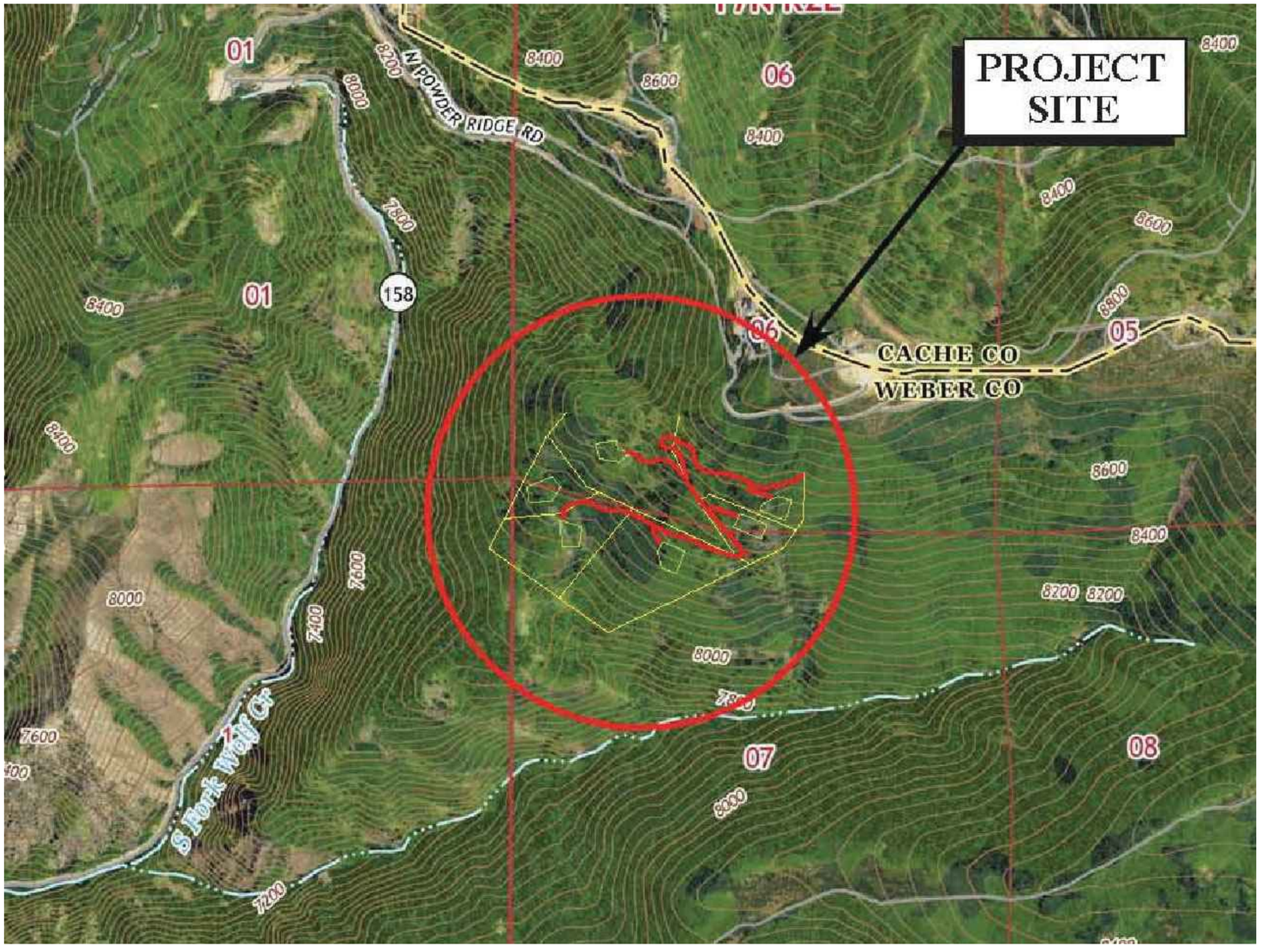
SUMMIT
POWDER MOUNTAIN

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH



PROJECT PLAN VIEW

BASE MAP: IGES, 2015, GEOTECHNICAL INVESTIGATION, SUMMIT EDEN PHASE 1E, SUMMIT AT POWDER MOUNTAIN RESORT, WEBER COUNTY, UTAH, IGES PROJECT NO. 01628-001, DATED AUG 10, 2015, DRAFT, FIGURE A-1

N

1"=300'

DESIGN PACKAGE CONTENTS		
	SHEET NO.	DESCRIPTION
SHOP DRAWINGS	1	COVER SHEET
	2	PLAN VIEW
	3	TYPICAL ROCKERY SECTION
	4	ROCKERY SPECIFICATIONS & NOTES
	5	DESIGN CRITERIA
DESIGN CALCULATION PACKAGE	SECTION 2.1	ROCKERY STABILITY CALCULATIONS
	SECTION 2.2	GLOBAL STABILITY CALCULATIONS

PREPARED FOR:	SUMMIT MOUNTAIN HOLDING GROUP 3632 NORTH WOLF CREEK DRIVE EDEN, UTAH 84310 ATTN: MR. RICK EVERSON (WATTS ENTERPRISES)
PREPARED BY:	SHUN LI, P.E.I.
REVIEWED BY:	PROFESSIONAL ENGINEER No. 6370734 DAVID A. GLASS 10-01-15 ELECTRONIC SEAL STATE OF UTAH DAVID A. GLASS, P.E.

REV		DATE	BY	CHK
REVISIONS				

IGES®

12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
COVER SHEET

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE 1"=300'
APPROVED BY:	DAG	OCT 1, 2015	
IGES PROJECT NO. 01628-011	SHEET NO. 1		REV. N/A

OPEN SPACE

SUMMIT PASS

HORIZON RUN

5R

6R

7A

7B

10R

POSSIBLE TEMPORARY TERMINATION POINT, STA: 8+43.38. SEE DETAIL ON SHEET 5.10

POSSIBLE TEMPORARY TERMINATION POINT, STA: 28+42.72. SEE DETAIL ON SHEET 5.10

1 — 1' GLOBAL STABILITY ANALYSIS SECTION

ROCKERY DESIGN 1

ROCKERY DESIGN 2

ROCKERY DESIGN 3

ROCKERY DESIGN 4

ROCKERY DESIGN 5

ROCKERY DESIGN 6

N

0 30 60 90 150 300

SCALE: 1" =150'

PROJECT PLAN VIEW

BASE MAP: NV5, 2015, SUMMIT EDEN PHASE 1E/1F/1G, OVERALL GRADING PLAN, SHEET 1.04, DATE SUBMITTED 7-7-2015, UPDATED 9-18-2015

REV		DATE	BY	CHK

REVISIONS

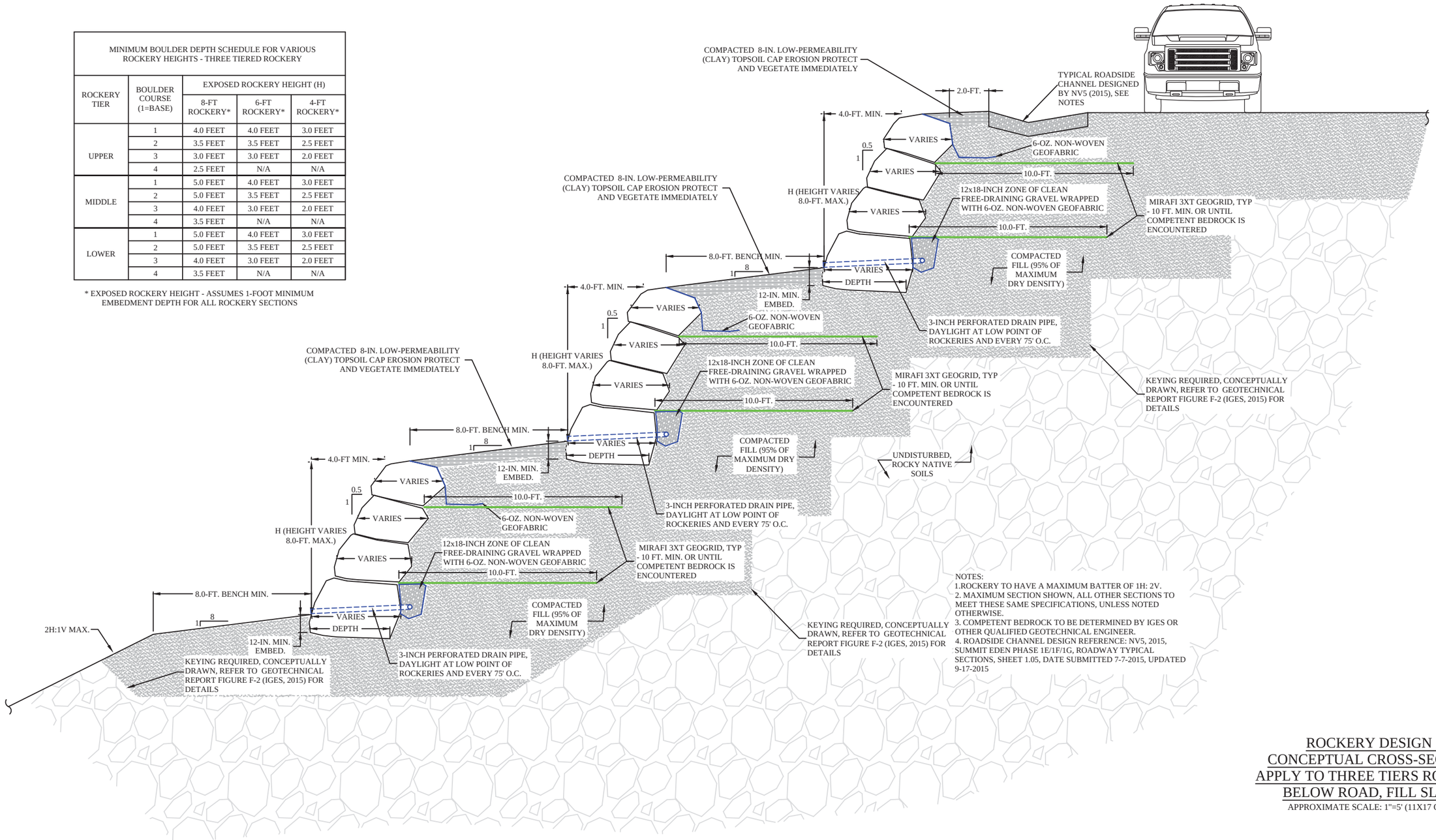
IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
PLAN VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE 1"=150'
APPROVED BY:	DAG	OCT 1, 2015	
IGES PROJECT NO. 01628-011	SHEET NO. 2		REV. N/A

MINIMUM BOULDER DEPTH SCHEDULE FOR VARIOUS ROCKERY HEIGHTS - THREE TIERED ROCKERY				
ROCKERY TIER	BOULDER COURSE (1=BASE)	EXPOSED ROCKERY HEIGHT (H)		
		8-FT ROCKERY*	6-FT ROCKERY*	4-FT ROCKERY*
UPPER	1	4.0 FEET	4.0 FEET	3.0 FEET
	2	3.5 FEET	3.5 FEET	2.5 FEET
	3	3.0 FEET	3.0 FEET	2.0 FEET
	4	2.5 FEET	N/A	N/A
MIDDLE	1	5.0 FEET	4.0 FEET	3.0 FEET
	2	5.0 FEET	3.5 FEET	2.5 FEET
	3	4.0 FEET	3.0 FEET	2.0 FEET
	4	3.5 FEET	N/A	N/A
LOWER	1	5.0 FEET	4.0 FEET	3.0 FEET
	2	5.0 FEET	3.5 FEET	2.5 FEET
	3	4.0 FEET	3.0 FEET	2.0 FEET
	4	3.5 FEET	N/A	N/A

* EXPOSED ROCKERY HEIGHT - ASSUMES 1-FOOT MINIMUM EMBEDMENT DEPTH FOR ALL ROCKERY SECTIONS



ROCKERY DESIGN 1
CONCEPTUAL CROSS-SECTION
APPLY TO THREE TIERS ROCKERY
BELOW ROAD, FILL SLOPE

APPROXIMATE SCALE: 1"=5' (11X17 ONLY)

