joint Data
	Mosler Ojai Rock Quarry
	PROJ NO: 111882 DATE: Nov 30, 2011 FIGURE: 3

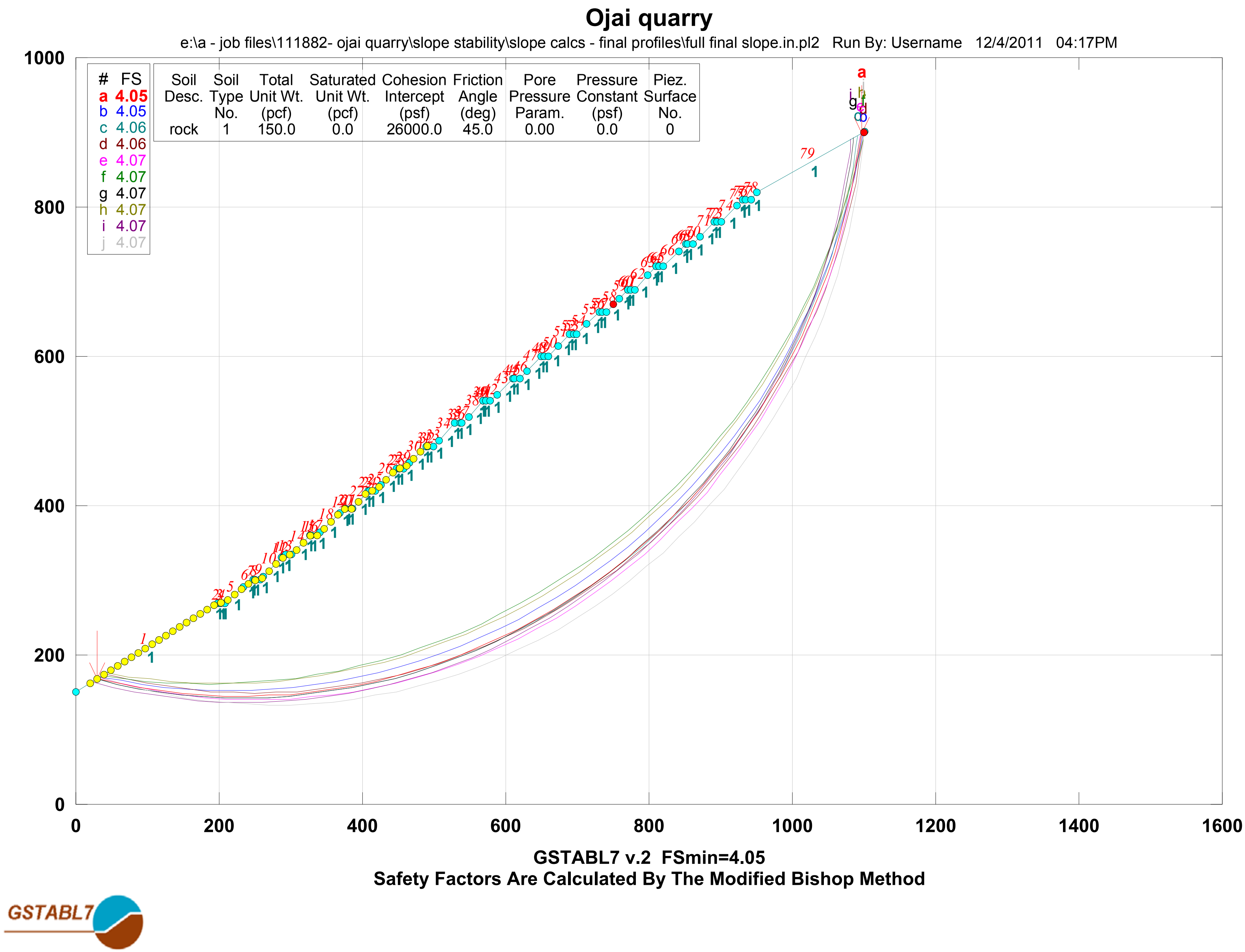


Figure 4. LEM analysis of full slope (750′) of100% sandstone.

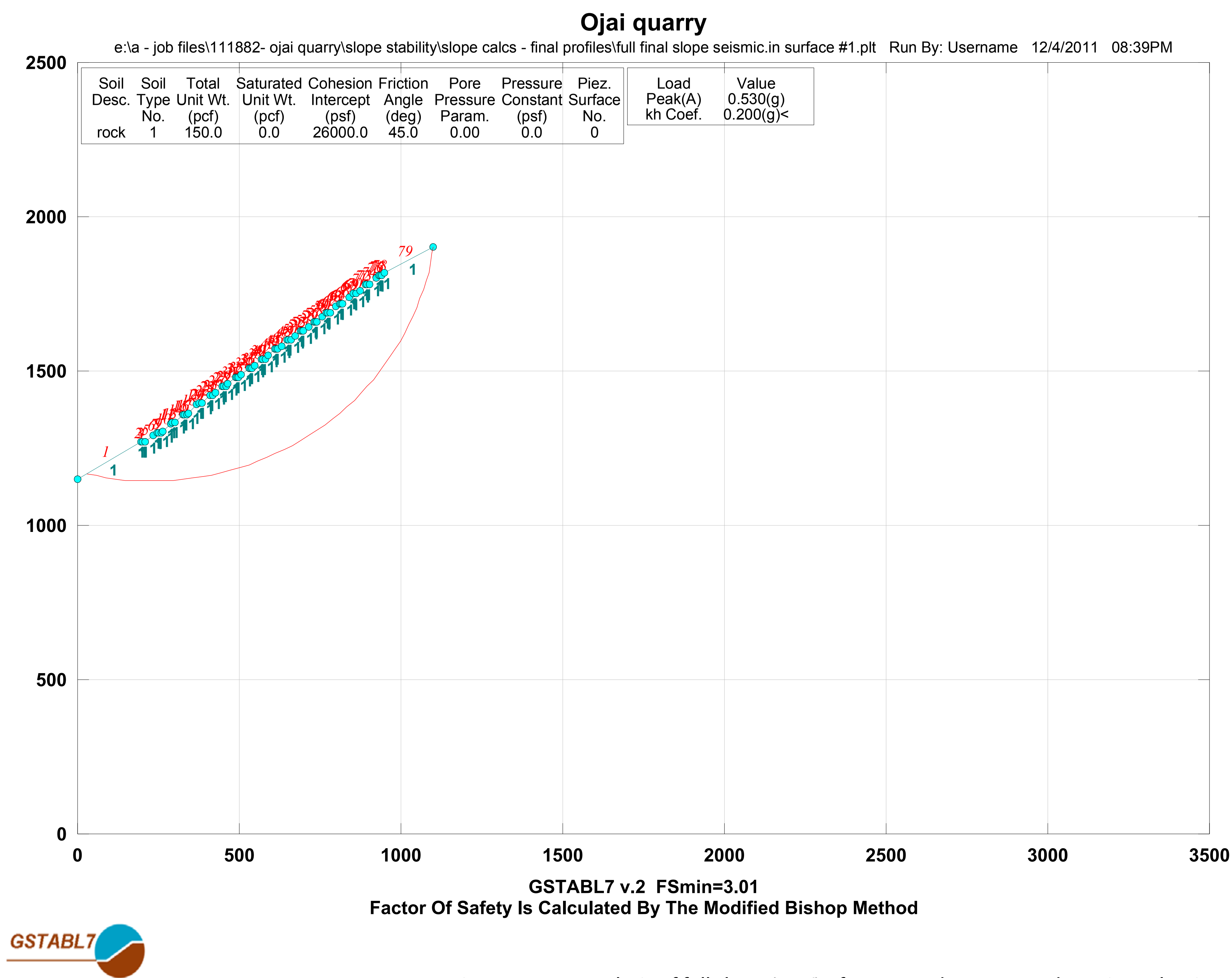


Figure 5. LEM analysis of full slope (750') of100% sandstone, pseudostatic evaluation.

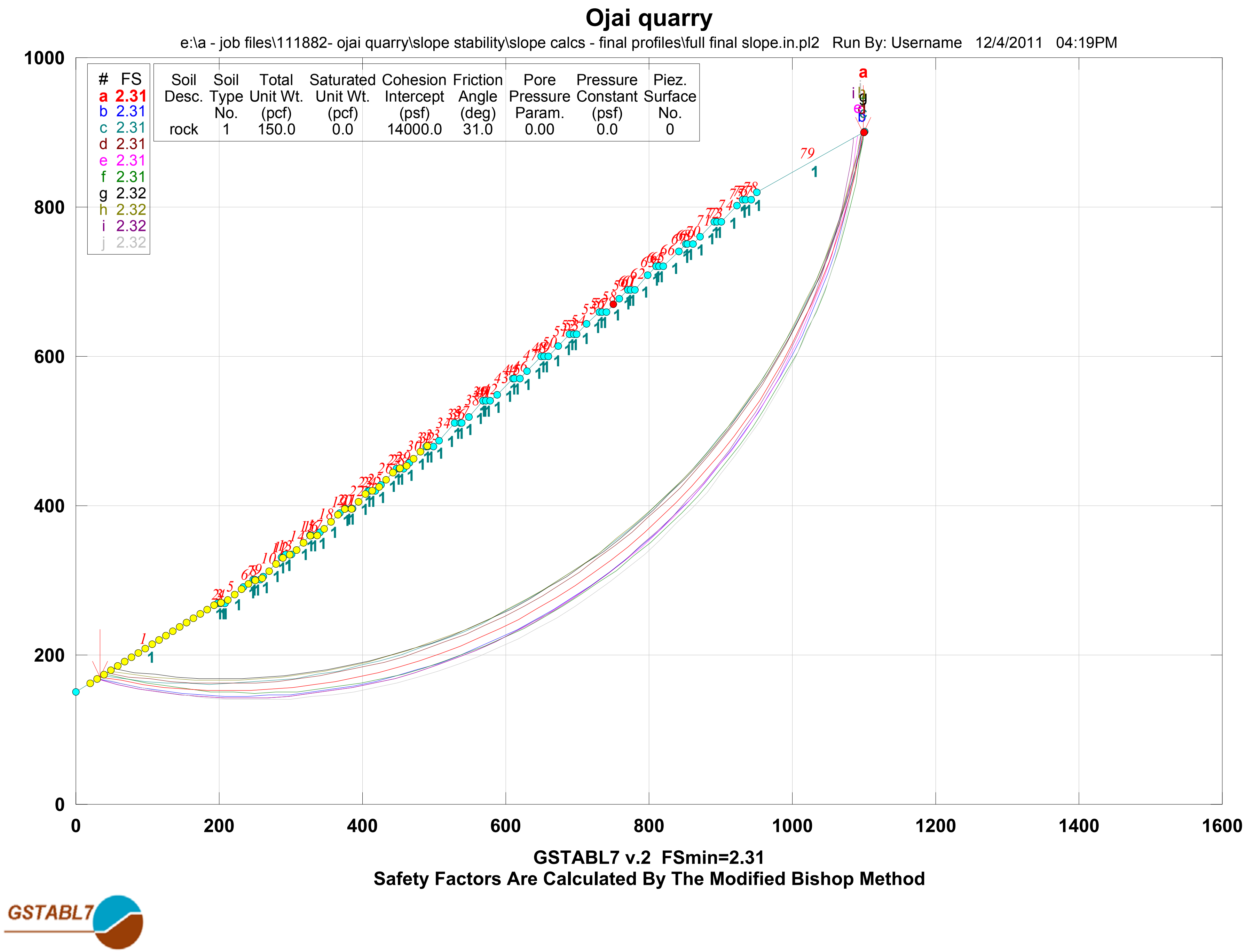


Figure 6. LEM analysis of full slope (750′) of sandstone-siltstone combination.

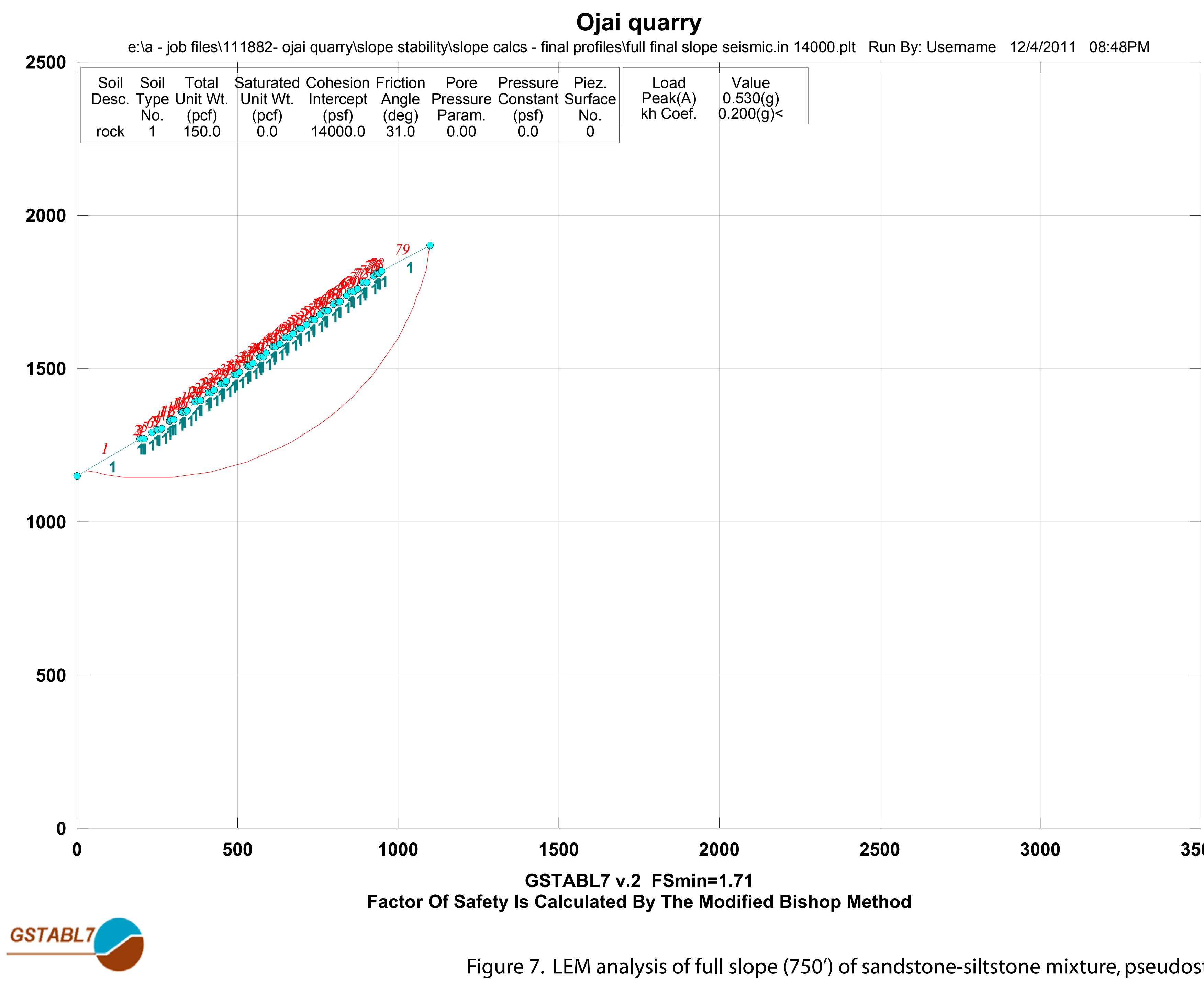


Figure 7. LEM analysis of full slope (750') of sandstone-siltstone mixture, pseudostatic.

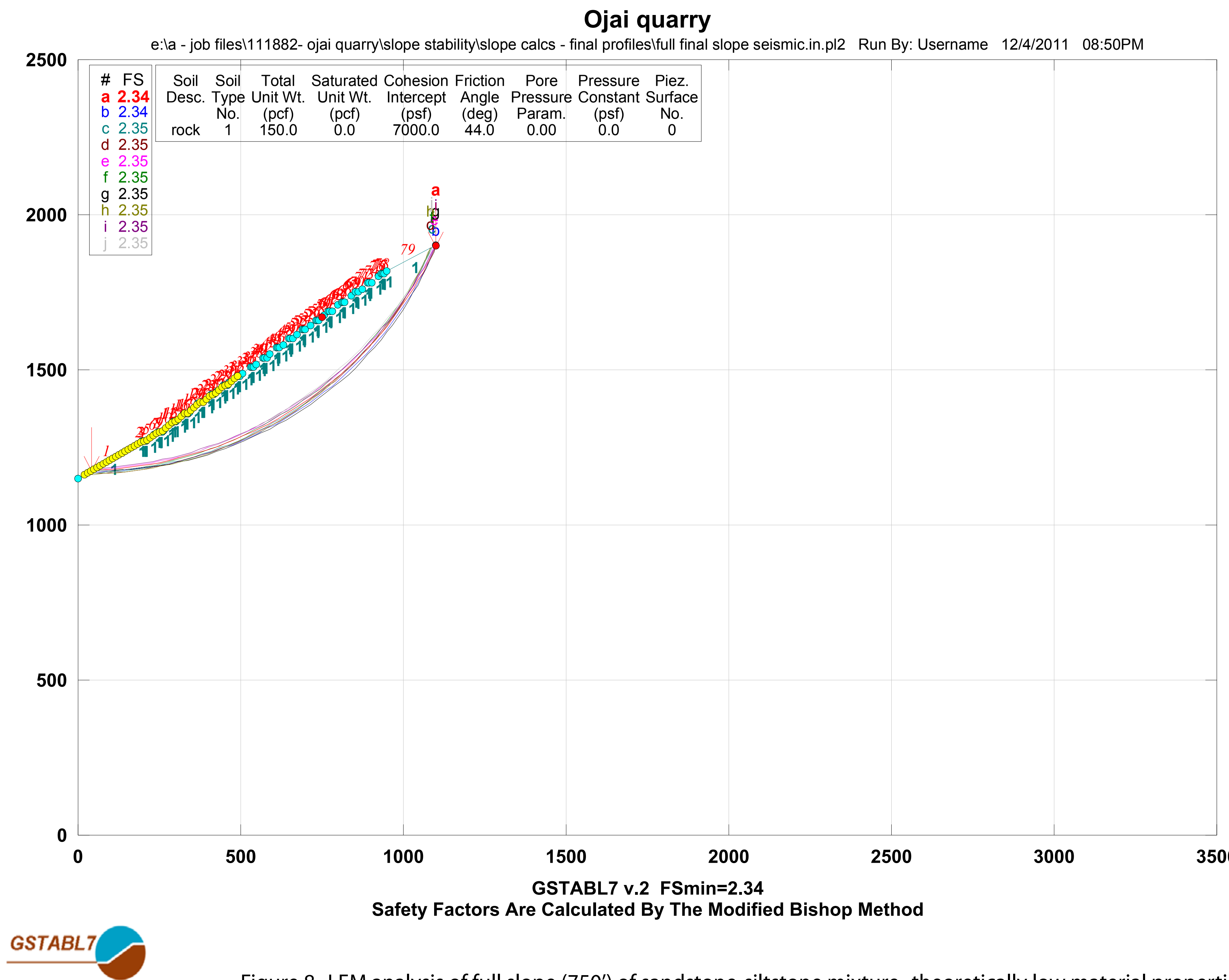


Figure 8. LEM analysis of full slope (750’) of sandstone-siltstone mixture, theoretically low material properties.

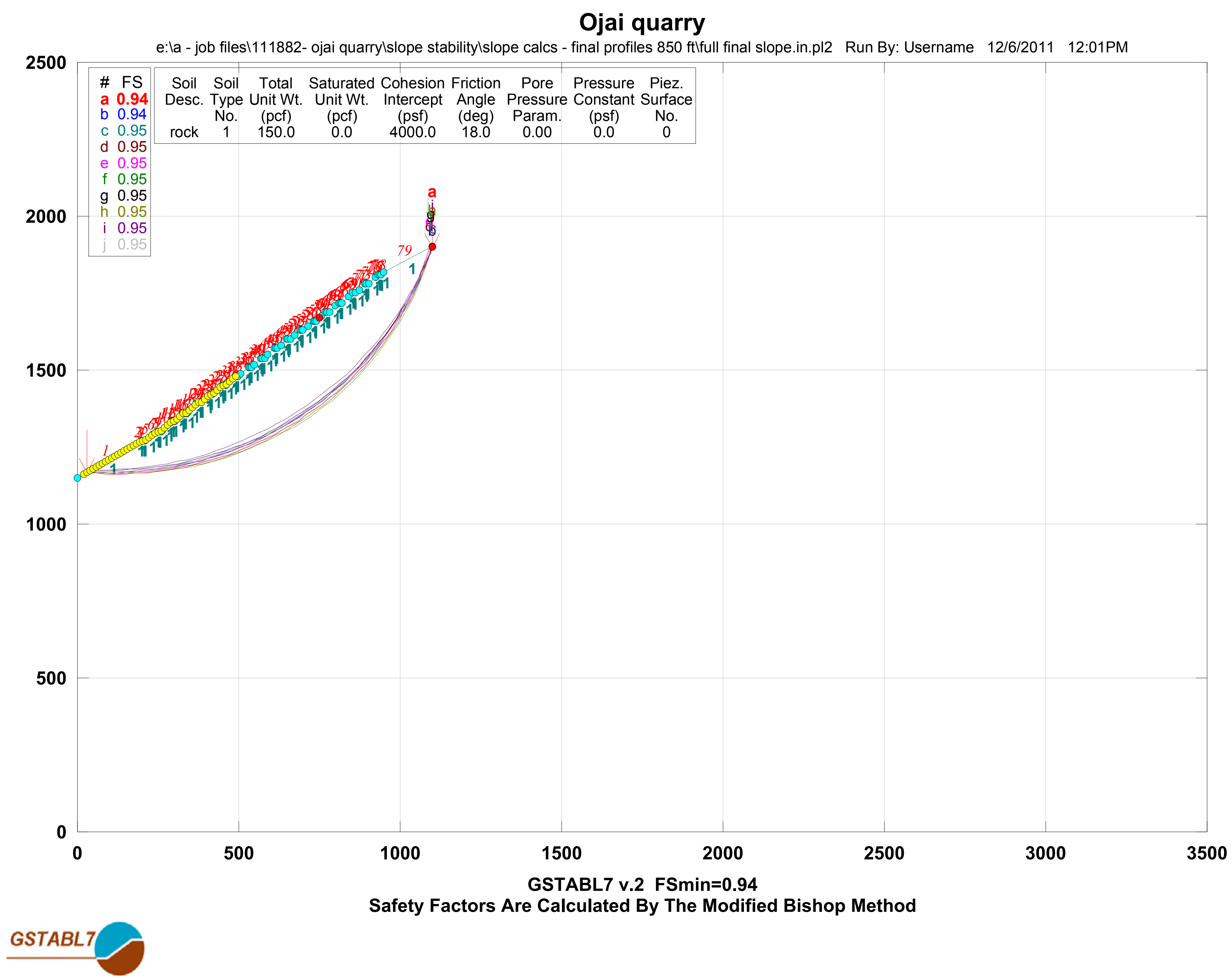
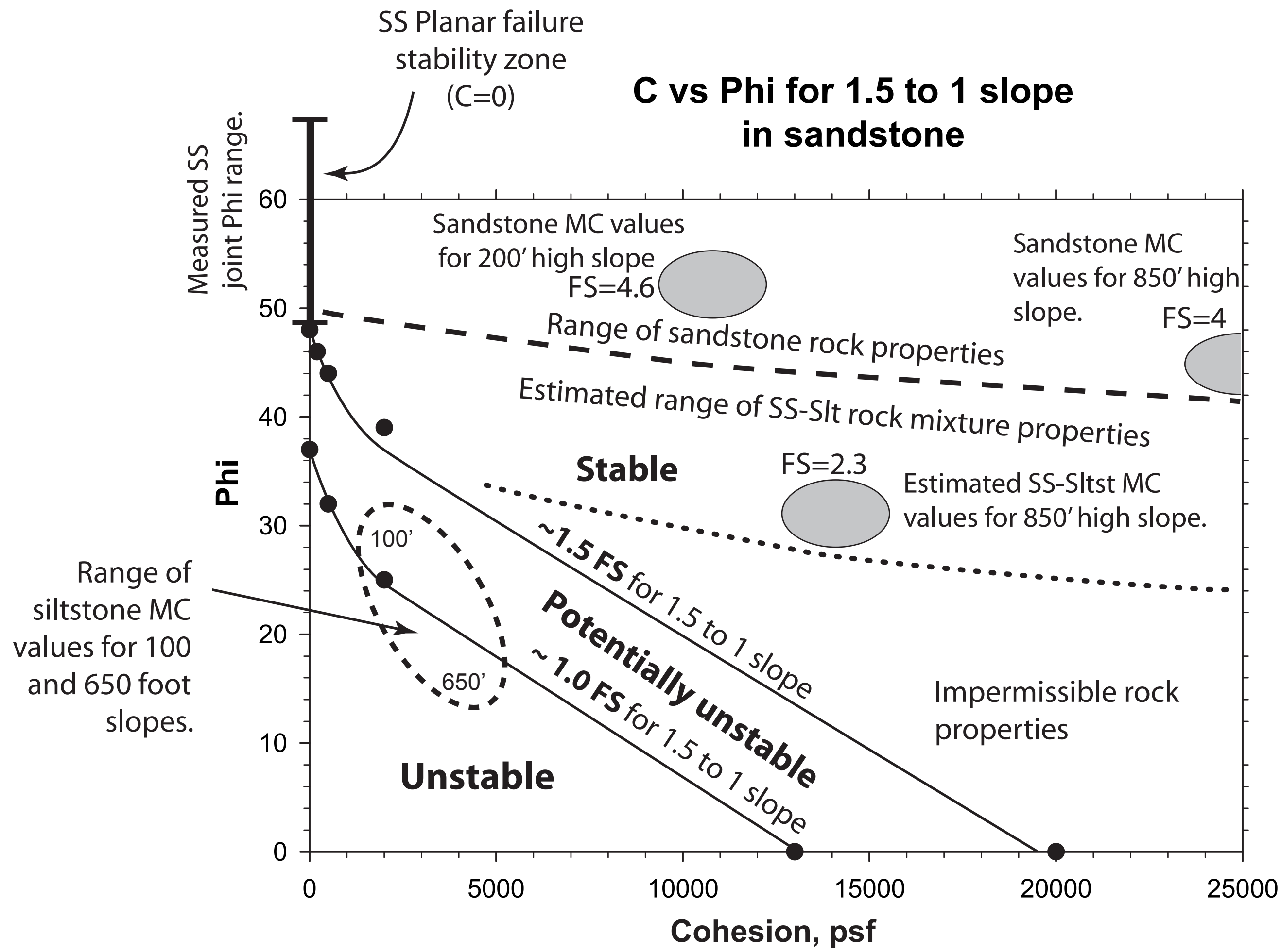