REV		DATE	BY	CHK

REVISIONS

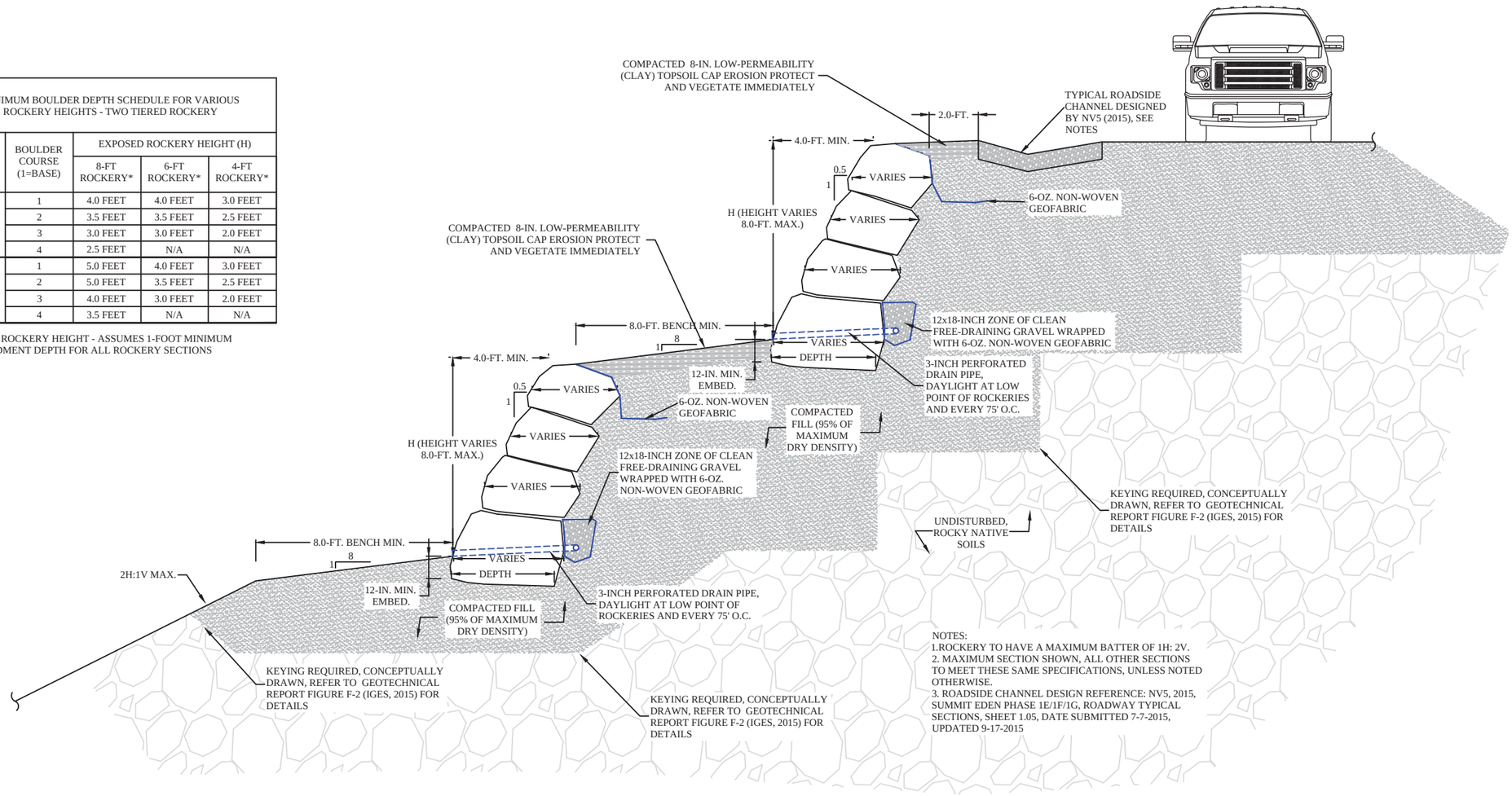
IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
TYPICAL SECTION VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE 1"=5'
APPROVED BY:	DAG	OCT 1, 2015	
IGES PROJECT NO. 01628-011	SHEET NO. 3.a		REV. N/A

MINIMUM BOULDER DEPTH SCHEDULE FOR VARIOUS ROCKERY HEIGHTS - TWO TIERED ROCKERY				
ROCKERY TIER	BOULDER COURSE (1=BASE)	EXPOSED ROCKERY HEIGHT (H)		
		8-FT ROCKERY*	6-FT ROCKERY*	4-FT ROCKERY*
UPPER	1	4.0 FEET	4.0 FEET	3.0 FEET
	2	3.5 FEET	3.5 FEET	2.5 FEET
	3	3.0 FEET	3.0 FEET	2.0 FEET
	4	2.5 FEET	N/A	N/A
LOWER	1	5.0 FEET	4.0 FEET	3.0 FEET
	2	5.0 FEET	3.5 FEET	2.5 FEET
	3	4.0 FEET	3.0 FEET	2.0 FEET
	4	3.5 FEET	N/A	N/A

* EXPOSED ROCKERY HEIGHT - ASSUMES 1-FOOT MINIMUM EMBEDMENT DEPTH FOR ALL ROCKERY SECTIONS



NOTES:
1.ROCKERY TO HAVE A MAXIMUM BATTER OF 1H: 2V.
2. MAXIMUM SECTION SHOWN, ALL OTHER SECTIONS TO MEET THESE SAME SPECIFICATIONS, UNLESS NOTED OTHERWISE.
3. ROADSIDE CHANNEL DESIGN REFERENCE: NV5, 2015, SUMMIT EDEN PHASE 1E/1F/1G, ROADWAY TYPICAL SECTIONS, SHEET 1.05, DATE SUBMITTED 7-7-2015, UPDATED 9-17-2015

ROCKERY DESIGN 2
CONCEPTUAL CROSS-SECTION
APPLY TO TWO TIERS ROCKERY BELOW ROAD, FILL SLOPE

APPROXIMATE SCALE: 1"=5' (11X17 ONLY)

REV		DATE	BY	CHK

REVISIONS

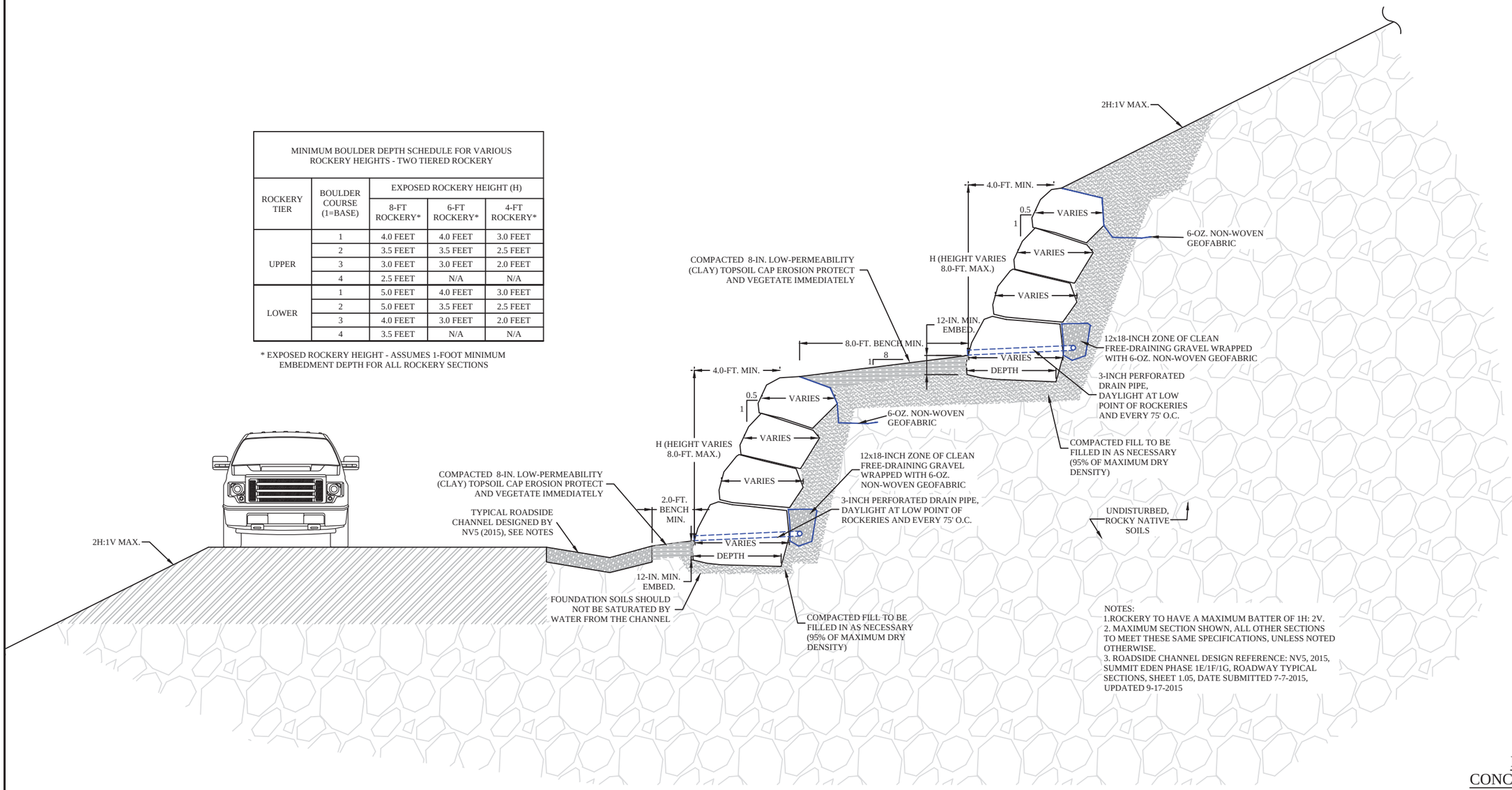
IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
TYPICAL SECTION VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE 1"=5'
APPROVED BY:	DAG	OCT 1, 2015	
IGES PROJECT NO. 01628-011	SHEET NO. 3.b		REV. N/A

MINIMUM BOULDER DEPTH SCHEDULE FOR VARIOUS ROCKERY HEIGHTS - TWO TIERED ROCKERY				
ROCKERY TIER	BOULDER COURSE (1=BASE)	EXPOSED ROCKERY HEIGHT (H)		
		8-FT ROCKERY*	6-FT ROCKERY*	4-FT ROCKERY*
UPPER	1	4.0 FEET	4.0 FEET	3.0 FEET
	2	3.5 FEET	3.5 FEET	2.5 FEET
	3	3.0 FEET	3.0 FEET	2.0 FEET
	4	2.5 FEET	N/A	N/A
LOWER	1	5.0 FEET	4.0 FEET	3.0 FEET
	2	5.0 FEET	3.5 FEET	2.5 FEET
	3	4.0 FEET	3.0 FEET	2.0 FEET
	4	3.5 FEET	N/A	N/A

* EXPOSED ROCKERY HEIGHT - ASSUMES 1-FOOT MINIMUM EMBEDMENT DEPTH FOR ALL ROCKERY SECTIONS



NOTES:
1.ROCKERY TO HAVE A MAXIMUM BATTER OF 1H: 2V.
2. MAXIMUM SECTION SHOWN, ALL OTHER SECTIONS TO MEET THESE SAME SPECIFICATIONS, UNLESS NOTED OTHERWISE.
3. ROADSIDE CHANNEL DESIGN REFERENCE: NV5, 2015, SUMMIT EDEN PHASE 1E/1F/1G, ROADWAY TYPICAL SECTIONS, SHEET 1.05, DATE SUBMITTED 7-7-2015, UPDATED 9-17-2015

ROCKERY DESIGN 3
CONCEPTUAL CROSS-SECTION
APPLY TO TWO TIERS ROCKERY ABOVE ROAD, CUT SLOPE

APPROXIMATE SCALE: 1"=5' (11X17 ONLY)