Figure 9. LEM analysis of full slope (750′) of siltstone.



This graph illustrates the relationship between the sandstone rock properties and the Factor of Safety for failure on a 1.5 to 1 slope. A Hoek-Brown analysis (GSI) was used to detemine the sandstone strength curve. Equivalent Mohr-Coloumb properties (C and Phi) were then calculated for 850 and 200 foot high slopes from that curve. Using the MC values, a series of Bishop stability analysis were run to determine the 1.5 and 1.0 FS limits. An estimated range of siltstone MC properties is shown in the lower left side of the graph. The estimated SS-Sltst value is a reduction of the sandstone MC values to take into account interbedding of sandstones and siltstones.

This diagram is only valid for the evaluated bedrock/face orientations and rock conditions at the Ojai quarry as discussed in this report.

Norfleet Consultants	Sandstone Factor of Safety Stability Field, 1.5 to 1 slope				
	Mosler Ojai Rock Quarry				
	PROJ NO: 111882	DATE: Nov 30, 2011	FIGURE: 10		

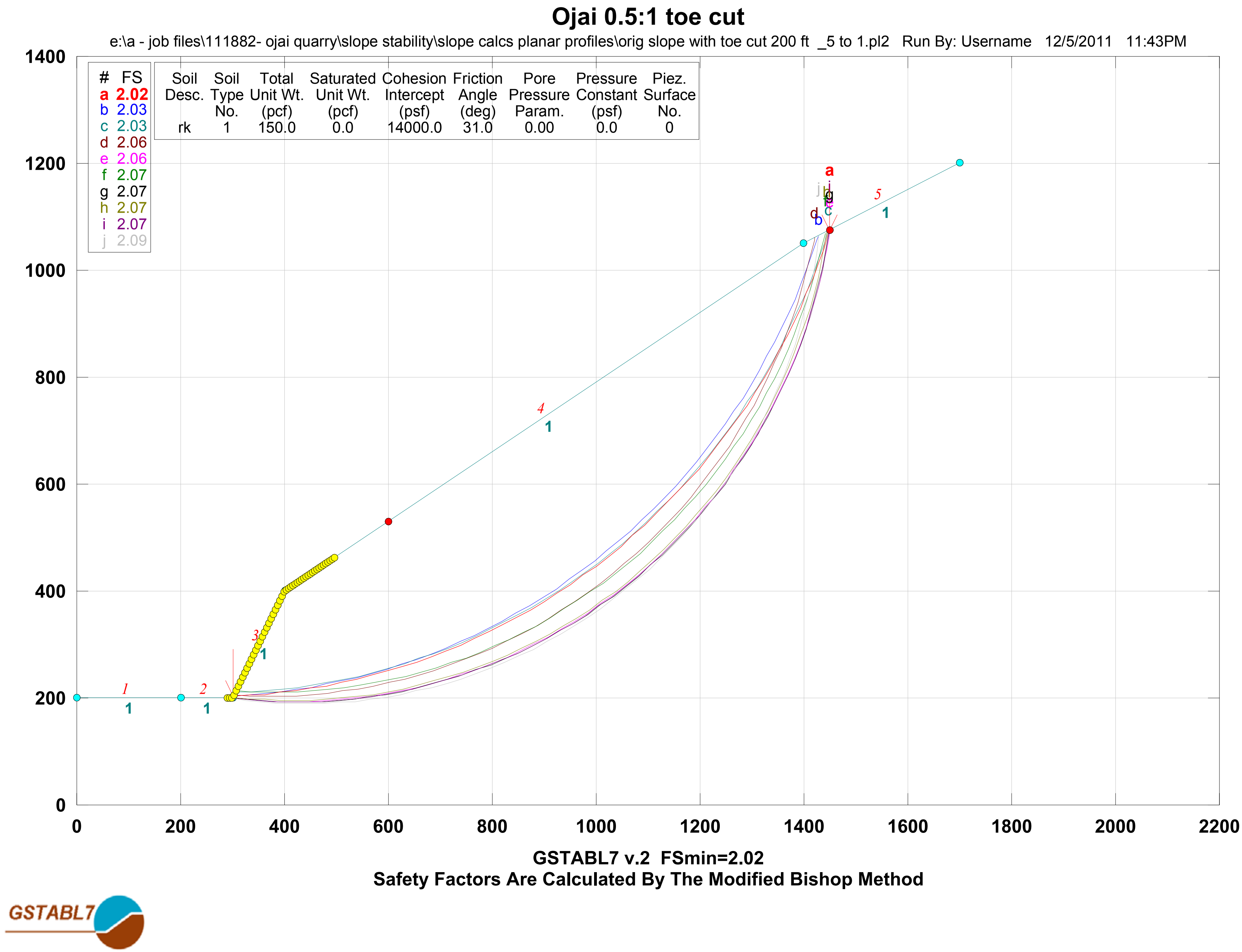


Figure 11. LEM analysis of full slope (750') in SS-Slt with a 200 ft high cut (0.5 to 1) at the toe of the slope.

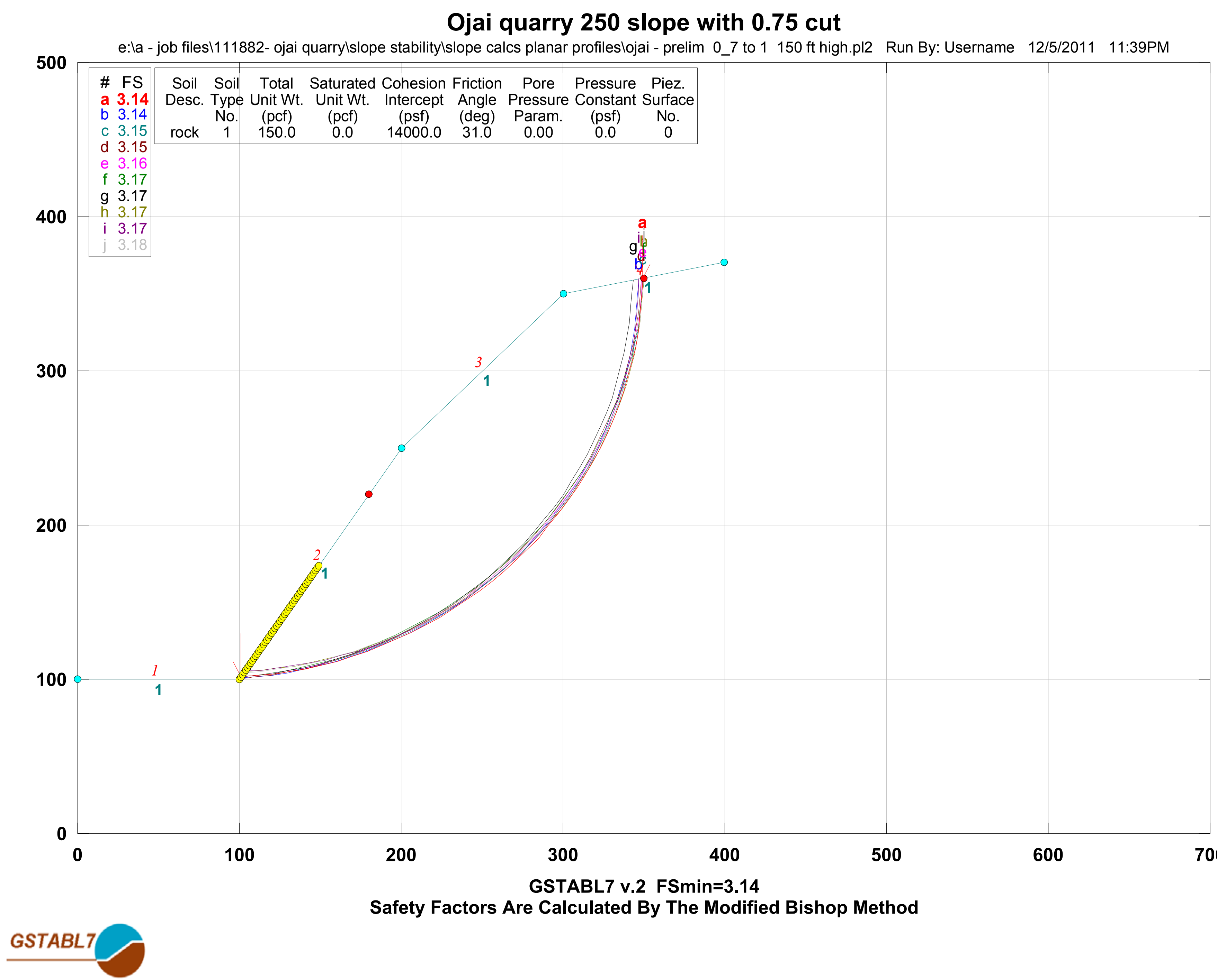


Figure 12. LEM analysis of 250 ft high bench in SS-Slt with a 75 ft high cut (0.75 to 1) at the toe of the slope.

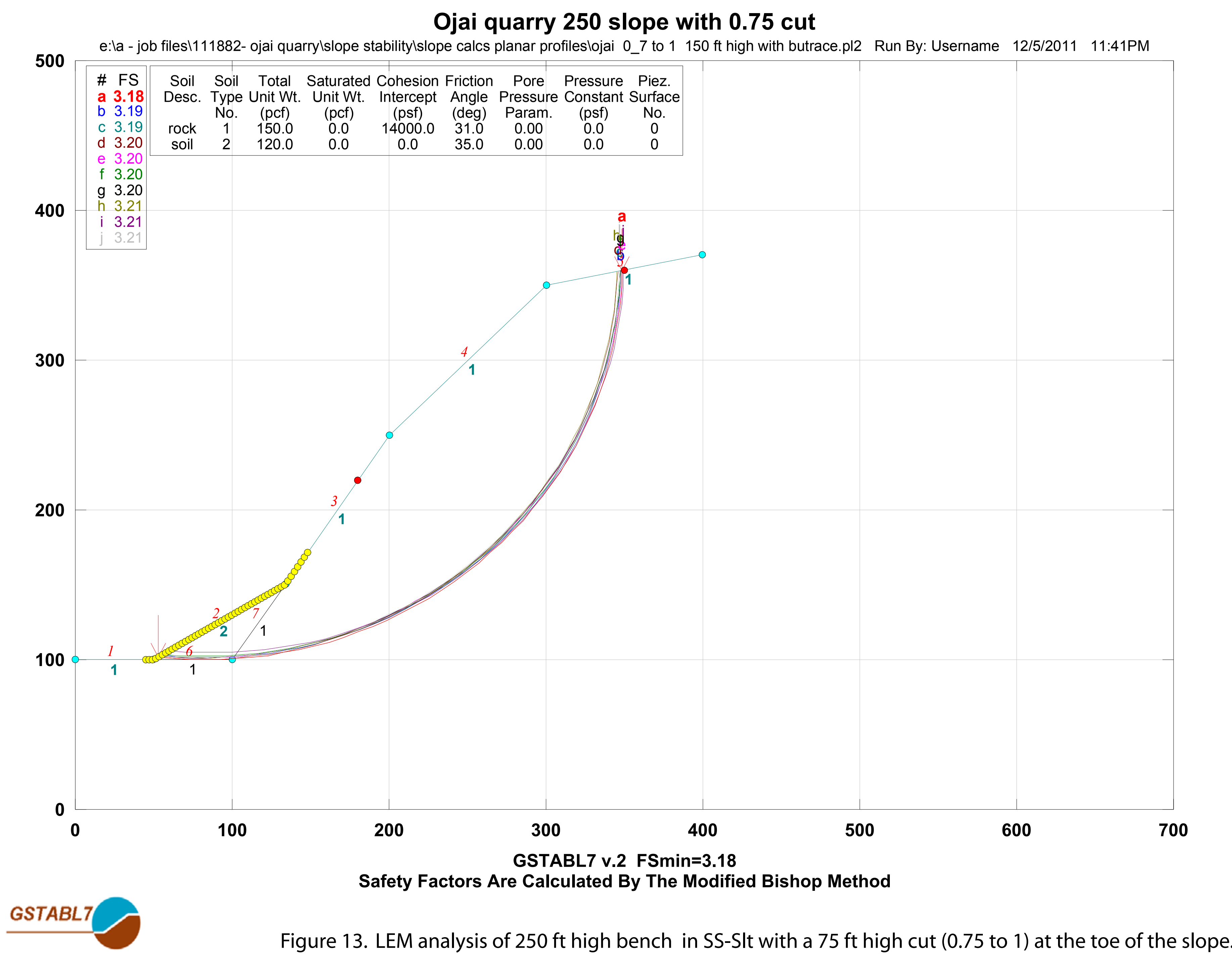


Figure 13. LEM analysis of 250 ft high bench in SS-Slt with a 75 ft high cut (0.75 to 1) at the toe of the slope. A 50 ft high buttress has been placed at the toe of the slope.

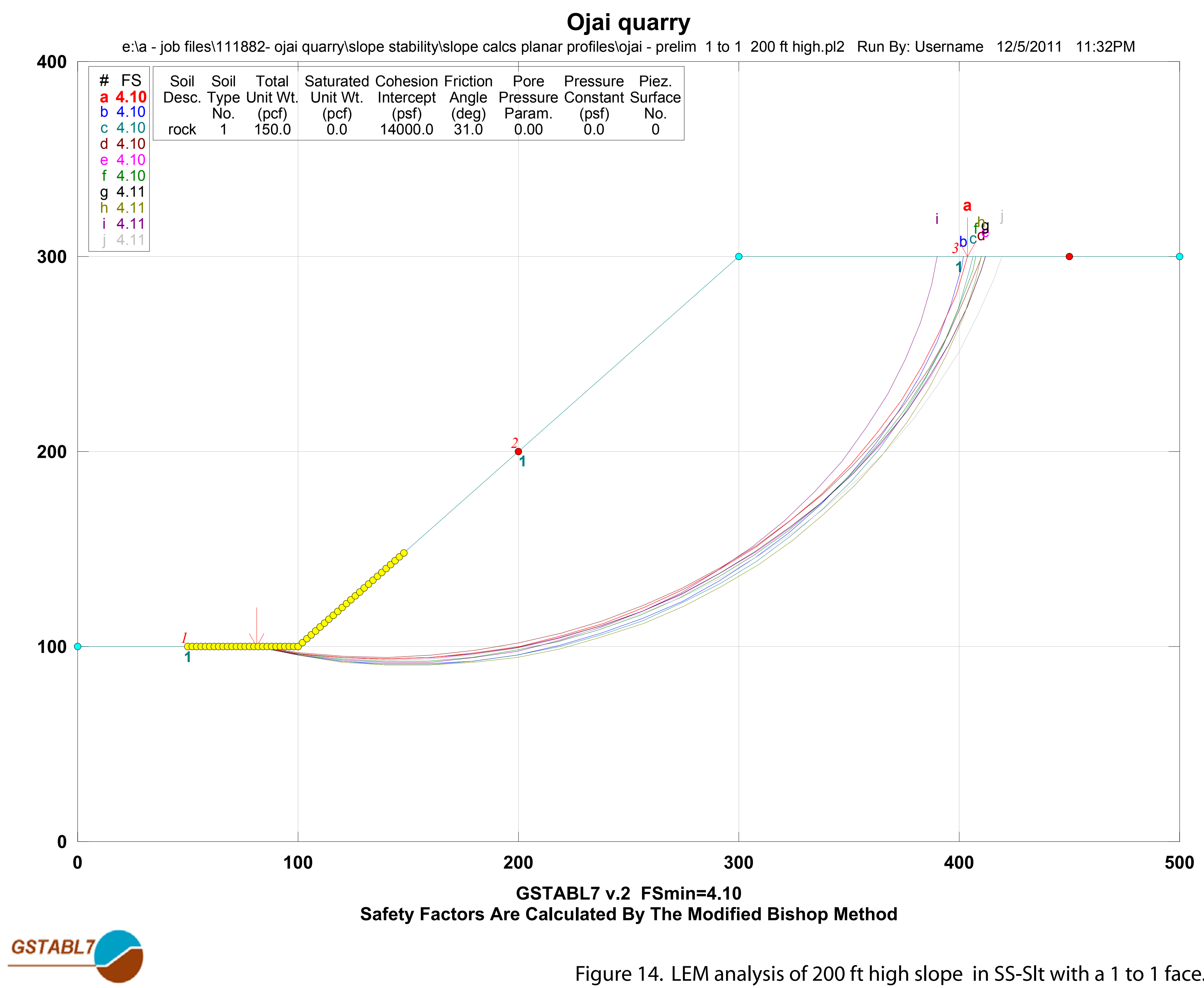


Figure 14. LEM analysis of 200 ft high slope in SS-Slt with a 1 to 1 face.

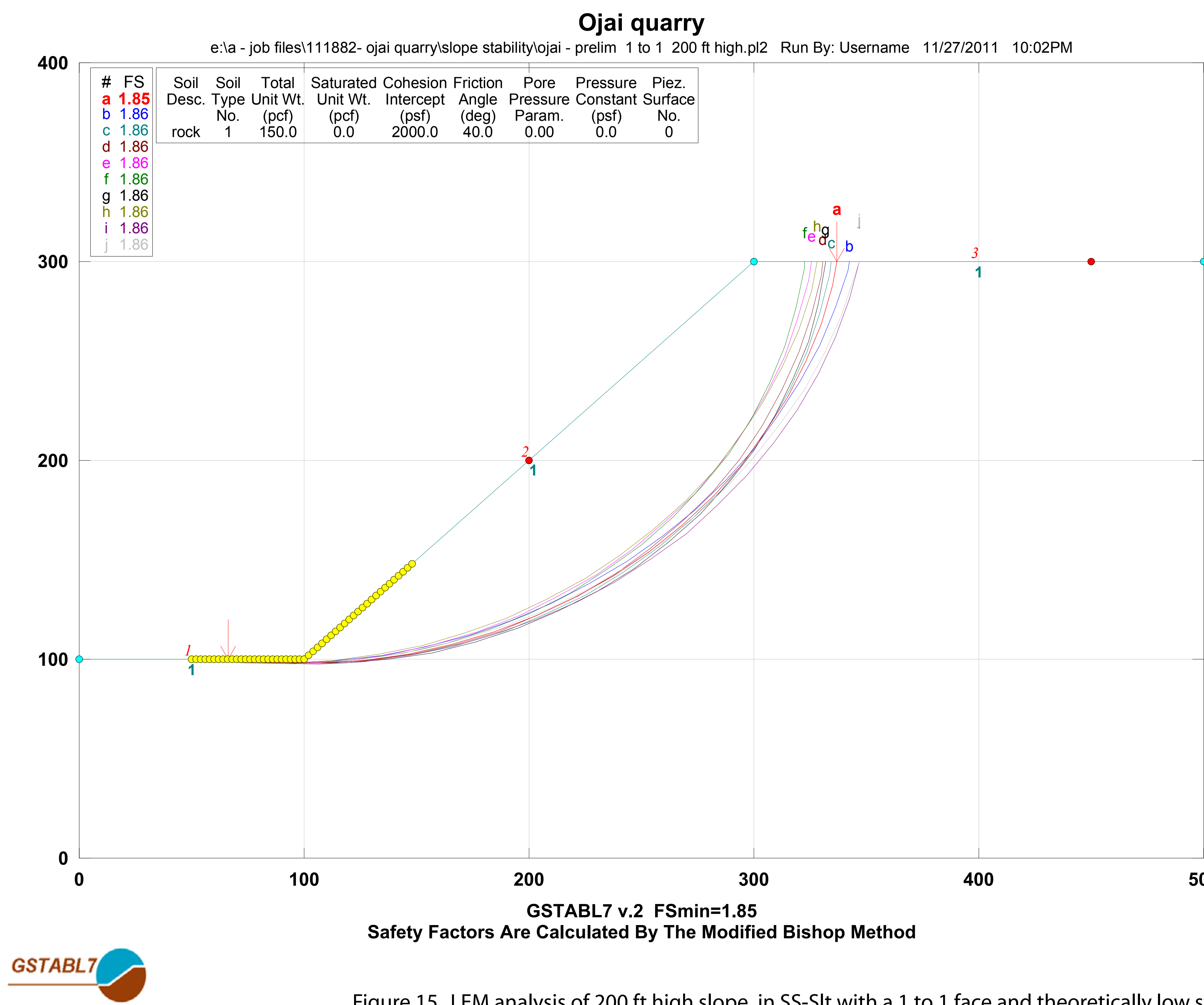


Figure 15. LEM analysis of 200 ft high slope in SS-Slt with a 1 to 1 face and theoretically low strength.