REV		DATE	BY	CHK

REVISIONS

IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

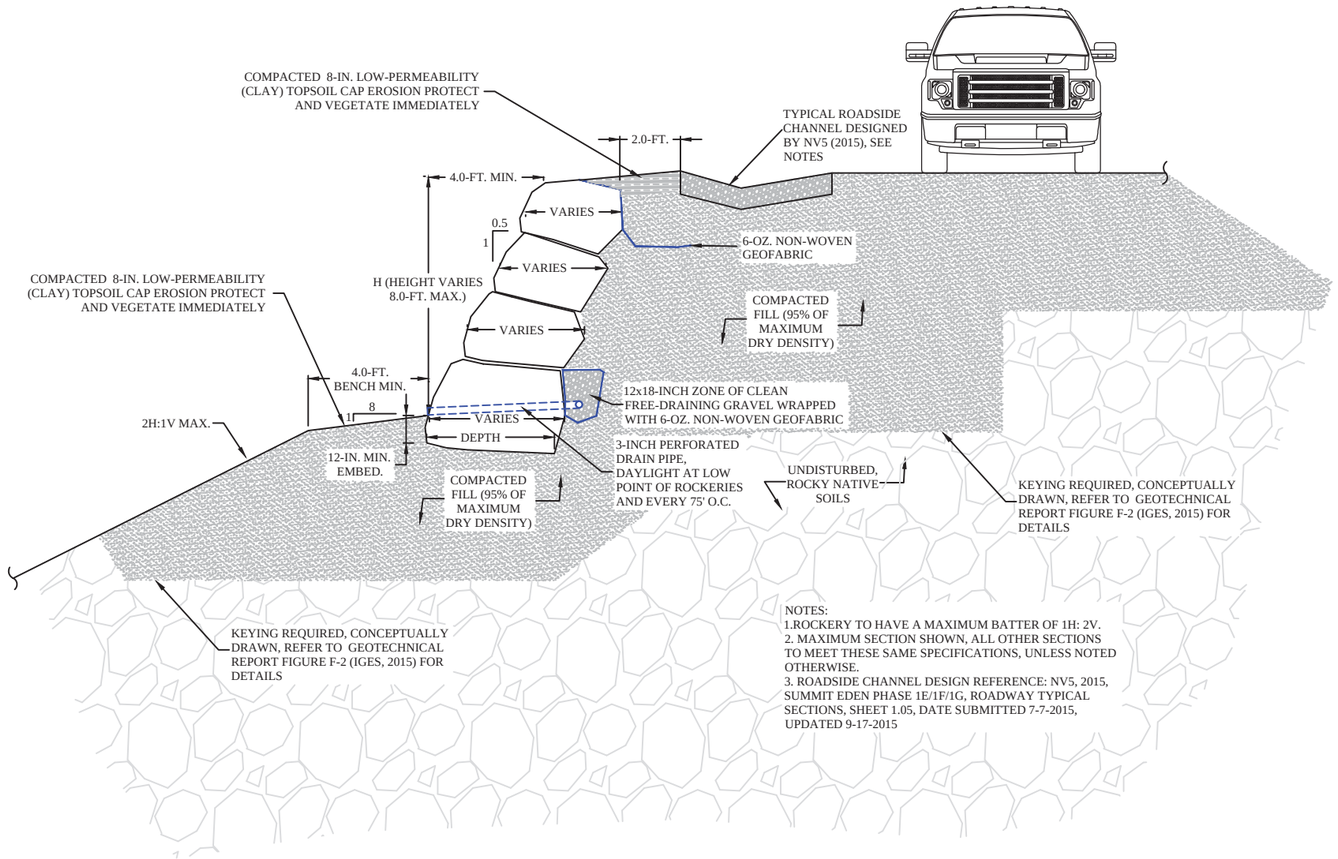
ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
TYPICAL SECTION VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE
DRAWN BY:	SL	OCT 1, 2015	1=1
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE
APPROVED BY:	DAG	OCT 1, 2015	1"=5'

IGES PROJECT NO. 01628-011 | SHEET NO. 3.c | REV. N/A

MINIMUM BOULDER DEPTH SCHEDULE FOR VARIOUS ROCKERY HEIGHTS - SINGLE TIERED ROCKERY				
ROCKERY TIER	BOULDER COURSE (1=BASE)	EXPOSED ROCKERY HEIGHT (H)		
		8-FT ROCKERY*	6-FT ROCKERY*	4-FT ROCKERY*
SINGLE	1	4.0 FEET	4.0 FEET	3.0 FEET
	2	3.5 FEET	3.5 FEET	2.5 FEET
	3	3.0 FEET	3.0 FEET	2.0 FEET
	4	2.5 FEET	N/A	N/A

* EXPOSED ROCKERY HEIGHT - ASSUMES 1-FOOT MINIMUM EMBEDMENT DEPTH FOR ALL ROCKERY SECTIONS



NOTES:
1.ROCKERY TO HAVE A MAXIMUM BATTER OF 1H: 2V.
2. MAXIMUM SECTION SHOWN, ALL OTHER SECTIONS TO MEET THESE SAME SPECIFICATIONS, UNLESS NOTED OTHERWISE.
3. ROADSIDE CHANNEL DESIGN REFERENCE: NV5, 2015, SUMMIT EDEN PHASE 1E/1F/1G, ROADWAY TYPICAL SECTIONS, SHEET 1.05, DATE SUBMITTED 7-7-2015, UPDATED 9-17-2015

ROCKERY DESIGN 4
CONCEPTUAL CROSS-SECTION
APPLY TO SINGLE TIER ROCKERY
BELOW ROAD, FILL SLOPE
APPROXIMATE SCALE: 1"=5' (11X17 ONLY)

REV		DATE	BY	CHK

REVISIONS

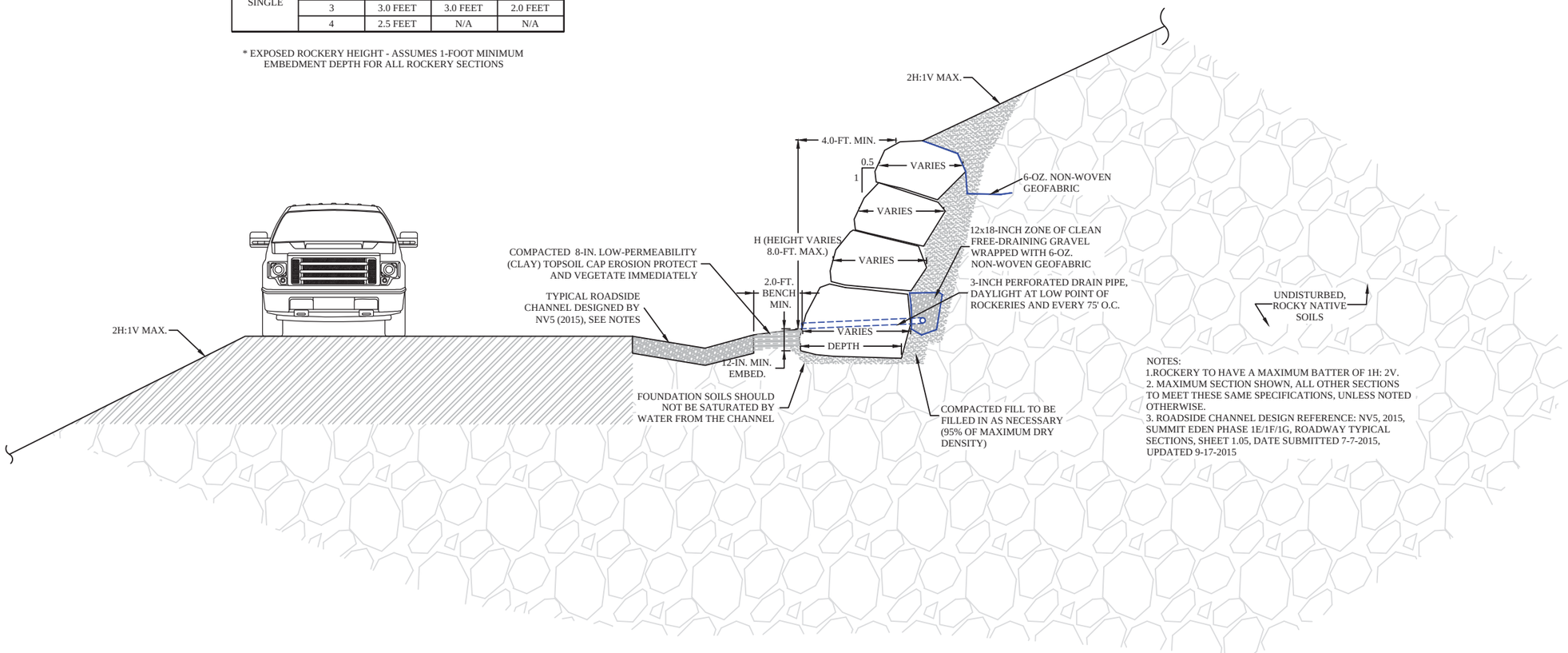
IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
TYPICAL SECTION VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE	1=1
DRAWN BY:	SL	OCT 1, 2015		
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE	1"=5'
APPROVED BY:	DAG	OCT 1, 2015		
IGES PROJECT NO. 01628-011	SHEET NO.	3.d	REV.	N/A

MINIMUM BOULDER DEPTH SCHEDULE FOR VARIOUS ROCKERY HEIGHTS - SINGLE TIERED ROCKERY				
ROCKERY TIER	BOULDER COURSE (1=BASE)	EXPOSED ROCKERY HEIGHT (H)		
		8-FT ROCKERY*	6-FT ROCKERY*	4-FT ROCKERY*
SINGLE	1	4.0 FEET	4.0 FEET	3.0 FEET
	2	3.5 FEET	3.5 FEET	2.5 FEET
	3	3.0 FEET	3.0 FEET	2.0 FEET
	4	2.5 FEET	N/A	N/A

* EXPOSED ROCKERY HEIGHT - ASSUMES 1-FOOT MINIMUM EMBEDMENT DEPTH FOR ALL ROCKERY SECTIONS



NOTES:
1.ROCKERY TO HAVE A MAXIMUM BATTER OF 1H: 2V.
2. MAXIMUM SECTION SHOWN, ALL OTHER SECTIONS TO MEET THESE SAME SPECIFICATIONS, UNLESS NOTED OTHERWISE.
3. ROADSIDE CHANNEL DESIGN REFERENCE: NV5, 2015, SUMMIT EDEN PHASE 1E/1F/1G, ROADWAY TYPICAL SECTIONS, SHEET 1.05, DATE SUBMITTED 7-7-2015, UPDATED 9-17-2015

ROCKERY DESIGN 5
CONCEPTUAL CROSS-SECTION
APPLY TO SINGLE TIER ROCKERY
ABOVE ROAD, CUT SLOPE
APPROXIMATE SCALE: 1"=5' (11X17 ONLY)

REV		DATE	BY	CHK

REVISIONS

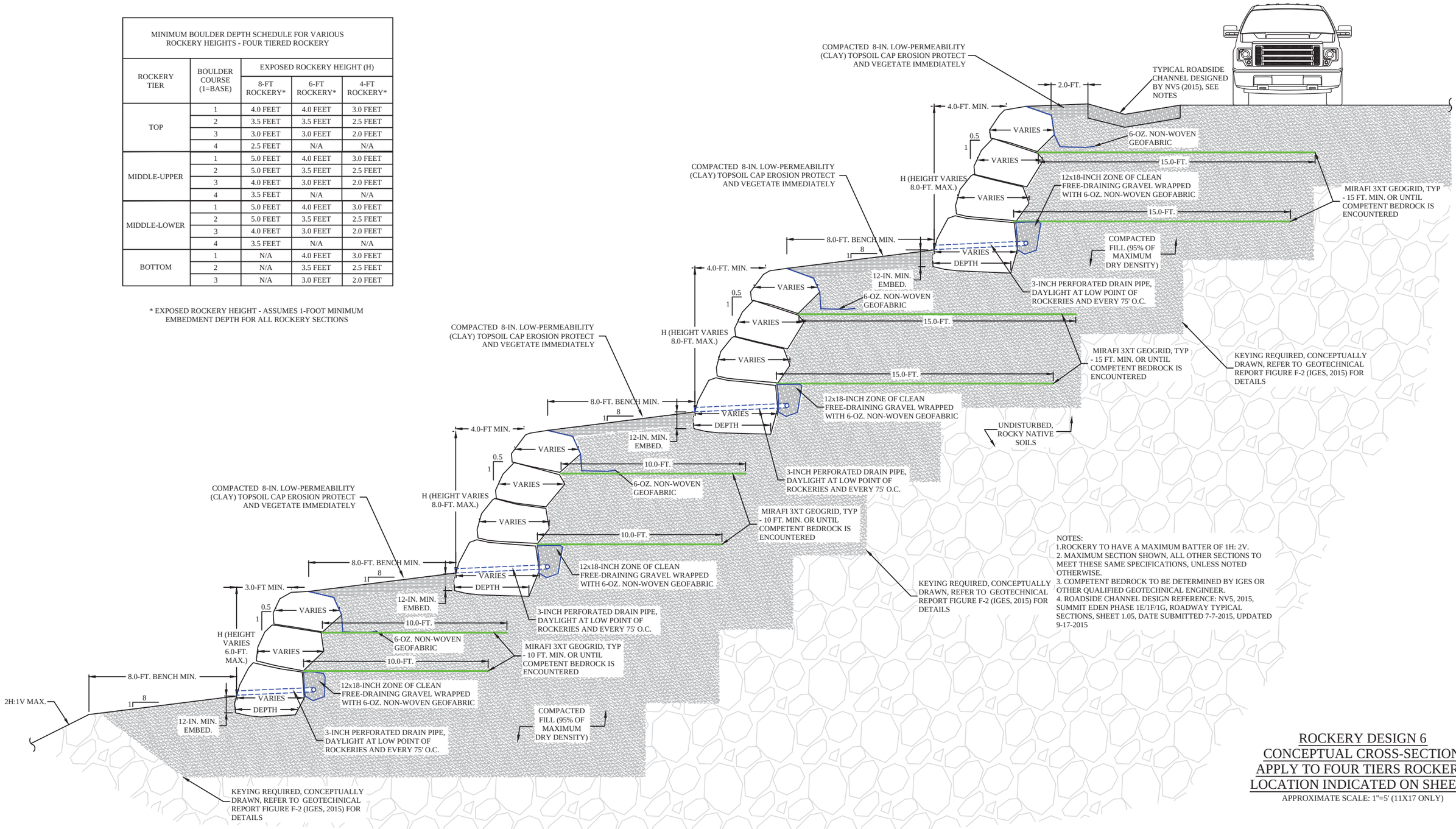
IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
TYPICAL SECTION VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE	1=1
DRAWN BY:	SL	OCT 1, 2015		
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE	1"=5'
APPROVED BY:	DAG	OCT 1, 2015		
IGES PROJECT NO. 01628-011		SHEET NO. 3.e	REV. N/A	