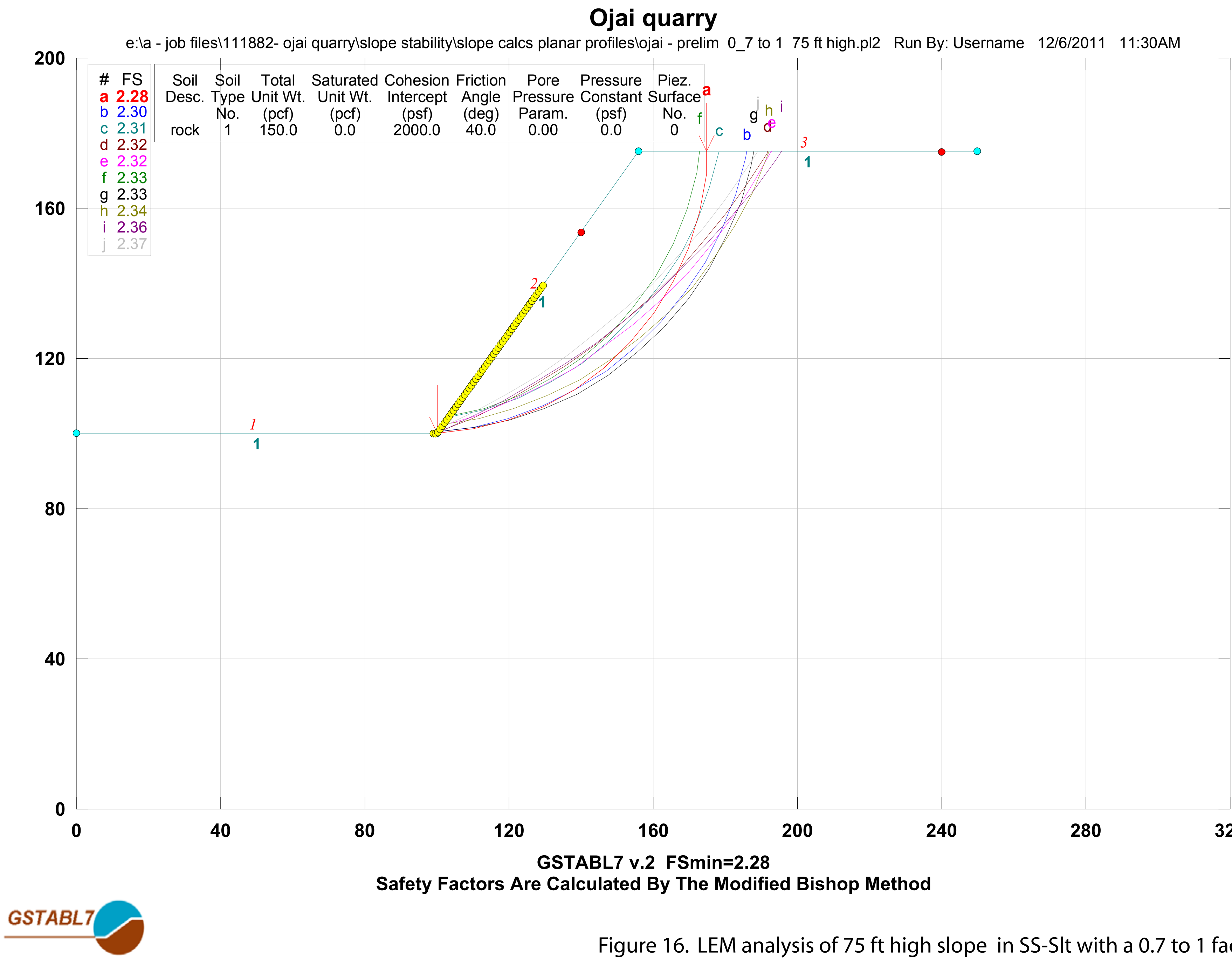


Figure 16. LEM analysis of 75 ft high slope in SS-Slt with a 0.7 to 1 face.. Theoretically very low material strengths are used.

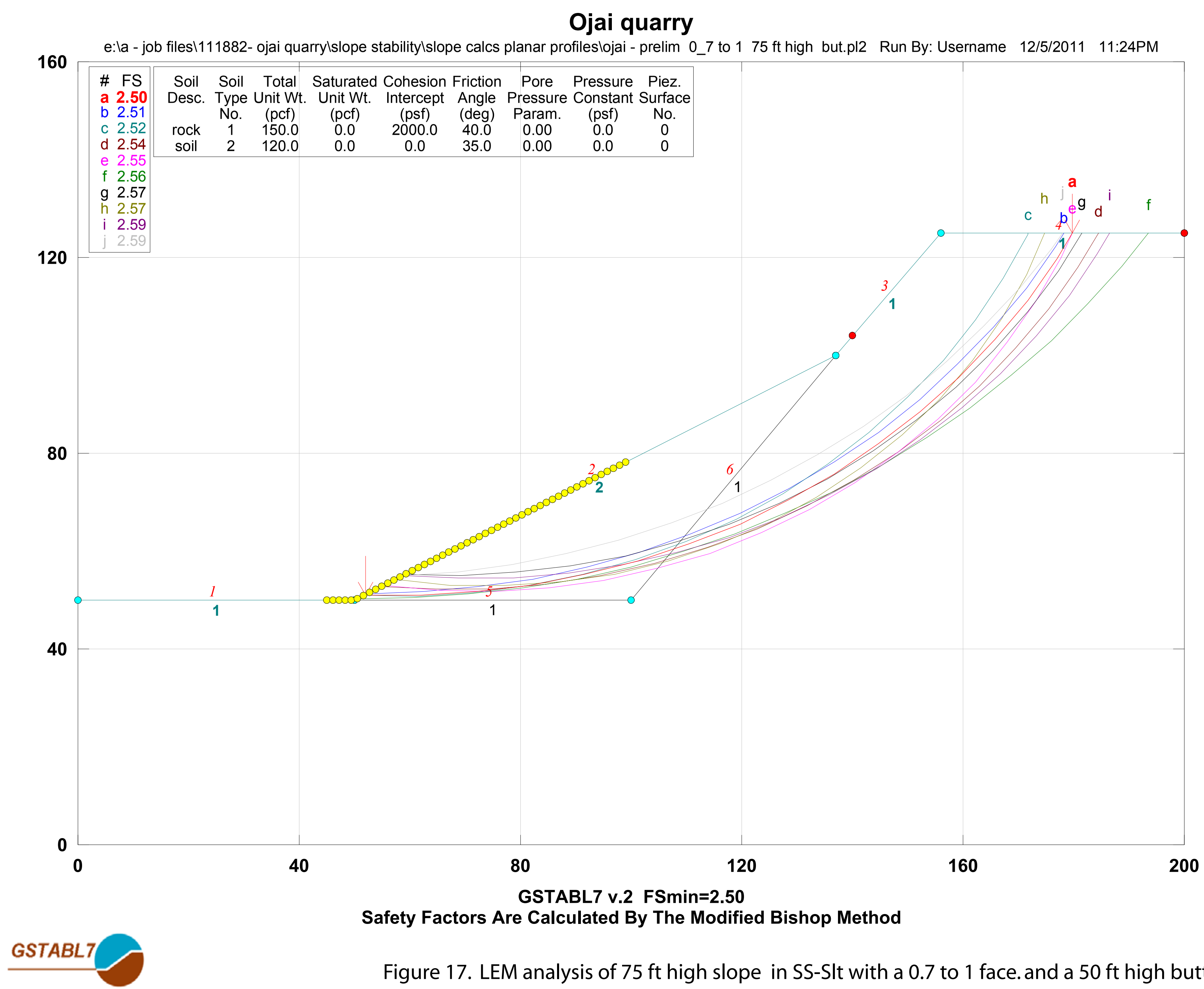


Figure 17. LEM analysis of 75 ft high slope in SS-Slt with a 0.7 to 1 face. and a 50 ft high buttress. Theoretically very low material strengths are used.

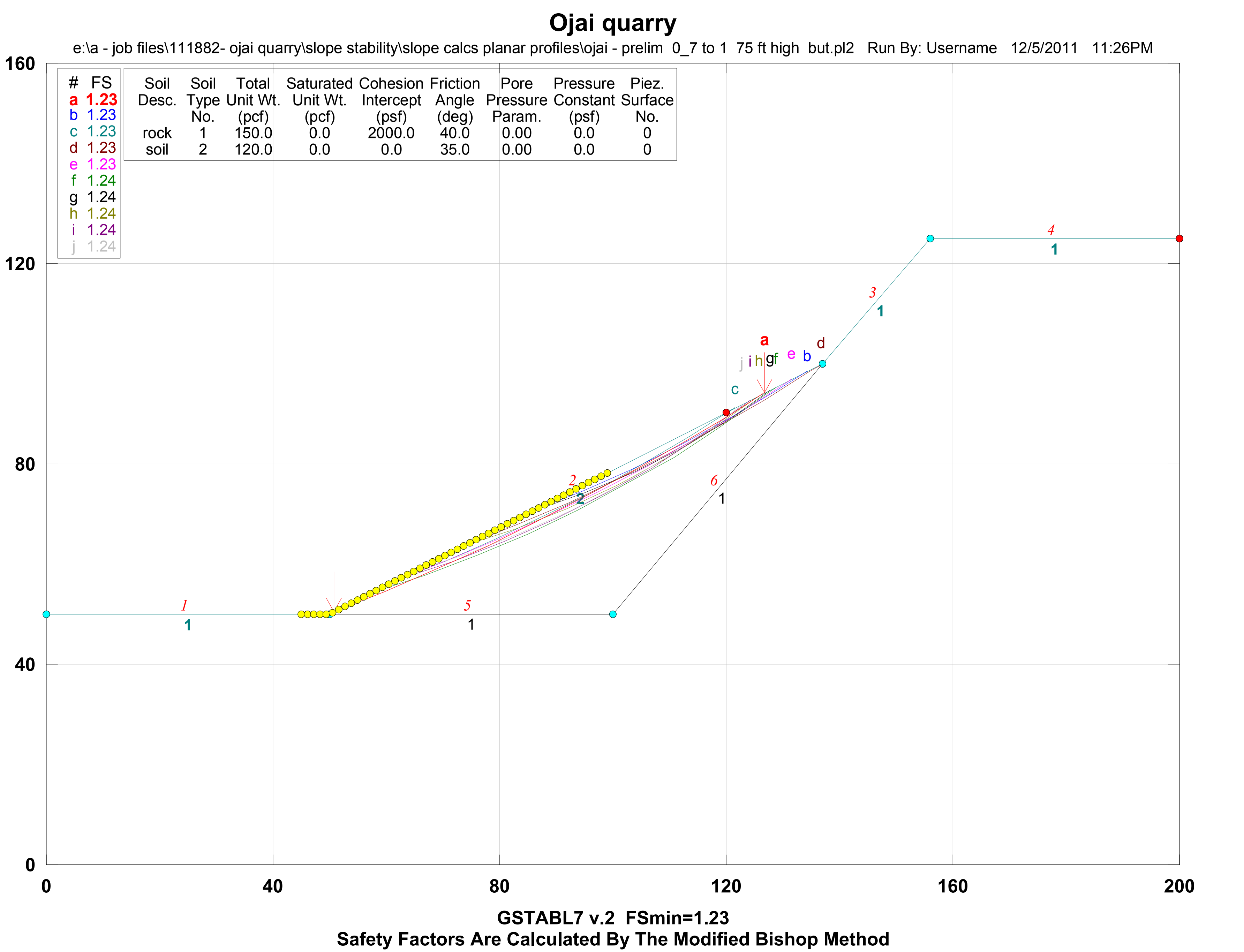
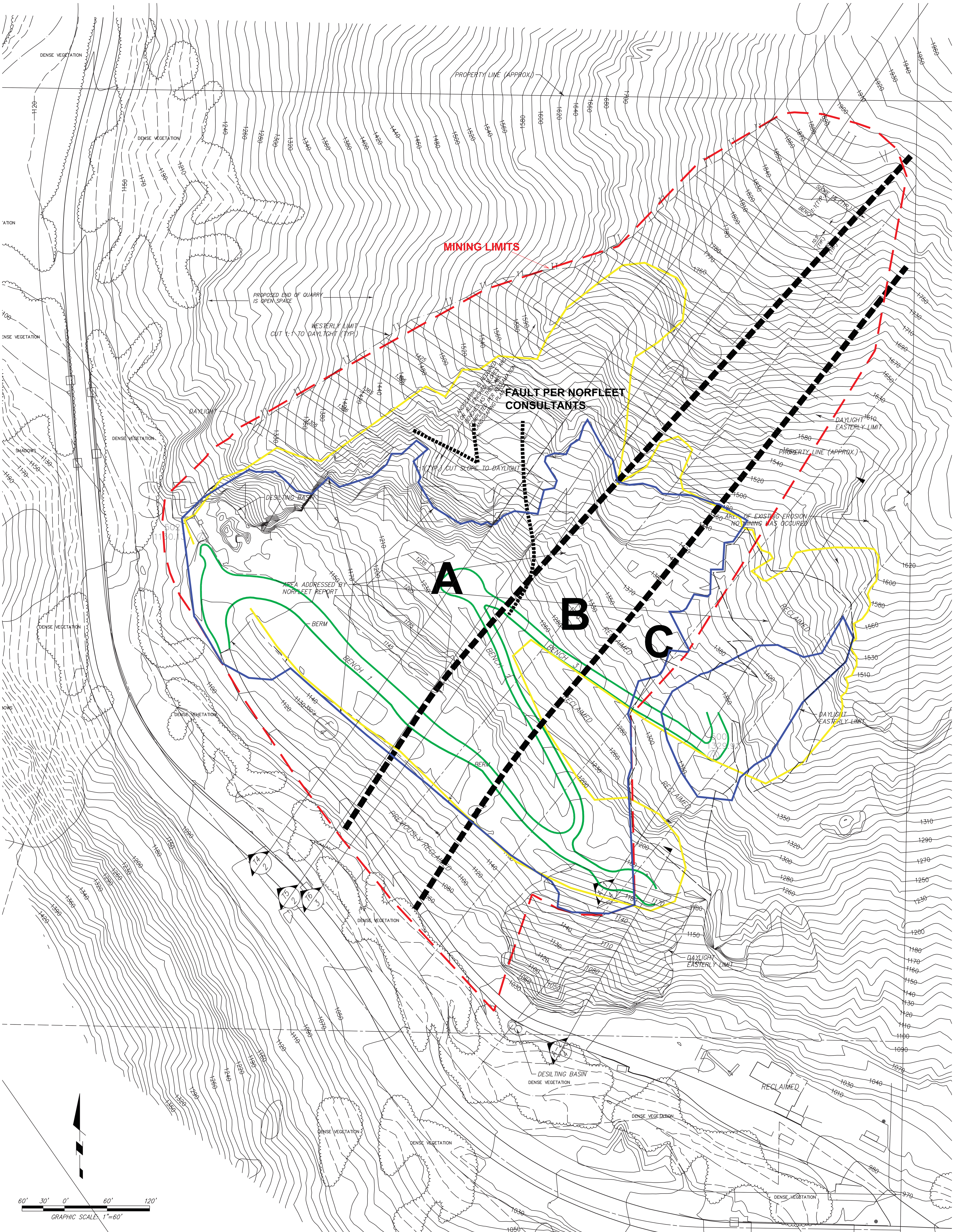


Figure 18. LEM analysis of 75 ft high slope in SS-Slt with a 0.7 to 1 face. and a 50 ft high buttress. Theoretically very low material strengths are used. The failure limts were restricted to the buttress.