MINIMUM BOULDER DEPTH SCHEDULE FOR VARIOUS ROCKERY HEIGHTS - FOUR TIERED ROCKERY				
ROCKERY TIER	BOULDER COURSE (1=BASE)	EXPOSED ROCKERY HEIGHT (H)		
		8-FT ROCKERY*	6-FT ROCKERY*	4-FT ROCKERY*
TOP	1	4.0 FEET	4.0 FEET	3.0 FEET
	2	3.5 FEET	3.5 FEET	2.5 FEET
	3	3.0 FEET	3.0 FEET	2.0 FEET
	4	2.5 FEET	N/A	N/A
MIDDLE-UPPER	1	5.0 FEET	4.0 FEET	3.0 FEET
	2	5.0 FEET	3.5 FEET	2.5 FEET
	3	4.0 FEET	3.0 FEET	2.0 FEET
	4	3.5 FEET	N/A	N/A
MIDDLE-LOWER	1	5.0 FEET	4.0 FEET	3.0 FEET
	2	5.0 FEET	3.5 FEET	2.5 FEET
	3	4.0 FEET	3.0 FEET	2.0 FEET
	4	3.5 FEET	N/A	N/A
BOTTOM	1	N/A	4.0 FEET	3.0 FEET
	2	N/A	3.5 FEET	2.5 FEET
	3	N/A	3.0 FEET	2.0 FEET

* EXPOSED ROCKERY HEIGHT - ASSUMES 1-FOOT MINIMUM EMBEDMENT DEPTH FOR ALL ROCKERY SECTIONS



ROCKERY DESIGN 6
CONCEPTUAL CROSS-SECTION
APPLY TO FOUR TIERS ROCKERY
LOCATION INDICATED ON SHEET 2

APPROXIMATE SCALE: 1"=5' (11X17 ONLY)

REV		DATE	BY	CHK

REVISIONS

IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
TYPICAL SECTION VIEW

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE 1"=5'
APPROVED BY:	DAG	OCT 1, 2015	
IGES PROJECT NO. 01628-011	SHEET NO. 3.e		REV. N/A

ROCKERY CONSTRUCTION SPECIFICATIONS:

GENERAL

- DESIGN AND CONSTRUCTION INFORMATION IS BASED ON SITE GEOMETRY PROVIDED BY THE CLIENT, THE REFERENCED CONSTRUCTION PLAN, AND THE ENGINEERING ANALYSIS PERFORMED AS PART OF THE SCOPE OF WORK FOR THIS PROJECT.
- CONTRACTOR SHALL LOCATE AND FULLY RESOLVE ALL CONFLICTS WITH EXISTING AND/OR PROPOSED UTILITIES PRIOR TO ROCKERY CONSTRUCTION.
- THE FOLLOWING MEASURES SHALL BE IMPLEMENTED TO REDUCE THE POTENTIAL FOR SATURATION OF THE SOIL BEHIND THE ROCKERY .
- HARDSCAPE, VEGETATION, OR EROSION CONTROL MEASURES SHALL BE ESTABLISHED ABOVE AND BELOW THE ROCKERY IMMEDIATELY FOLLOWING CONSTRUCTION.
- CONDITIONS SUCH AS LEAKY OR BROKEN IRRIGATION LINES AND/OR RUNOFF FROM PRECIPITATION CAN LEAD TO UNDERMINING OR SATURATION OF THE SOIL BEHIND THE ROCKERY, WHICH CAN LEAD TO SLOPE OR ROCKERY DISTRESS AND/OR MOVEMENT. THESE CONDITIONS WERE NOT CONSIDERED IN THE ANALYSIS OF THE ROCKERY AND MUST BE PREVENTED.
- THE OWNER SHALL BE AWARE OF THE RISKS IF THESE OR OTHER CONDITIONS OCCUR THAT COULD SATURATE OR ERODE THE SOIL BEHIND THE ROCKERY.

MATERIALS

- THE FILL ZONE BEHIND AND BELOW THE ROCKERY SHALL CONSIST OF SUITABLE ROCKY NATIVE SOILS OR APPROVED GRANULAR BORROW BACKFILL SOILS AS SHOWN ON THE SECTION VIEWS.
- MATERIAL USED TO FILL IN THE SPACE BETWEEN THE ROCKS AND THE SOIL CUT SHALL CONSIST OF GRANULAR SOILS MEETING THE FOLLOWING CRITERIA:
  - GRANULAR MATERIALS CONTAINING LESS THAN 35% FINES
  - MAXIMUM NOMINAL PARTICLE SIZE OF 4 INCHES
  - REASONABLY FREE FROM ORGANIC OR OTHER DELETERIOUS MATERIALS
- ROCKS TO BE USED AS FACING SHALL BE DURABLE ANGULAR BOULDERS WITH A MINIMUM NOMINAL DIAMETER OF 18 INCHES. ROCK SIZES SHALL MEET ALL MINIMUM DIAMETERS IN ACCORDANCE WITH DESIGN DRAWINGS. ROCKS SHOULD FOLLOW FHWA GUIDELINES:
  - ROCKS SHALL BE HARD, ANGULAR, DURABLE, AND ABLE TO RESIST PHYSICAL, CLIMATIC, AND CHEMICAL DECOMPOSITION.
  - ROCKS SHALL BE ROUGHLY RECTANGULAR, TABULAR, OR CUBIC IN SHAPE; ROUNDED ROCKS AND COBBLES SHOULD NOT BE USED.
  - ROCKS SHOULD CONSIST OF INTACT BLOCKS WITHOUT OPEN FRACTURES, FOLIATION, OR OTHER PLANES OF WEAKNESS
- GEOTEXTILE FABRIC SHALL BE NON-WOVEN AND 6.0-OZ. MIN.

COMPACTION

- BACKFILL SHOULD BE COMPACTED TO 90% OF MAXIMUM DRY DENSITY (MDD) IN LANDSCAPED AREAS AND 95% OF MDD UNDER STRUCTURES AS DETERMINED BY ASTM D1557 (MODIFIED PROCTOR). THE MOISTURE CONTENT FOR ALL BACKFILL SHOULD BE AT OR SLIGHTLY ABOVE THE OPTIMUM MOISTURE CONTENT (OMC) AT THE TIME OF PLACEMENT AND COMPACTION BASED ON ASTM D1557 .
- ALL BACKFILL SHOULD BE PLACED IN MAXIMUM 4-INCH LOOSE LIFTS IF COMPACTED BY SMALL HAND-OPERATED COMPACTION EQUIPMENT, MAXIMUM 6-INCH LOOSE LIFTS IF COMPACTED BY LIGHT- TO MEDIUM-DUTY ROLLERS, AND MAXIMUM 10-INCH LOOSE LIFTS IF COMPACTED BY HEAVY-DUTY COMPACTION EQUIPMENT THAT IS CAPABLE OF EFFICIENTLY COMPACTING THE ENTIRE THICKNESS OF THE LIFT.
- ALL BACKFILL SHOULD BE COMPACTED ON A HORIZONTAL PLANE.

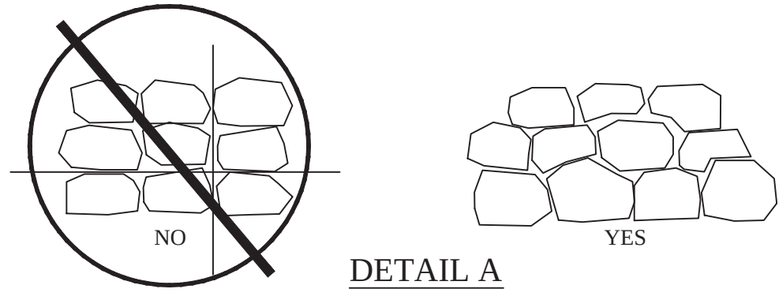
INSTALLATION

- ROCKS SHOULD BE STACKED IN GENERAL ACCORDANCE WITH THE ASSOCIATED ROCKERY CONTRACTORS (ARC) AND FHWA ROCKERY CONSTRUCTION GUIDELINES. ARC GUIDELINES ARE GIVEN ON THIS SHEET (SEE GUIDELINES TO THE RIGHT). FHWA GUIDELINES ARE SUMMARIZED AS FOLLOWS:
  - EACH ROCK SHOULD BEAR ON AT LEAST TWO OTHER ROCKS BELOW
  - EACH ROCK SHOULD HAVE AT LEAST THREE BEARING POINTS - TWO IN FRONT AND ONE IN BACK
  - THE FRONT-MOST BEARING POINTS FOR EACH ROCK SHOULD BE WITHIN 6 INCHES OF THE AVERAGE FACE OF THE ROCKERY
  - THE REAR OF THE ROCKS SHOULD BE ALIGNED ALONG AN IMAGINARY VERTICAL PLANE. IF ROCKS LARGER THAN THE MINIMUM SPECIFIED DIAMETERS ARE USED, THEY CAN EXTEND BEYOND THIS IMAGINARY PLANE PROVIDED THEY DO NOT INTERFERE WITH ROCKERY DRAINAGE
  - THE TOPS OF EACH ROCK SHOULD BE SLOPED BACK AT LEAST 5% TOWARDS THE BACK OF THE ROCKERY
- ROCK FACING SHOULD BE STACKED AT A MAXIMUM STEEPNESS OF 1 HORIZONTAL TO 2 VERTICAL.
- THE BOTTOM ROW OF ROCKS SHOULD BE BURIED (EMBEDDED) A MINIMUM DEPTH OF 12 INCHES FOR ALL ROCKERIES.
- ALL BACKFILL SOILS SHALL CONSIST OF FREE DRAINING GRANULAR SOILS.
- ROCKERY CONSTRUCTION SHOULD BE OBSERVED AT REGULAR INTERVALS BY IGES TO ACCOMMODATE FINAL CONSTRUCTION OBSERVATION AND ACCEPTANCE LETTER.
- THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING THE CONSTRUCTION OBSERVATIONS AND QUALITY CONTROL.

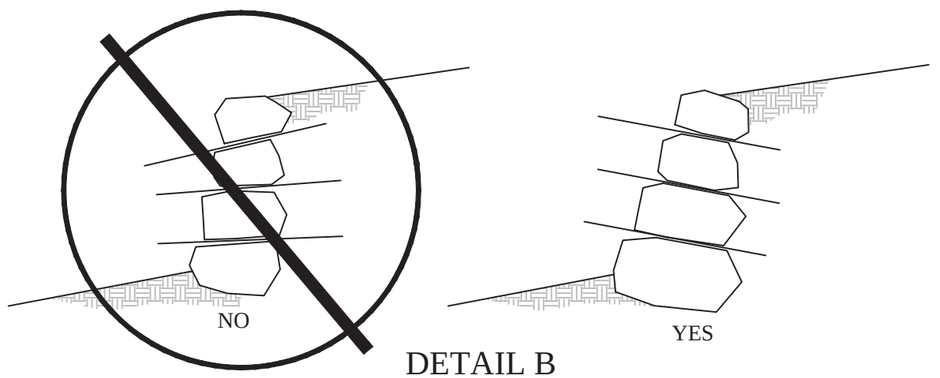
ROCK STACKING CONSTRUCTION GUIDELINES:

ROCKS SHOULD BE STACKED IN GENERAL ACCORDANCE WITH FHWA AND THE ASSOCIATED ROCKERY CONTRACTORS (ARC) ROCKERY CONSTRUCTION GUIDELINES, SUMMARIZED AS FOLLOWS:

- *ROCKS SHOULD BE PLACED SO THAT THERE ARE NO CONTINUOUS JOINT PLANES IN EITHER THE VERTICAL OR LATERAL DIRECTION (SEE DETAIL A)*
- *WHEREVER POSSIBLE, EACH ROCK SHOULD BEAR ON AT LEAST TWO ROCKS BELOW IT.*
- *THE UPPER PLANE OF EACH ROCK BETWEEN COURSES (THE TOP SURFACE OF ROCK), SHOULD SLOPE BACK TOWARDS THE SLOPE FACE AND AWAY FROM THE FACE OF THE ROCK WALL (SEE DETAIL B)*



DETAIL A



DETAIL B

REV		DATE	BY	CHK

REVISIONS

IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
SPECIFICATIONS & GUIDELINES

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE NTS
APPROVED BY:	DAG	OCT 1, 2015	

IGES PROJECT NO. 01628-011 | SHEET NO. 4 | REV. N/A

ASSUMED SOIL CONDITIONS USED IN DESIGN			
EARTH MATERIALS	FRICTION ANGLE	COHESION	UNIT WEIGHT
STRUCTURAL FILL	36°	50 PSF	130 PCF
ROCKY COLLUVIUM	44°	0 PSF	135 PCF

SOURCES & NOTES:
1. IGES, 2015, GEOTECHNICAL INVESTIGATION, SUMMIT EDEN PHASE 1E, SUMMIT AT POWDER MOUNTAIN RESORT, WEBER COUNTY, UTAH, IGES PROJECT NO. 01628-001, DATED AUG 10, 2015, DRAFT
2. COHESION WAS USED IN GLOBAL STABILITY ANALYSES ONLY

ROCKERY ANALYSIS USED IN DESIGN	
ANALYSIS	DESIGN REFERENCES/SOFTWARE
EXTERNAL/INTERNAL STABILITY	MACK, D.A., SANDERS, S.H., MILLHONE, W.L., FIPPIN, R.L., AND KENNEDY, D.G., 2006, ROCKERY DESIGN AND CONSTRUCTION GUILDELINES, SANDERS & ASSOCIATES GEOSTRUCTURAL ENGINEERING, INC., REPORT NO. FHWA-CFL/TD-06-006, REPORT DATED NOVEMBER 2006
GLOBAL STABILITY	SLIDE: ROCSCIENCE, INC., 1998-2015, VERSION 6.034, BUILD DATE MARCH 10, 2015

SEISMIC PARAMETERS USED IN DESIGN			
SEISMIC CRITERIA	PEAK GROUND ACCELERATION (A_S)	GLOBAL STABILITY (k_h)	EXTERNAL/INTERNAL STABILITY (k_h)
7% IN 75 YEARS	0.26g	0.10g (GLOBAL)	0.10g

SOURCES & NOTES:
1. U.S. GEOLOGICAL SURVEY, 2012, U.S. SEISMIC DESIGNMAPS WEB APPLICATION, SITE: http://earthquake.usgs.gov/designmaps/us/application.php, ACCESSED 8-13-2015
2. A MAXIMUM ALLOWABLE SEISMIC DISPLACEMENT THRESHOLD OF 3 INCHES WAS USED TO ESTABLISH THE HORIZONTAL SEISMIC ACCELERATION COEFFICIENT IN ACCORDANCE WITH AASHTO LRFD METHODOLOGY (SEE BRIDGE DESIGN MANUAL CHAPTER 11-20).

REV		DATE	BY	CHK

REVISIONS

IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

ROCKERY DESIGN PACKAGE
PHASE 1E, 1F, AND 1G - SUMMIT POWDER MOUNTAIN
WEBER COUNTY, UTAH
DESIGN CRITERIA

DESIGNED BY:	SL	OCT 1, 2015	PLOT SCALE 1=1
DRAWN BY:	SL	OCT 1, 2015	
CHECKED BY:	DAG	OCT 1, 2015	DWG SCALE NTS
APPROVED BY:	DAG	OCT 1, 2015	

IGES PROJECT NO. 01628-011 | SHEET NO. 5 | REV. N/A

SECTION 2.1

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 1

PROJECT NO.: 01628-011 **SECTION: LOWER TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: MIDDLE TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.7	OK
Overturning	2.0	4.5	OK
Individual Rock Sliding	1.5	1.6	OK
Bearing Capacity	2.0	5.2	OK
Seismic Overturning	1.5	2.3	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	8.8	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	1108	lbf/ft	(Horizontal Surcharge Load)
W_s =	8	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.833	q_{max} =	2,969	psf	$e_{s,s}$ =	-0.147	FS_{BC} = 5.2
e_s =	**-0.847**	q_{ult} =	15,417	psf	$q_{max,s}$ =	1,756	$FS_{BC,s}$ = 8.8

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	5.0	0.7	3.5	9.0	7,052	32,045	2,128	3,237	5,153	5,234	9,153	14,962	33,790	34,446	2.5	3.7	1.7	2.3
2	5.0	0.6	2.75	7.7	4,558	23,531	1,678	2,425	2,630	2,676	5,481	10,046	24,720	25,185	1.6	4.5	1.1	2.5
3	4.0	0.7	2.8	4.9	2,599	14,837	905	1,287	1,480	1,499	1,972	4,618	15,222	15,371	1.6	7.7	1.2	3.3
4	3.5	0.6	2.1	2.1	1,024	6,450	314	441	572	576	310	1,405	6,510	6,533	1.8	21.0	1.3	4.7
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.2 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 1

PROJECT NO.: 01628-011 **SECTION: MIDDLE TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: UPPER TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.7	OK
Overturning	2.0	4.5	OK
Individual Rock Sliding	1.5	1.6	OK
Bearing Capacity	2.0	5.2	OK
Seismic Overturning	1.5	2.3	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	8.8	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	1108	lbf/ft	(Horizontal Surcharge Load)
W_s =	8	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.833	q_{max} =	2,969	psf	$e_{s,s}$ =	-0.147	FS_{BC} = 5.2
e_s =	**-0.847**	q_{ult} =	15,417	psf	$q_{max,s}$ =	1,756	$FS_{BC,s}$ = 8.8

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	5.0	0.7	3.5	9.0	7,052	32,045	2,128	3,237	5,153	5,234	9,153	14,962	33,790	34,446	**2.5**	**3.7**	**1.7**	**2.3**
2	5.0	0.6	2.75	7.7	4,558	23,531	1,678	2,425	2,630	2,676	5,481	10,046	24,720	25,185	**1.6**	**4.5**	**1.1**	**2.5**
3	4.0	0.7	2.8	4.9	2,599	14,837	905	1,287	1,480	1,499	1,972	4,618	15,222	15,371	**1.6**	**7.7**	**1.2**	**3.3**
4	3.5	0.6	2.1	2.1	1,024	6,450	314	441	572	576	310	1,405	6,510	6,533	**1.8**	**21.0**	**1.3**	**4.7**
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	**N/A**	**N/A**	**N/A**	**N/A**
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	**N/A**	**N/A**	**N/A**	**N/A**
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	**N/A**	**N/A**	**N/A**	**N/A**
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	**N/A**	**N/A**	**N/A**	**N/A**

11.2 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 1

PROJECT NO.: 01628-011 **SECTION: UPPER TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: TRAFFIC**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.192		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	1.8	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.251	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.2	OK
Overturning	2.0	7.2	OK
Individual Rock Sliding	1.5	2.3	OK
Bearing Capacity	2.0	9.4	OK
Seismic Overturning	1.5	1.9	OK
Seismic Sliding	1.1	1.6	OK
Seismic Bearing Capacity	1.5	9.4	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	250	psf					
x_s =	7	ft	(Distance from soil cut)	F_s =	327	lbf/ft	(Horizontal Surcharge Load)
W_s =	9	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,638	psf	$e_{s,s}$ =	0.331	FS_{BC} = 9.4
e_s =	**-0.358**	q_{ult} =	15,357	psf		1,630	$FS_{BC,s}$ = 9.4

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	9.0	3,971	13,383	1,293	2,046	2,985	3,058	4,695	8,119	14,748	15,234	2.5	3.2	1.6	1.9
2	3.5	0.6	2.1	5.7	2,396	9,035	594	980	1,383	1,405	1,326	3,142	9,474	9,638	2.3	7.2	1.4	3.1
3	3.0	0.7	2.1	3.6	1,373	5,785	285	482	781	790	421	1,478	5,932	5,987	2.7	14.1	1.6	4.1
4	2.5	0.6	1.5	1.5	506	2,341	81	143	283	284	54	468	2,362	2,370	3.5	43.5	2.0	5.1
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.5 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 2

PROJECT NO.: 01628-011 **SECTION: LOWER TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: UPPER TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.7	OK
Overturning	2.0	4.5	OK
Individual Rock Sliding	1.5	1.6	OK
Bearing Capacity	2.0	5.2	OK
Seismic Overturning	1.5	2.3	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	8.8	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	1108	lbf/ft	(Horizontal Surcharge Load)
W_s =	8	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.833	q_{max} =	2,969	psf	$e_{s,s}$ =	-0.147	FS_{BC} = 5.2
e_s =	**-0.847**	q_{ult} =	15,417	psf	$q_{max,s}$ =	1,756	$FS_{BC,s}$ = 8.8

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	5.0	0.7	3.5	9.0	7,052	32,045	2,128	3,237	5,153	5,234	9,153	14,962	33,790	34,446	2.5	3.7	1.7	2.3
2	5.0	0.6	2.75	7.7	4,558	23,531	1,678	2,425	2,630	2,676	5,481	10,046	24,720	25,185	1.6	4.5	1.1	2.5
3	4.0	0.7	2.8	4.9	2,599	14,837	905	1,287	1,480	1,499	1,972	4,618	15,222	15,371	1.6	7.7	1.2	3.3
4	3.5	0.6	2.1	2.1	1,024	6,450	314	441	572	576	310	1,405	6,510	6,533	1.8	21.0	1.3	4.7
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.2 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 2

PROJECT NO.: 01628-011 **SECTION: UPPER TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: TRAFFIC**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.192		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	1.8	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.251	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.2	OK
Overturning	2.0	7.2	OK
Individual Rock Sliding	1.5	2.3	OK
Bearing Capacity	2.0	9.4	OK
Seismic Overturning	1.5	1.9	OK
Seismic Sliding	1.1	1.6	OK
Seismic Bearing Capacity	1.5	9.4	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	250	psf					
x_s =	7	ft	(Distance from soil cut)	F_s =	327	lbf/ft	(Horizontal Surcharge Load)
W_s =	9	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,638	psf	$e_{s,s}$ =	0.331	FS_{BC} = 9.4
e_s =	**-0.358**	q_{ult} =	15,357	psf		1,630	$FS_{BC,s}$ = 9.4

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	9.0	3,971	13,383	1,293	2,046	2,985	3,058	4,695	8,119	14,748	15,234	2.5	3.2	1.6	1.9
2	3.5	0.6	2.1	5.7	2,396	9,035	594	980	1,383	1,405	1,326	3,142	9,474	9,638	2.3	7.2	1.4	3.1
3	3.0	0.7	2.1	3.6	1,373	5,785	285	482	781	790	421	1,478	5,932	5,987	2.7	14.1	1.6	4.1
4	2.5	0.6	1.5	1.5	506	2,341	81	143	283	284	54	468	2,362	2,370	3.5	43.5	2.0	5.1
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.5 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 3

PROJECT NO.: 01628-011 **SECTION: LOWER TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: UPPER TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.7	OK
Overturning	2.0	4.5	OK
Individual Rock Sliding	1.5	1.6	OK
Bearing Capacity	2.0	5.2	OK
Seismic Overturning	1.5	2.3	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	8.8	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	1108	lbf/ft	(Horizontal Surcharge Load)
W_s =	8	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.833	q_{max} =	2,969	psf	$e_{s,s}$ =	-0.147	FS_{BC} = 5.2
e_s =	**-0.847**	q_{ult} =	15,417	psf	$q_{max,s}$ =	1,756	$FS_{BC,s}$ = 8.8

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	5.0	0.7	3.5	9.0	7,052	32,045	2,128	3,237	5,153	5,234	9,153	14,962	33,790	34,446	2.5	3.7	1.7	2.3
2	5.0	0.6	2.75	7.7	4,558	23,531	1,678	2,425	2,630	2,676	5,481	10,046	24,720	25,185	1.6	4.5	1.1	2.5
3	4.0	0.7	2.8	4.9	2,599	14,837	905	1,287	1,480	1,499	1,972	4,618	15,222	15,371	1.6	7.7	1.2	3.3
4	3.5	0.6	2.1	2.1	1,024	6,450	314	441	572	576	310	1,405	6,510	6,533	1.8	21.0	1.3	4.7
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.2 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 3

PROJECT NO.: 01628-011 **SECTION: UPPER TIER - 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: N/A**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.279		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	26.6	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.440	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.4	OK
External Overturning	2.0	3.6	OK
Overturning	2.0	9.0	OK
Individual Rock Sliding	1.5	2.5	OK
Bearing Capacity	2.0	7.3	OK
Seismic Overturning	1.5	1.6	OK
Seismic Sliding	1.1	1.3	OK
Seismic Bearing Capacity	1.5	6.5	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	0	psf					
x_s =	7	ft	(Distance from soil cut)	F_s =	0	lbf/ft	(Horizontal Surcharge Load)
W_s =	9	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,967	psf	$e_{s,s}$ =	0.617	FS_{BC} = 7.3
e_s =	**-0.526**	q_{ult} =	14,400	psf	$q_{max,s}$ =	2,236	$FS_{BC,s}$ = 6.5