APPENDIX III
RECLAMATION PLAN / GEOTECHNICAL MAP AND CROSS-SECTIONS



CONTOURS ARE BASED ON AERIAL SURVEY BY JDS – AUGUST 2019

LEGEND

- NORFLEET REPORT LIMITS
- MINING LIMITS
- ACCESS ROADS
- ACTIVITY LIMITS (CURRENT)
- A, B, C — MATILIJA DOMAINS (GMU'S) PER NORFLEET REPORTS
  - DOMAIN A - MATILIJA SANDSTONE AND LESSER THIN SILTSTONE
  - DOMAIN B - SILTSTONE AND LESSER SANDSTONE
  - DOMAIN C - THICKLY BEDDED SANDSTONE AND LESSER THIN SILTSTONE BEDS

SEE SHEET 2 & 3 FOR CROSS SECTIONS
SEE SHEET 4 FOR TYPICAL DETAILS

2019

PLATE 1	GOLD COAST GEOSERVICES, INC.		
	GEOTECHNICAL MAP OJAI QUARRY		
DATE: 06-05-2020	SIZE: D	CLIENT: MOSLER	REV:
FILE NO: GC18-092902	SCALE: 1" = 60'	DRAWN BY: IM	APPROVED BY: SJH

5251 VERDUGO WAY, SUITE J * CAMARILLO, CA 93012 * (805) 484-5070

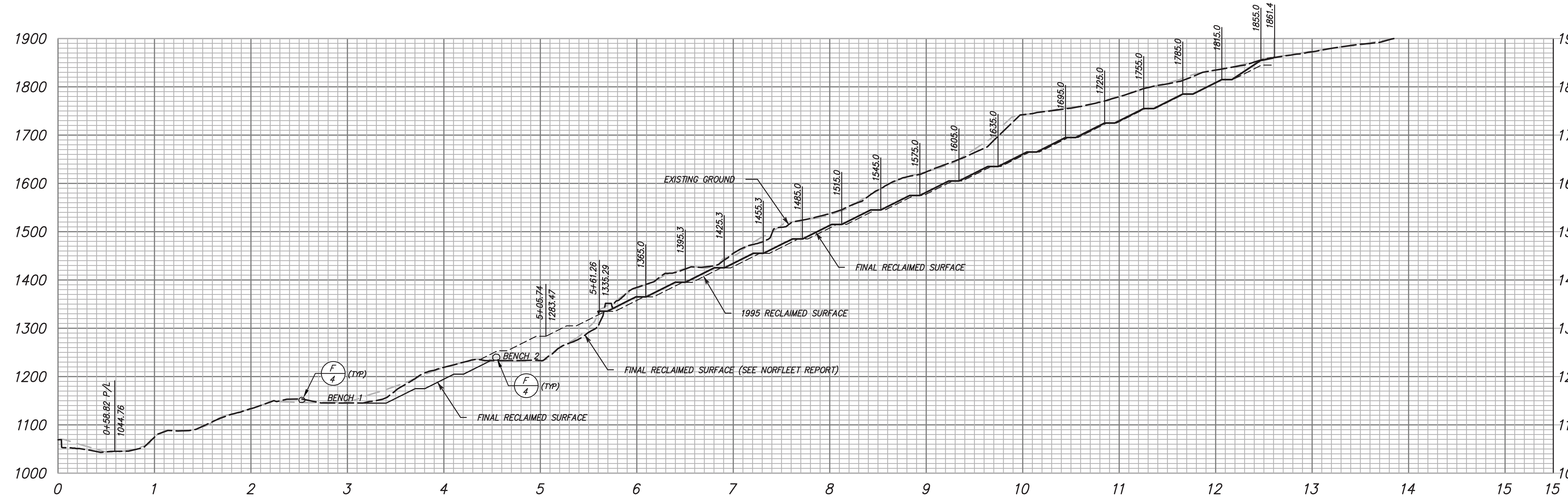
REGISTERED PROFESSIONAL ENGINEER FREDERICK T. GIROUX No. C 057289 Exp. 12-31-21 CIVIL STATE OF CALIFORNIA

JENSEN DESIGN & SURVEY, INC
www.jdscivil.com
1672 DONLON STREET
VENTURA, CALIF. 93003
PHONE 805/654-6977
FAX 805/654-6979

SCALE: 1"=60' | J.N.: MOS02.4059
DATE: 2/22/2019 | DWG. NAME:

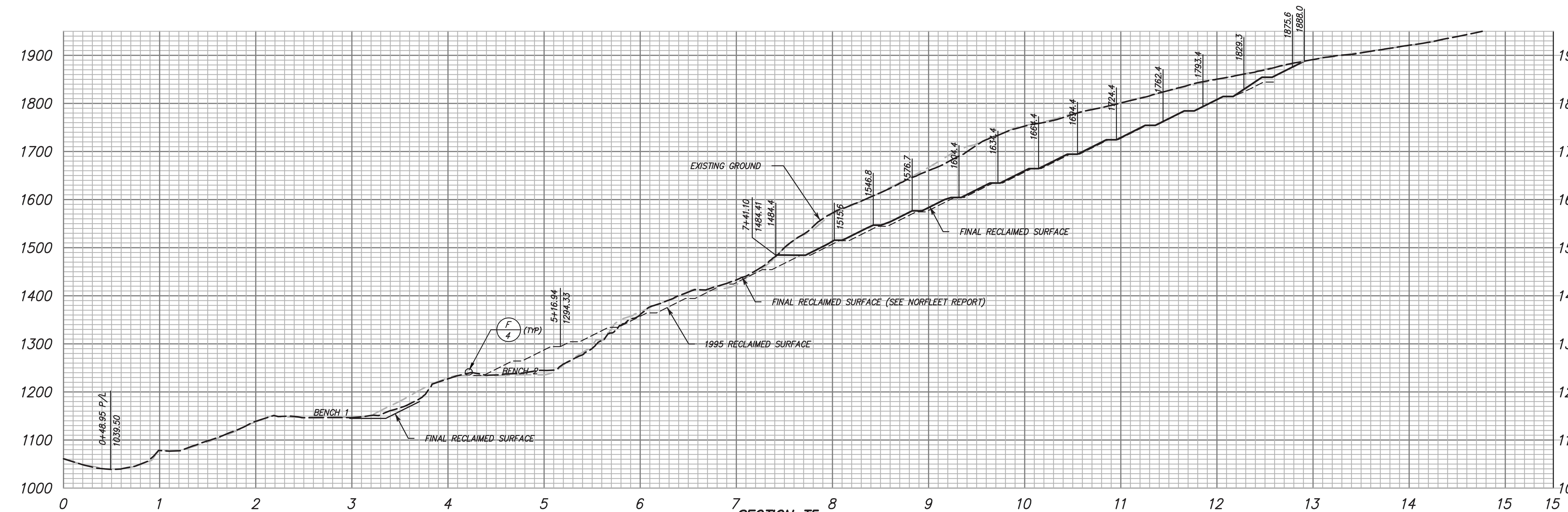
RECLAMATION PLAN FOR OJAI QUARRY

HWY 33
City of Ojai
COUNTY OF VENTURA — STATE OF CALIFORNIA



SECTION T4

HORZ SCALE: 1" = 60'
VERT SCALE: 1" = 30'



SECTION T5

HORZ SCALE: 1" = 60'
VERT SCALE: 1" = 30'

RECLAMATION NOTES

1. ALL ACCESS ROADS SHALL BE GRADED TO DRAIN INTO HILLSIDE WITH BOULDERS PLACED ALONG OUTSIDE OF ROADWAY, AS SHOWN IN DETAIL F, SHEET 3.
2. ALL ACCESS ROAD DRAINAGE CANAL/DITCHES SHALL BE CONSTRUCTED ON EXISTING BEDROCK
3. THIS RECLAMATION PLAN WAS PREPARED BASED ON THE QUARRY EXCAVATION SCHEME AS SHOWN ON SHEET 1 (QUARRY PLAN), BUT DUE TO POSSIBLE CHANGES IN QUARRY OPERATIONS DUE TO CHANGE IN STRUCTURAL GEOLOGY OF UNDERLYING STRATA, THIS RECLAMATION PLAN MAY BE REVISED ACCORDINGLY, SUBJECT TO THE REVIEW AND APPROVAL OF THE LEAD AGENCY.
4. QUARRY EXCAVATION SHALL BE UNDER THE OBSERVATION OF AN ENGINEERING GEOLOGIST WHO SHALL PROVIDE PERIODIC INSPECTION ON AT LEAST AN ANNUAL BASIS OF MEASURES TO MITIGATE QUARRY SAFETY AND TO AID IN IDENTIFICATION OF ANY CHANGES IN TERRAIN DISTURBANCE WITHIN OR ADJACENT TO QUARRY SITE. ANY CHANGE IN SLOPE PERFORMANCE OR EROSION/SEDIMENTATION CONDITIONS MAY REQUIRE REVISION TO THIS RECLAMATION PLAN. RESULTS OF THE ANNUAL INSPECTION SHALL BE SUMMARIZED IN A REPORT PREPARED BY THE ENGINEERING GEOLOGIST.
5. QUARRY EXCAVATION SHALL BE LIMITED TO 30 FOOT MAX BENCHES WITH TEMPORARY QUARRY EXCAVATION SLOPE NO TO EXCEED 60 DEGREE ANGLE OF REPOSE, WITHOUT WRITTEN APPROVAL BY THE ENGINEERING GEOLOGIST. TEMPORARY SLOPES ARE DEFINED AS SLOPES GRADED WITHIN THE PREVIOUS 12 MONTHS. FINAL SLOPES SHALL NOT EXCEED A 45 DEGREE ANGLE OF REPOSE AND SHALL HAVE 10 FOOT WIDE BENCHES EVERY 30 VERTICAL FEET, UNLESS APPROVED BY THE ENGINEERING GEOLOGIST AND THE LEAD AGENCY. NO PERCHED BOULDERS SHALL EXIST AT ANY TIME ON THE SITE.
6. WARNING SIGN INDICATING QUARRY HAZARD AND POSSIBLE ROCKFALL DANGER SHALL BE POSTED ALONG HIGHWAY 33 BELOW THE QUARRY SITE. WARNING SIGN SHALL ALSO BE POSTED INDICATING NO RECREATIONAL USE OF CREEK BELOW QUARRY SITE.
7. THE WESTERLY EDGE OF THE QUARRY SITE SHALL BE SLOPED AND BERMED TO PREVENT ANY MATERIALS FROM ROLLING DOWN THE NATURAL SLOPE INTO HIGHWAY 33, OR MATILIJA CREEK. IN THE EVENT THAT QUARRY MATERIALS FALL INTO MATILIJA CREEK, SAID MATERIALS SHALL BE REMOVED IMMEDIATELY BY CONTRACTOR.