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	9.0	3,971	13,383	1,408	2,687	3,079	3,263	4,225	10,484	15,336	16,566	2.4	3.6	1.3	1.6
2	3.5	0.6	2.1	5.7	2,396	9,035	565	1,161	1,412	1,470	1,073	3,610	9,676	10,090	2.5	9.0	1.3	2.8
3	3.0	0.7	2.1	3.6	1,373	5,785	225	506	792	816	270	1,509	6,000	6,138	3.5	22.2	1.6	4.1
4	2.5	0.6	1.5	1.5	506	2,341	39	116	285	289	20	447	2,372	2,391	7.3	121.3	2.5	5.4
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.5 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 4

PROJECT NO.: 01628-011 **SECTION: 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: TRAFFIC**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.192		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	1.8	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.251	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.2	OK
Overturning	2.0	7.2	OK
Individual Rock Sliding	1.5	2.3	OK
Bearing Capacity	2.0	9.4	OK
Seismic Overturning	1.5	1.9	OK
Seismic Sliding	1.1	1.6	OK
Seismic Bearing Capacity	1.5	9.4	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	250	psf					
x_s =	7	ft	(Distance from soil cut)	F_s =	327	lbf/ft	(Horizontal Surcharge Load)
W_s =	9	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,638	psf	$e_{s,s}$ =	0.331	FS_{BC} = 9.4
e_s =	**-0.358**	q_{ult} =	15,357	psf		1,630	$FS_{BC,s}$ = 9.4

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	9.0	3,971	13,383	1,293	2,046	2,985	3,058	4,695	8,119	14,748	15,234	2.5	3.2	1.6	1.9
2	3.5	0.6	2.1	5.7	2,396	9,035	594	980	1,383	1,405	1,326	3,142	9,474	9,638	2.3	7.2	1.4	3.1
3	3.0	0.7	2.1	3.6	1,373	5,785	285	482	781	790	421	1,478	5,932	5,987	2.7	14.1	1.6	4.1
4	2.5	0.6	1.5	1.5	506	2,341	81	143	283	284	54	468	2,362	2,370	3.5	43.5	2.0	5.1
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.5 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1G/1F - ROCKERY DESIGN 5

PROJECT NO.: 01628-011 **SECTION: 8-FT EXPOSED**

DATE: 8/18/2015 **SURCHARGE: N/A**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.279		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	26.6	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.440	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.4	OK
External Overturning	2.0	3.6	OK
Overturning	2.0	9.0	OK
Individual Rock Sliding	1.5	2.5	OK
Bearing Capacity	2.0	7.3	OK
Seismic Overturning	1.5	1.6	OK
Seismic Sliding	1.1	1.3	OK
Seismic Bearing Capacity	1.5	6.5	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	0	psf					
x_s =	7	ft	(Distance from soil cut)	F_s =	0	lbf/ft	(Horizontal Surcharge Load)
W_s =	9	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,967	psf	$e_{s,s}$ =	0.617	FS_{BC} = 7.3
e_s =	-0.526	q_{ult} =	14,400	psf		2,236	$FS_{BC,s}$ = 6.5

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	9.0	3,971	13,383	1,408	2,687	3,079	3,263	4,225	10,484	15,336	16,566	2.4	3.6	1.3	1.6
2	3.5	0.6	2.1	5.7	2,396	9,035	565	1,161	1,412	1,470	1,073	3,610	9,676	10,090	2.5	9.0	1.3	2.8
3	3.0	0.7	2.1	3.6	1,373	5,785	225	506	792	816	270	1,509	6,000	6,138	3.5	22.2	1.6	4.1
4	2.5	0.6	1.5	1.5	506	2,341	39	116	285	289	20	447	2,372	2,391	7.3	121.3	2.5	5.4
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.5 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 6

PROJECT NO.: 01628-011 **SECTION: MIDDLE-LOWER TIER - 8-FT EXPOSED**

DATE: 9/28/2015 **SURCHARGE: MIDDLE-UPPER TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.7	OK
Overturning	2.0	4.5	OK
Individual Rock Sliding	1.5	1.6	OK
Bearing Capacity	2.0	5.2	OK
Seismic Overturning	1.5	2.3	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	8.8	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	1108	lbf/ft	(Horizontal Surcharge Load)
W_s =	8	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.833	q_{max} =	2,969	psf	$e_{s,s}$ =	-0.147	FS_{BC} = 5.2
e_s =	**-0.847**	q_{ult} =	15,417	psf	$q_{max,s}$ =	1,756	$FS_{BC,s}$ = 8.8

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	5.0	0.7	3.5	9.0	7,052	32,045	2,128	3,237	5,153	5,234	9,153	14,962	33,790	34,446	2.5	3.7	1.7	2.3
2	5.0	0.6	2.75	7.7	4,558	23,531	1,678	2,425	2,630	2,676	5,481	10,046	24,720	25,185	1.6	4.5	1.1	2.5
3	4.0	0.7	2.8	4.9	2,599	14,837	905	1,287	1,480	1,499	1,972	4,618	15,222	15,371	1.6	7.7	1.2	3.3
4	3.5	0.6	2.1	2.1	1,024	6,450	314	441	572	576	310	1,405	6,510	6,533	1.8	21.0	1.3	4.7
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.2 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 6

PROJECT NO.: 01628-011 **SECTION: MIDDLE-UPPER TIER - 8-FT EXPOSED**

DATE: 9/28/2015 **SURCHARGE: TOP TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.7	OK
Overturning	2.0	4.5	OK
Individual Rock Sliding	1.5	1.6	OK
Bearing Capacity	2.0	5.2	OK
Seismic Overturning	1.5	2.3	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	8.8	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	1108	lbf/ft	(Horizontal Surcharge Load)
W_s =	8	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.833	q_{max} =	2,969	psf	$e_{s,s}$ =	-0.147	FS_{BC} = 5.2
e_s =	**-0.847**	q_{ult} =	15,417	psf	$q_{max,s}$ =	1,756	$FS_{BC,s}$ = 8.8

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	5.0	0.7	3.5	9.0	7,052	32,045	2,128	3,237	5,153	5,234	9,153	14,962	33,790	34,446	2.5	3.7	1.7	2.3
2	5.0	0.6	2.75	7.7	4,558	23,531	1,678	2,425	2,630	2,676	5,481	10,046	24,720	25,185	1.6	4.5	1.1	2.5
3	4.0	0.7	2.8	4.9	2,599	14,837	905	1,287	1,480	1,499	1,972	4,618	15,222	15,371	1.6	7.7	1.2	3.3
4	3.5	0.6	2.1	2.1	1,024	6,450	314	441	572	576	310	1,405	6,510	6,533	1.8	21.0	1.3	4.7
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.2 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 6

PROJECT NO.: 01628-011 **SECTION: TOP TIER - 8-FT EXPOSED**

DATE: 9/28/2015 **SURCHARGE: TRAFFIC**

Rockery Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Rockery
H_R =	8	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.192		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	1.8	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.251	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	3.2	OK
Overturning	2.0	7.2	OK
Individual Rock Sliding	1.5	2.3	OK
Bearing Capacity	2.0	9.4	OK
Seismic Overturning	1.5	1.9	OK
Seismic Sliding	1.1	1.6	OK
Seismic Bearing Capacity	1.5	9.4	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	4.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	250	psf					
x_s =	7	ft	(Distance from soil cut)	F_s =	327	lbf/ft	(Horizontal Surcharge Load)
W_s =	9	ft	(Width of Strip Load)	y_s =	5.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,638	psf	$e_{s,s}$ =	0.331	FS_{BC} = 9.4
e_s =	**-0.358**	q_{ult} =	15,357	psf		1,630	$FS_{BC,s}$ = 9.4

Rocks = 4 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	9.0	3,971	13,383	1,293	2,046	2,985	3,058	4,695	8,119	14,748	15,234	2.5	3.2	1.6	1.9
2	3.5	0.6	2.1	5.7	2,396	9,035	594	980	1,383	1,405	1,326	3,142	9,474	9,638	2.3	7.2	1.4	3.1
3	3.0	0.7	2.1	3.6	1,373	5,785	285	482	781	790	421	1,478	5,932	5,987	2.7	14.1	1.6	4.1
4	2.5	0.6	1.5	1.5	506	2,341	81	143	283	284	54	468	2,362	2,370	3.5	43.5	2.0	5.1
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.5 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

PROJECT: SUMMIT EDEN PHASE 1E/1F/1G - ROCKERY DESIGN 6

PROJECT NO.: 01628-011 **SECTION: BOTTOM TIER 6-FT EXPOSED**

DATE: 9/28/2015 **SURCHARGE: MIDDLE-LOWER TIER ROCKERY AND SOIL**

Rockery Geometry & Soil Data:

H_{total} =	7	ft	Total Height of Rockery
H_R =	6	ft	Exposed Height of Rockery
ϕ_s =	36	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	130	pcf	Unit weight of the soil
γ_R =	150	pcf	Unit weight of the rock
δ =	24.0	deg	Interface Friction Angle
ψ =	7.1	deg	Back Cut Inclination
μ =	0.70		Frictional Component
μ_{rock} =	0.55		Rock-to-Rock Friction
K_A =	0.202		Active Earth Pressure Coefficient
ν =	63.4	deg	Rockery Face Angle

Slope Geometry:

Backslope:	β =	7.1	deg	Backslope Angle
Soil Cut Angle:	α =	82.9	deg	Soil Cut Angle
Rockery Face Slope:	1	H	2	V

Seismic Earth Pressure Coefficient:

(Mack et al., 2006)

A =	0.26	Peak Ground acceleration (7% in 75 years)
d =	3	in (Allowable Displacement)
k_h =	0.10	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.90	
K_{AE} =	0.269	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.7	OK
External Overturning	2.0	3.3	OK
Overturning	2.0	7.1	OK
Individual Rock Sliding	1.5	2.1	OK
Bearing Capacity	2.0	11.4	OK
Seismic Overturning	1.5	2.1	OK
Seismic Sliding	1.1	1.8	OK
Seismic Bearing Capacity	1.5	12.3	OK

Surcharge:

Uniform: Uniform Applied Surcharge

q_s =	0	psf	
F_s =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_s =	3.5	ft	(Surcharge load centroid)

Strip: Strip Load (Boussinesq Equation for Strip Loading)

q_s =	1040	psf					
x_s =	8	ft	(Distance from soil cut)	F_s =	470	lbf/ft	(Horizontal Surcharge Load)
W_s =	4	ft	(Width of Strip Load)	y_s =	5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_{max} =	0.667	q_{max} =	1,377	psf	$e_{s,s}$ =	0.214	FS_{BC} = 11.4
e_s =	**-0.294**	q_{ult} =	15,719	psf	$q_{max,s}$ =	1,282	$FS_{BC,s}$ = 12.3