QUARRY NOTES

1. THIS PLAN WAS PREPARED TAKING INTO CONSIDERATION THE FINDINGS AND RECOMMENDATIONS OF PACIFIC MATERIALS LABORATORY, INC REPORT DATED JULY 25, 1988, ALONG WITH REPORTS PREPARED BY GOLD COAST GEOSERVICES, DATED DECEMBER 7, 2018 AND BY NORFLEET CONSULTANTS, DATED JULY 2015.
2. PRIOR TO ANY QUARRY EXCAVATION, ANY ON-SITE PERCHED BOULDERS OR LAND/ROCK SLIDES UPSLOPE THAT POSE DANGER TO ANY DOWNSLOPE QUARRY EXCAVATION SHALL BE REMOVED FIRST.
3. QUARRY EXCAVATION SHALL COMMENCE FROM TOP OF SLOPE, PROCEEDING DOWNWARD ACCORDING TO BENCH DETAIL D, SHEET 3.

2019

SEE SHEET 1 FOR SITE PLAN
SEE SHEET 4 FOR TYPICAL DETAILS

REGISTERED PROFESSIONAL ENGINEER
FREDERICK T. GIROUX
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Exp. 12-31-21
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FAX 805/654-6979

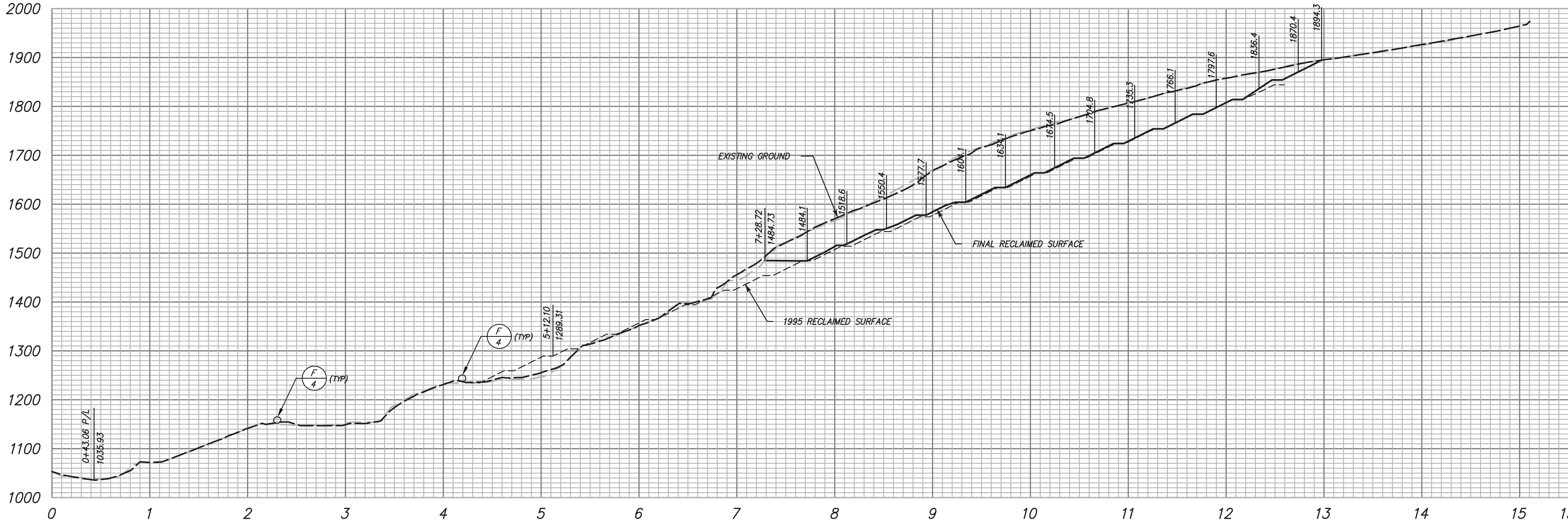
SCALE: 1"=60' | J.N.: MOS02.4059
DATE: 9/5/2019 | DWG. NAME: 4059_2019 Rec Plan - Sections.dwg

RECLAMATION PLAN
FOR
OJAI QUARRY

HWY 33
City of Ojai

COUNTY OF VENTURA | STATE OF CALIFORNIA

SHEET
2
OF 4



SECTION T6

HORZ SCALE: 1" = 60'
VERT SCALE: 1" = 30'

Jan 21, 2020

RECLAMATION NOTES

1. ALL ACCESS ROADS SHALL BE GRADED TO DRAIN INTO HILLSIDE WITH BOULDERS PLACED ALONG OUTSIDE OF ROADWAY, AS SHOWN IN DETAIL F, SHEET 3.
2. ALL ACCESS ROAD DRAINAGE CANAL/DITCHES SHALL BE CONSTRUCTED ON EXISTING BEDROCK
3. THIS RECLAMATION PLAN WAS PREPARED BASED ON THE QUARRY EXCAVATION SCHEME AS SHOWN ON SHEET 1 (QUARRY PLAN), BUT DUE TO POSSIBLE CHANGES IN QUARRY OPERATIONS DUE TO CHANGE IN STRUCTURAL GEOLOGY OF UNDERLYING STRATA, THIS RECLAMATION PLAN MAY BE REVISED ACCORDINGLY, SUBJECT TO THE REVIEW AND APPROVAL OF THE LEAD AGENCY.
4. QUARRY EXCAVATION SHALL BE UNDER THE OBSERVATION OF AN ENGINEERING GEOLOGIST WHO SHALL PROVIDE PERIODIC INSPECTION ON AT LEAST AN ANNUAL BASIS OF MEASURES TO MITIGATE QUARRY SAFETY AND TO AID IN IDENTIFICATION OF ANY CHANGES IN TERRAIN DISTURBANCE WITHIN OR ADJACENT TO QUARRY SITE. ANY CHANGE IN SLOPE PERFORMANCE OR EROSION/SEDIMENTATION CONDITIONS MAY REQUIRE REVISION TO THIS RECLAMATION PLAN. RESULTS OF THE ANNUAL INSPECTION SHALL BE SUMMARIZED IN A REPORT PREPARED BY THE ENGINEERING GEOLOGIST.
5. QUARRY EXCAVATION SHALL BE LIMITED TO 30 FOOT MAX BENCHES WITH TEMPORARY QUARRY EXCAVATION SLOPE NO TO EXCEED 60 DEGREE ANGLE OF REPOSE, WITHOUT WRITTEN APPROVAL BY THE ENGINEERING GEOLOGIST. TEMPORARY SLOPES ARE DEFINED AS SLOPES GRADED WITHIN THE PREVIOUS 12 MONTHS. FINAL SLOPES SHALL NOT EXCEED A 45 DEGREE ANGLE OF REPOSE AND SHALL HAVE 10 FOOT WIDE BENCHES EVERY 30 VERTICAL FEET, UNLESS APPROVED BY THE ENGINEERING GEOLOGIST AND THE LEAD AGENCY. NO PERCHED BOULDERS SHALL EXIST AT ANY TIME ON THE SITE.
6. WARNING SIGN INDICATING QUARRY HAZARD AND POSSIBLE ROCKFALL DANGER SHALL BE POSTED ALONG HIGHWAY 33 BELOW THE QUARRY SITE. WARNING SIGN SHALL ALSO BE POSTED INDICATING NO RECREATIONAL USE OF CREEK BELOW QUARRY SITE.
7. THE WESTERLY EDGE OF THE QUARRY SITE SHALL BE SLOPED AND BERMED TO PREVENT ANY MATERIALS FROM ROLLING DOWN THE NATURAL SLOPE INTO HIGHWAY 33, OR MATILIJA CREEK. IN THE EVENT THAT QUARRY MATERIALS FALL INTO MATILIJA CREEK, SAID MATERIALS SHALL BE REMOVED IMMEDIATELY BY CONTRACTOR.

QUARRY NOTES

1. THIS PLAN WAS PREPARED TAKING INTO CONSIDERATION THE FINDINGS AND RECOMMENDATIONS OF PACIFIC MATERIALS LABORATORY, INC REPORT DATED JULY 25, 1988, ALONG WITH REPORTS PREPARED BY GOLD COAST GEOSERVICES, DATED DECEMBER 7, 2018 AND BY NORFLEET CONSULTANTS, DATED JULY 2015.
2. PRIOR TO ANY QUARRY EXCAVATION, ANY ON-SITE PERCHED BOULDERS OR LAND/ROCK SLIDES UPSLOPE THAT POSE DANGER TO ANY DOWNSLOPE QUARRY EXCAVATION SHALL BE REMOVED FIRST.
3. QUARRY EXCAVATION SHALL COMMENCE FROM TOP OF SLOPE, PROCEEDING DOWNWARD ACCORDING TO BENCH DETAIL D, SHEET 3.