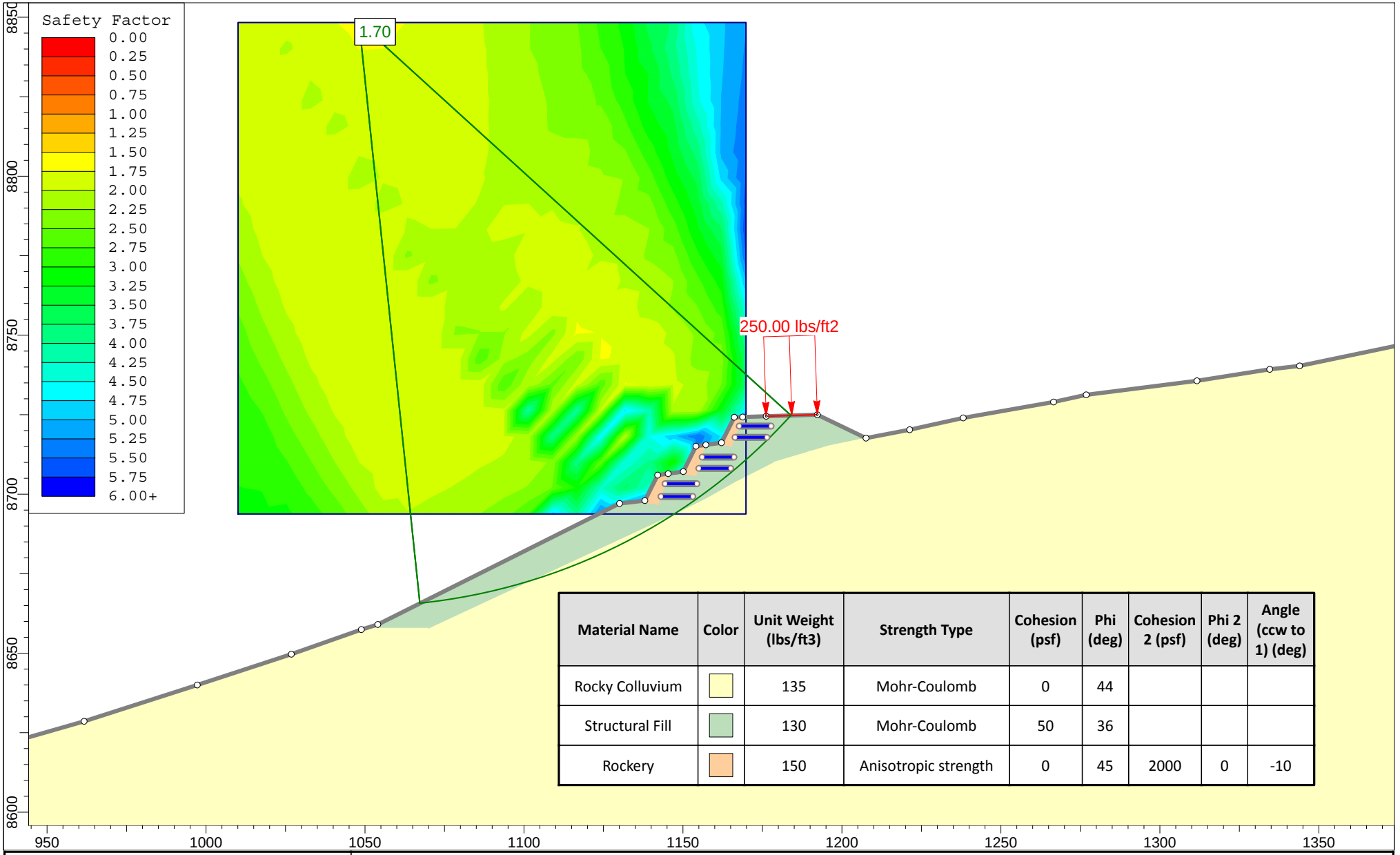
Rocks = 3 (R* - Boulder Height to Width Ratio)

Boulder	B' (ft)	R*	H_R (ft)	H-H' (ft)	ΣW_i	$\Sigma W_i * x_i$	F_H	$F_{H,s}$	F_μ	$F_{\mu,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	4.0	0.7	2.8	7.0	3,636	11,672	1,087	1,693	2,676	2,725	3,789	6,046	12,558	12,874	2.7	3.3	1.8	2.1
2	3.5	0.7	2.45	4.6	2,061	7,492	566	876	1,177	1,193	1,090	2,417	7,783	7,897	2.1	7.1	1.4	3.3
3	3.0	0.7	2.1	2.1	866	3,595	197	307	486	489	187	777	3,647	3,667	2.5	19.5	1.6	4.7
4	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

7.4 Total Estimated Height of Rockery

(See Mack, et. al [2006], Rockery Design and Construction Guidelines, Report No. FHWA-CFL/TD-06-006, Report Dated November 2006 - for term definitions and equations)

SECTION 2.2



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 1-1'		
Drawn By	SL	Scale	1:500
Company	IGES, INC.		
Date	9-25-2015	File Name	Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent

Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.703070
Center: 1048.112, 8848.310
Radius: 183.664
Left Slip Surface Endpoint: 1067.248, 8665.645
Right Slip Surface Endpoint: 1183.995, 8724.745
Resisting Moment=2.28096e+007 lb-ft
Driving Moment=1.33932e+007 lb-ft
Resisting Horizontal Force=109008 lb
Driving Horizontal Force=64006.8 lb
Total Slice Area=1175.56 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4286
Number of Invalid Surfaces: 554

Error Codes:

Error Code -103 reported for 60 surfaces
Error Code -106 reported for 5 surfaces
Error Code -108 reported for 116 surfaces
Error Code -111 reported for 272 surfaces
Error Code -112 reported for 101 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.70307

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.91546	599.858	Structural Fill	50	36	94.251	160.516	152.112	0	152.112
2	4.91546	1756.43	Structural Fill	50	36	202.268	344.477	405.314	0	405.314
3	4.91546	2826.19	Structural Fill	50	36	296.032	504.164	625.102	0	625.102
4	4.91546	3808.02	Structural Fill	50	36	376.502	641.21	813.731	0	813.731
5	4.91546	4700.54	Structural Fill	50	36	444.525	757.057	973.182	0	973.182
6	4.91546	5502.15	Structural Fill	50	36	500.849	852.981	1105.21	0	1105.21
7	4.91546	6210.99	Structural Fill	50	36	546.137	930.109	1211.37	0	1211.37
8	4.64238	6439.98	Rocky Colluvium	0	44	751.396	1279.68	1325.15	0	1325.15
9	4.64238	6919.81	Rocky Colluvium	0	44	782.839	1333.23	1380.6	0	1380.6
10	4.64238	7312.19	Rocky Colluvium	0	44	802.134	1366.09	1414.63	0	1414.63
11	4.64238	7614.53	Rocky Colluvium	0	44	809.949	1379.4	1428.41	0	1428.41
12	4.64238	7823.87	Rocky Colluvium	0	44	806.884	1374.18	1423	0	1423
13	4.64238	7936.86	Rocky Colluvium	0	44	793.473	1351.34	1399.35	0	1399.35
14	4.64238	7530.43	Rocky Colluvium	0	44	729.588	1242.54	1286.69	0	1286.69
15	4.64238	6469.13	Rocky Colluvium	0	44	607.174	1034.06	1070.8	0	1070.8
16	4.64238	8973.17	Rocky Colluvium	0	44	815.474	1388.81	1438.15	0	1438.15
17	4.64238	8413.92	Rocky Colluvium	0	44	739.928	1260.15	1304.92	0	1304.92
18	4.48943	7580.95	Structural Fill	50	36	536.428	913.574	1188.61	0	1188.61
19	4.48943	9809.03	Structural Fill	50	36	666.25	1134.67	1492.92	0	1492.92
20	4.48943	7956.1	Structural Fill	50	36	529.666	902.058	1172.76	0	1172.76
21	4.48943	8482.76	Structural Fill	50	36	545.709	929.38	1210.36	0	1210.36
22	4.48943	8845.63	Structural Fill	50	36	549.723	936.216	1219.77	0	1219.77
23	4.48943	6381.05	Structural Fill	50	36	390.598	665.216	846.772	0	846.772
24	4.48943	3953.67	Structural Fill	50	36	289.719	493.411	610.303	0	610.303
25	4.48943	1349.21	Structural Fill	50	36	156.031	265.731	296.928	0	296.928

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.70307

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1067.25	8665.65	0	0	0
2	1072.16	8666.23	375.276	203.386	28.4561
3	1077.08	8666.94	1080.01	585.324	28.456
4	1081.99	8667.8	2003.13	1085.62	28.456
5	1086.91	8668.79	3048.43	1652.14	28.4561
6	1091.83	8669.92	4133.11	2240	28.4561
7	1096.74	8671.2	5186.63	2810.97	28.4561
8	1101.66	8672.62	6149.7	3332.92	28.4561
9	1106.3	8674.11	7677.4	4160.88	28.4561
10	1110.94	8675.73	9079.12	4920.56	28.4561
11	1115.58	8677.49	10315.3	5590.51	28.4561
12	1120.23	8679.4	11355.1	6154.04	28.456
13	1124.87	8681.45	12176.2	6599.06	28.4561
14	1129.51	8683.67	12764.6	6917.95	28.4561
15	1134.15	8686.05	13095.9	7097.52	28.4561
16	1138.8	8688.59	13189.4	7148.17	28.4561
17	1143.44	8691.32	13058.1	7077.03	28.4561
18	1148.08	8694.24	12693.7	6879.51	28.456
19	1152.57	8697.24	11529.7	6248.7	28.4562
20	1157.06	8700.45	9739.39	5278.4	28.4561
21	1161.55	8703.86	8114.44	4397.73	28.4561
22	1166.04	8707.5	6159.84	3338.41	28.4561
23	1170.53	8711.39	3891.61	2109.11	28.4561
24	1175.02	8715.54	2132.76	1155.88	28.4561
25	1179.51	8719.98	750.193	406.578	28.4561
26	1184	8724.74	0	0	0

List Of Coordinates

Distributed Load

X	Y
1192.24	8725
1176.19	8724.5

External Boundary

X	Y
1176.19	8724.5

1168.79	8724.28
1166.15	8724.2
1162.13	8716.16
1157.2	8715.51
1154.09	8715.09
1150.1	8707.12
1145.36	8706.46
1142.04	8706.01
1138.02	8697.98
1130.07	8697.08
1054.01	8659.02
1048.84	8657.42
1026.85	8649.69
997.268	8640
961.646	8628.56
941.224	8622.71
918.085	8616.03
918.063	8511.08
1374.81	8511.08
1374.81	8746.76
1343.95	8740.33
1334.56	8739.27
1311.67	8735.66
1276.84	8731.24
1266.54	8728.99
1238.16	8723.97
1221.32	8720.27
1207.57	8717.63
1192.24	8725

Material Boundary

X	Y
1054.01	8659.02
1054.98	8657.88
1069.98	8657.88
1149.54	8694.92
1157.71	8699
1166.21	8703.85
1178.29	8710
1189.81	8713.38
1195.91	8715.24
1207.57	8717.63

Material Boundary

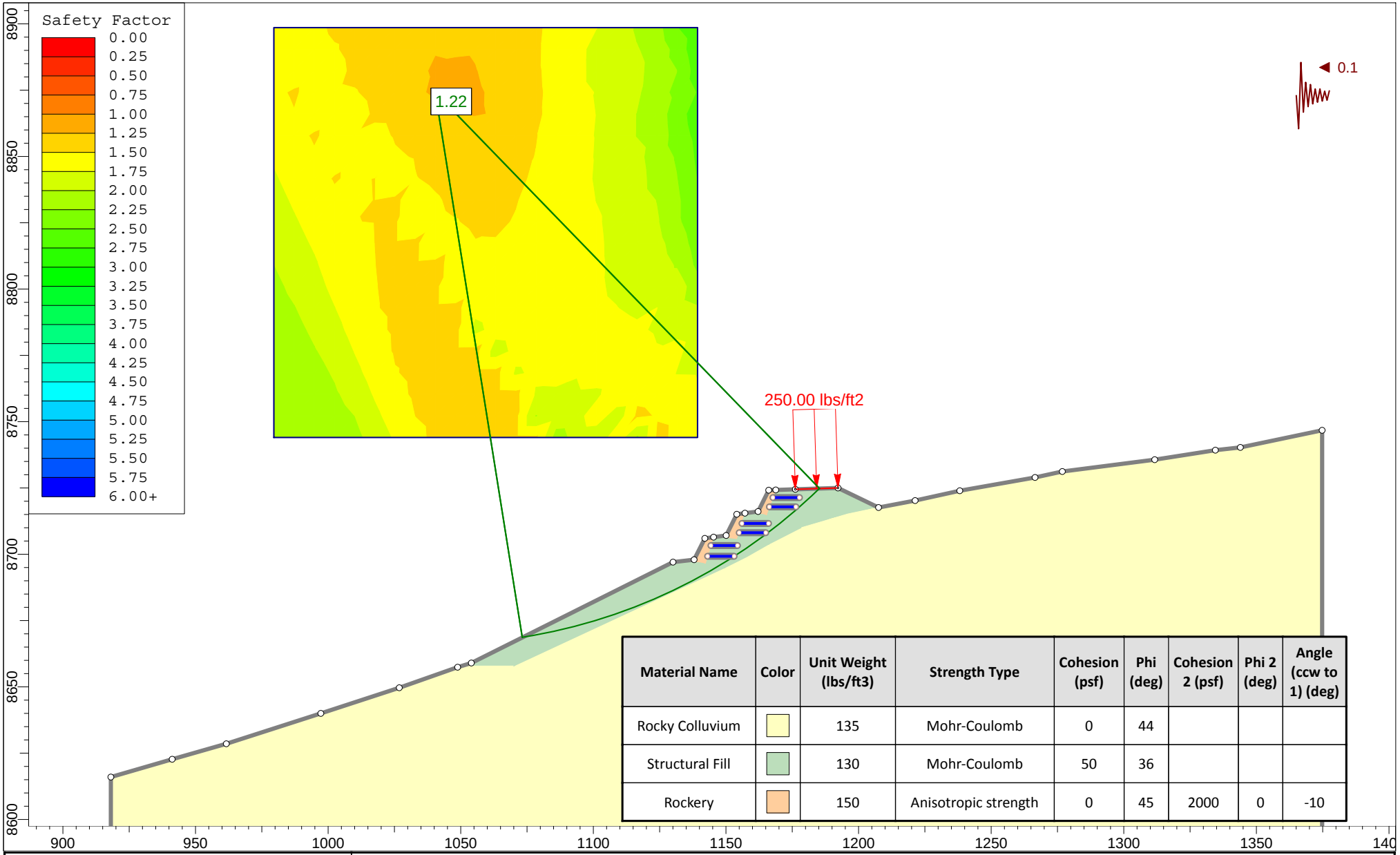
X	Y
1138.02	8697.98
1137.57	8697.09
1142.24	8696.61
1145.36	8706.46