2019

REGISTERED PROFESSIONAL ENGINEER
FREDERICK T. GIROUX
No. C 057289
Exp. 12-31-21
CIVIL
STATE OF CALIFORNIA

SEE SHEET 1 FOR SITE PLAN
SEE SHEET 4 FOR TYPICAL DETAILS

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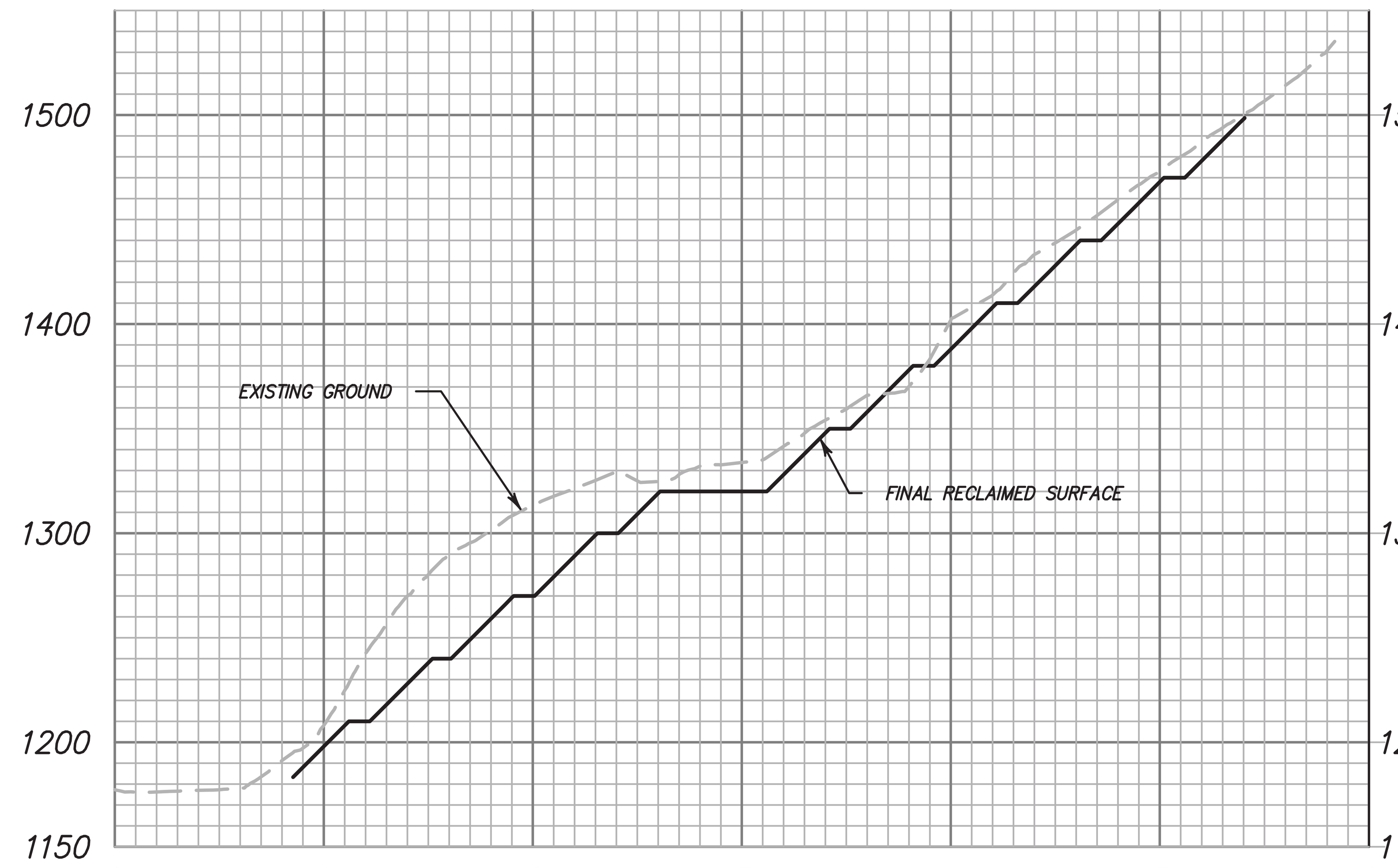
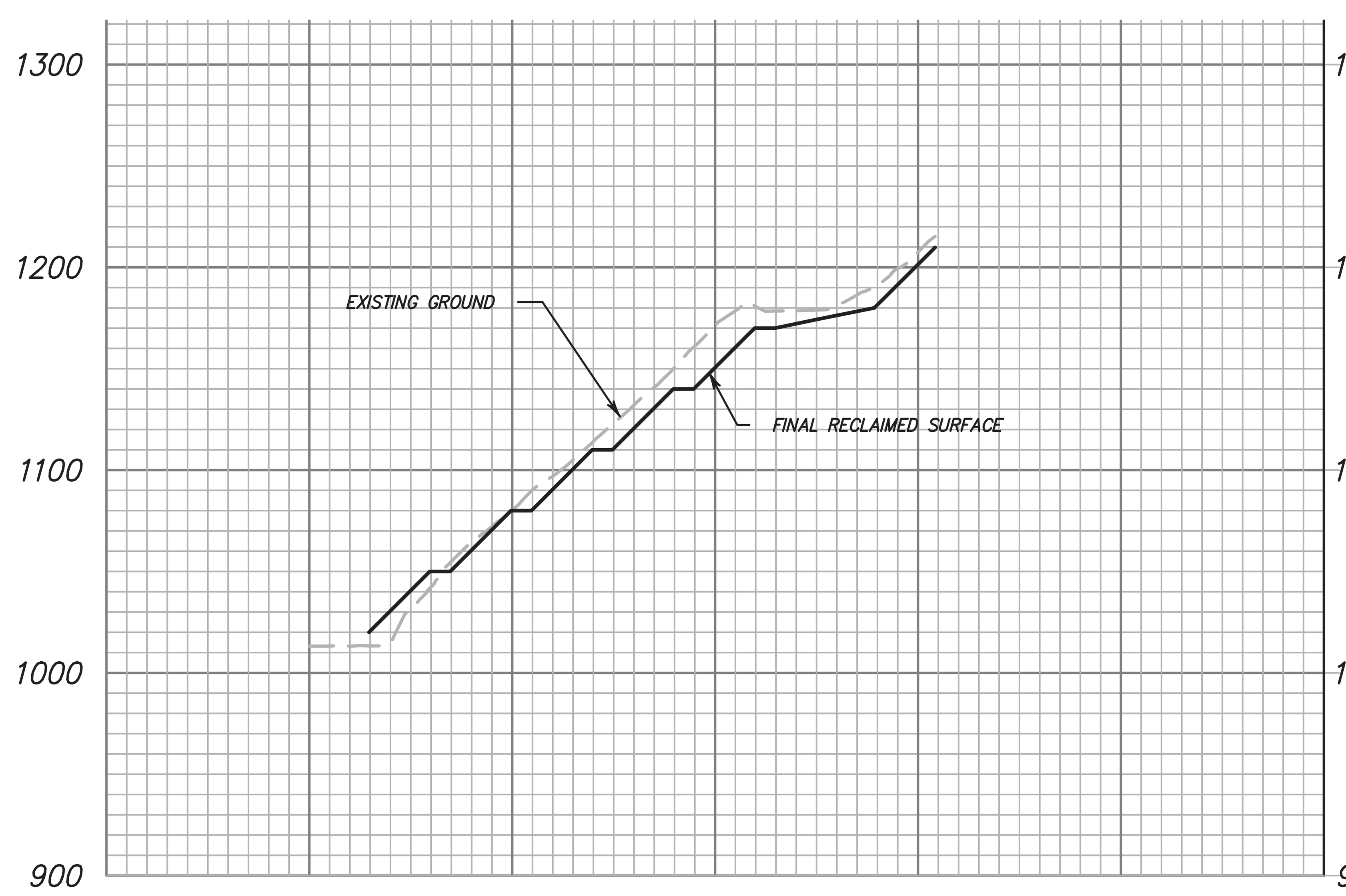
SCALE: 1"=60'
J.N.: MOS02.4059
DATE: 9/5/2019
DWG. NAME: 4059_2019 Rec Plan - Sections.dwg

RECLAMATION PLAN
FOR
OJAI QUARRY

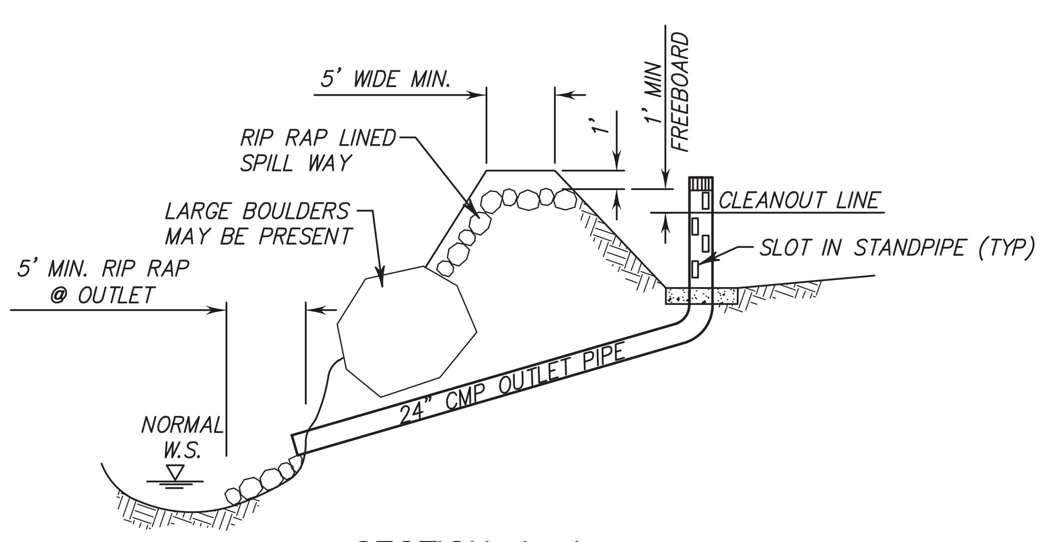
HWY 33
City of Ojai
COUNTY OF VENTURA
STATE OF CALIFORNIA



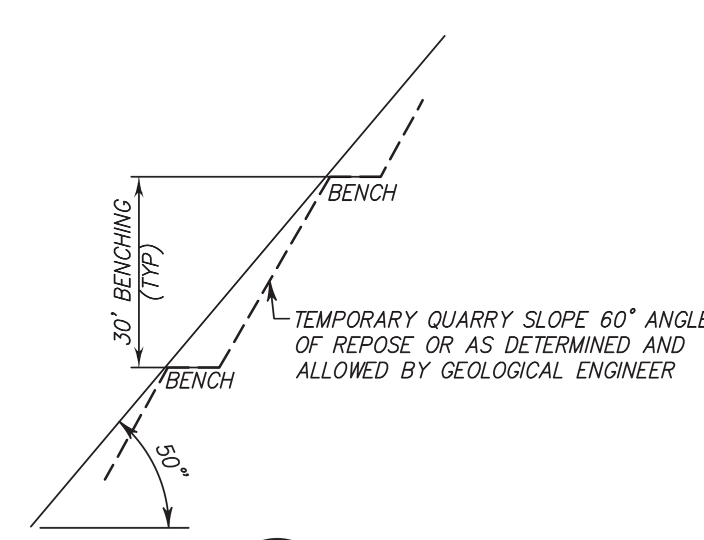
SECTION A–1
HORZ SCALE: 1" = 60'
VERT SCALE: 1" = 60'



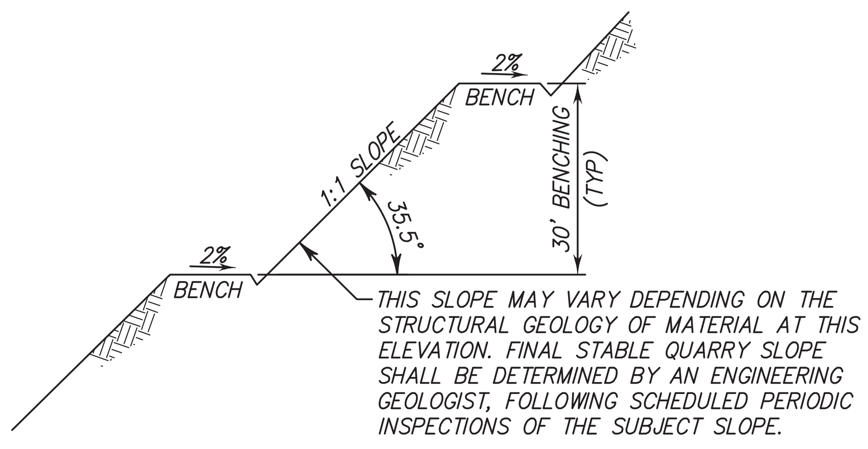
SECTION A–2
HORZ SCALE: 1" = 60'
VERT SCALE: 1" = 60'



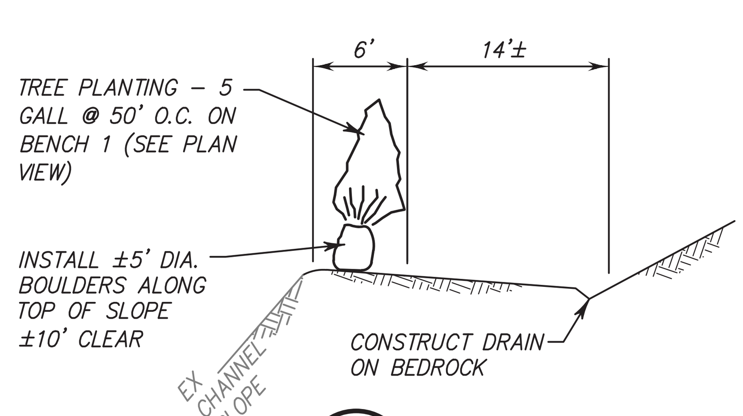
SECTION A–A
NOT TO SCALE



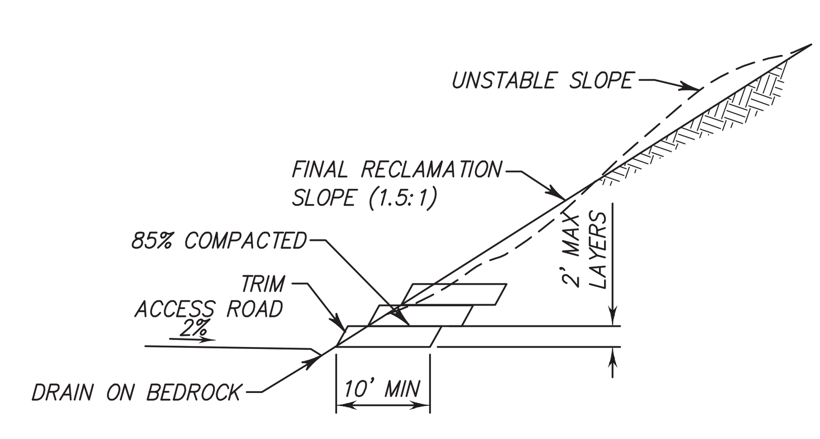
D – BENCH DETAIL
NOT TO SCALE



E – FINAL BENCHING DETAIL
NOT TO SCALE



F – DETAIL
NOT TO SCALE



H – DETAIL
NOT TO SCALE
WORK PROCEDURE ON EXISTING UNSTABLE SLOPE

Jan 21, 2020

SEE SHEET 1 FOR SITE PLAN
SEE SHEET 2 & 3 FOR SECTIONS

2019

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SCALE: 1"=60'	J.N.: MOS02.4059	RECLAMATION PLAN FOR OJAI QUARRY HWY 33 City of Ojai	SHEET 4 OF 4
DATE: 9/5/2019	DWG. NAME: 4059_2019 Rec Plan – Sections.dwg	COUNTY OF VENTURA — STATE OF CALIFORNIA	