Material Boundary

X	Y
1150.1	8707.12
1149.63	8706.17
1154.26	8705.59
1157.2	8715.51

Material Boundary

X	Y
1162.13	8716.16
1161.68	8715.27
1165.28	8714.88
1168.79	8724.28



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 1-1'		
Drawn By	SL	Scale 1:600	Company IGES, INC.
Date	9-25-2015		File Name P-static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
1 Distributed Load present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear

Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.217890
Center: 1040.399, 8874.208
Radius: 208.176
Left Slip Surface Endpoint: 1073.227, 8668.637
Right Slip Surface Endpoint: 1185.349, 8724.787
Resisting Moment=1.81994e+007 lb-ft
Driving Moment=1.49433e+007 lb-ft
Resisting Horizontal Force=76656.7 lb
Driving Horizontal Force=62942.2 lb
Total Slice Area=967.383 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4565
Number of Invalid Surfaces: 275

Error Codes:

Error Code -106 reported for 28 surfaces
Error Code -108 reported for 86 surfaces
Error Code -111 reported for 157 surfaces
Error Code -112 reported for 4 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep

seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.21789

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.4849	430.714	Structural Fill	50	36	120.775	147.091	133.634	0	133.634
2	4.4849	1262.56	Structural Fill	50	36	239.611	291.82	332.836	0	332.836
3	4.4849	2034.85	Structural Fill	50	36	342.393	416.997	505.129	0	505.129
4	4.4849	2746.78	Structural Fill	50	36	430.254	524.002	652.408	0	652.408
5	4.4849	3397.43	Structural Fill	50	36	504.222	614.087	776.4	0	776.4
6	4.4849	3985.76	Structural Fill	50	36	565.232	688.391	878.668	0	878.668
7	4.4849	4510.6	Structural Fill	50	36	614.135	747.949	960.645	0	960.645
8	4.4849	4970.67	Structural Fill	50	36	651.708	793.709	1023.63	0	1023.63
9	4.4849	5364.51	Structural Fill	50	36	678.662	826.536	1068.81	0	1068.81
10	4.4849	5690.52	Structural Fill	50	36	695.651	847.226	1097.29	0	1097.29
11	4.4849	5946.9	Structural Fill	50	36	703.273	856.509	1110.06	0	1110.06
12	4.4849	6131.69	Structural Fill	50	36	702.081	855.057	1108.07	0	1108.07
13	4.4849	6188.95	Structural Fill	50	36	687.016	836.71	1082.81	0	1082.81
14	4.4849	5442.3	Structural Fill	50	36	591.384	720.241	922.507	0	922.507
15	4.4849	5322.34	Structural Fill	50	36	561.923	684.36	873.12	0	873.12
16	4.4849	7954.76	Structural Fill	50	36	792.956	965.733	1260.4	0	1260.4
17	4.4849	6517.03	Structural Fill	50	36	637.255	776.107	999.4	0	999.4
18	4.4849	7459.67	Structural Fill	50	36	700.665	853.333	1105.69	0	1105.69
19	4.4849	8579.99	Structural Fill	50	36	774.194	942.883	1228.95	0	1228.95
20	4.4849	6901.18	Structural Fill	50	36	610.616	743.663	954.744	0	954.744
21	4.4849	8839.21	Structural Fill	50	36	745.394	907.808	1180.67	0	1180.67
22	4.4849	7781.89	Structural Fill	50	36	639.015	778.25	1002.35	0	1002.35
23	4.4849	5678.41	Structural Fill	50	36	464.677	565.926	710.111	0	710.111
24	4.4849	3501.38	Structural Fill	50	36	377.004	459.149	563.145	0	563.145
25	4.4849	1190.51	Structural Fill	50	36	204.159	248.643	273.409	0	273.409

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.21789

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1073.23	8668.64	0	0	0
2	1077.71	8669.4	397.097	274.017	34.6076
3	1082.2	8670.27	1058.43	730.366	34.6075
4	1086.68	8671.24	1902.82	1313.04	34.6076
5	1091.17	8672.32	2859.74	1973.36	34.6076

6	1095.65	8673.5	3868.35	2669.35	34.6076
7	1100.14	8674.79	4876.69	3365.15	34.6075
8	1104.62	8676.19	5840.99	4030.57	34.6076
9	1109.11	8677.7	6725.06	4640.62	34.6076
10	1113.59	8679.32	7499.76	5175.2	34.6076
11	1118.08	8681.07	8142.62	5618.8	34.6075
12	1122.56	8682.93	8637.47	5960.28	34.6076
13	1127.05	8684.92	8974.16	6192.6	34.6075
14	1131.53	8687.04	9148.46	6312.88	34.6076
15	1136.02	8689.29	9184.62	6337.84	34.6076
16	1140.5	8691.68	9091.18	6273.36	34.6076
17	1144.99	8694.21	8666.57	5980.36	34.6076
18	1149.47	8696.89	8197.69	5656.8	34.6075
19	1153.95	8699.73	7461.4	5148.73	34.6076
20	1158.44	8702.73	6391.8	4410.65	34.6075
21	1162.92	8705.91	5413.29	3735.43	34.6075
22	1167.41	8709.27	3913.04	2700.19	34.6076
23	1171.89	8712.82	2444.61	1686.9	34.6076
24	1176.38	8716.58	1295.62	894.038	34.6075
25	1180.86	8720.56	431.144	297.51	34.6075
26	1185.35	8724.79	0	0	0

List Of Coordinates

Distributed Load

X	Y
1192.24	8725
1176.19	8724.5

External Boundary

X	Y
1176.19	8724.5
1168.79	8724.28
1166.15	8724.2
1162.13	8716.16
1157.2	8715.51
1154.09	8715.09
1150.1	8707.12
1145.36	8706.46
1142.04	8706.01
1138.02	8697.98
1130.07	8697.08
1054.01	8659.02
1048.84	8657.42

1026.85	8649.69
997.268	8640
961.646	8628.56
941.224	8622.71
918.085	8616.03
918.063	8511.08
1374.81	8511.08
1374.81	8746.76
1343.95	8740.33
1334.56	8739.27
1311.67	8735.66
1276.84	8731.24
1266.54	8728.99
1238.16	8723.97
1221.32	8720.27
1207.57	8717.63
1192.24	8725

Material Boundary

X	Y
1054.01	8659.02
1054.98	8657.88
1069.98	8657.88
1149.54	8694.92
1157.71	8699
1166.21	8703.85
1178.29	8710
1189.81	8713.38
1195.91	8715.24
1207.57	8717.63

Material Boundary

X	Y
1138.02	8697.98
1137.57	8697.09
1142.24	8696.61
1145.36	8706.46

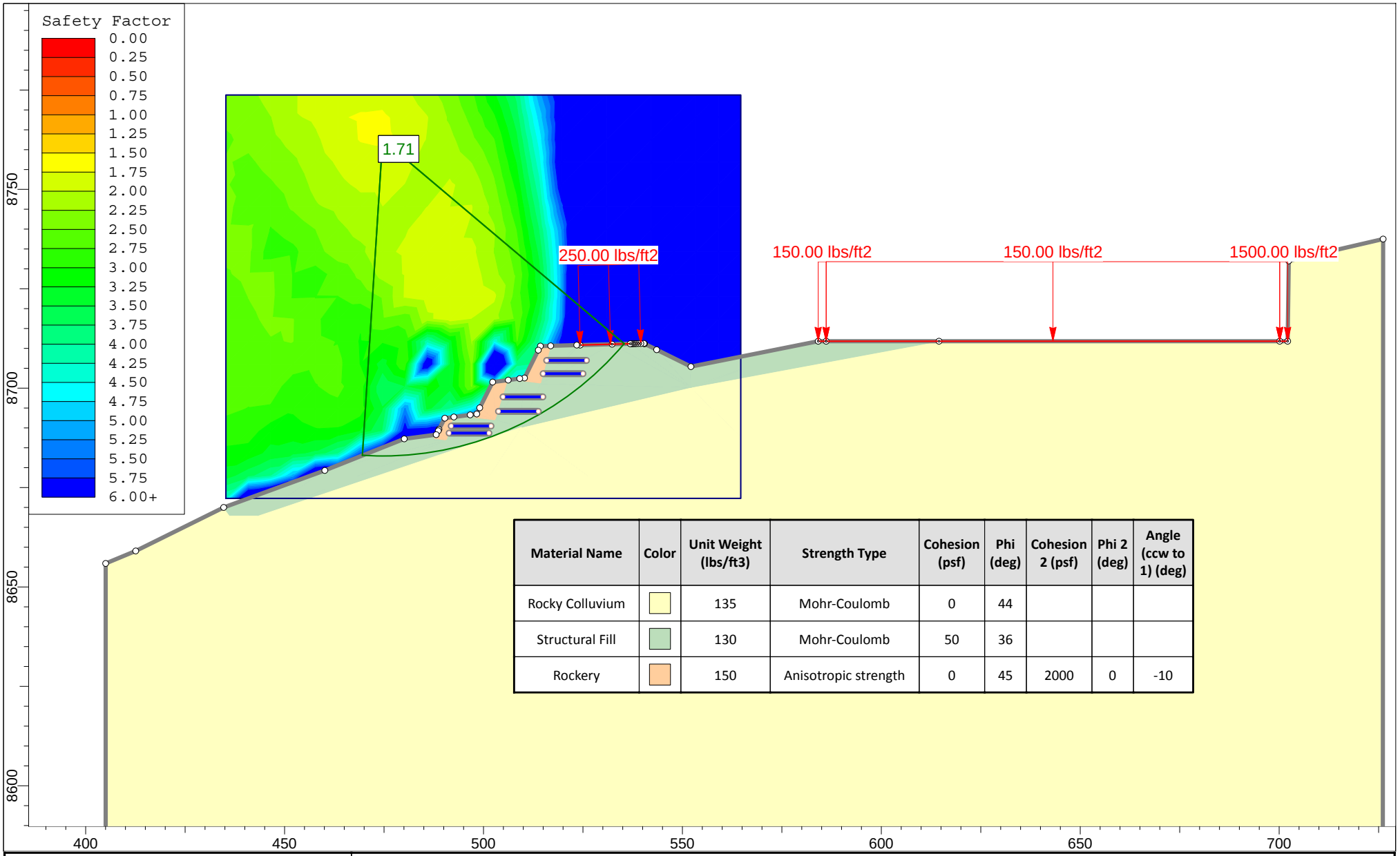
Material Boundary

X	Y
1150.1	8707.12
1149.63	8706.17
1154.26	8705.59

1157.2	8715.51

Material Boundary

X	Y
1162.13	8716.16
1161.68	8715.27
1165.28	8714.88
1168.79	8724.28



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 2-2'		
Drawn By	SL	*Scale* 1:400	*Company* IGES, INC.
Date	9-25-2015	*File Name*	Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

4 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 150
Orientation: Normal to boundary

Distributed Load 3

Distribution: Constant
Magnitude [psf]: 150
Orientation: Normal to boundary

Distributed Load 4

Distribution: Constant
Magnitude [psf]: 1500
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000

Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.707330
Center: 474.649, 8762.474
Radius: 79.553
Left Slip Surface Endpoint: 469.575, 8683.083
Right Slip Surface Endpoint: 535.423, 8711.139
Resisting Moment=4.26176e+006 lb-ft
Driving Moment=2.49615e+006 lb-ft
Resisting Horizontal Force=47569.1 lb
Driving Horizontal Force=27861.7 lb
Total Slice Area=531.088 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3528
Number of Invalid Surfaces: 1488

Error Codes:

Error Code -103 reported for 7 surfaces
Error Code -105 reported for 1 surface
Error Code -106 reported for 15 surfaces
Error Code -107 reported for 141 surfaces
Error Code -108 reported for 130 surfaces
Error Code -109 reported for 2 surfaces
Error Code -111 reported for 277 surfaces
Error Code -112 reported for 915 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-109 = Soiltype for slice base not located. This error should occur very rarely, if at all. It may occur if a very low number of slices is combined with certain soil geometries, such that the midpoint of a slice base is actually outside the soil region,even though the slip surface is wholly within the soil region.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.70733

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.6339	200.509	Structural Fill	50	36	78.6656	134.308	116.04	0	116.04
2	2.6339	586.572	Structural Fill	50	36	154.089	263.08	293.28	0	293.28
3	2.6339	942.745	Structural Fill	50	36	218.694	373.383	445.096	0	445.096
4	2.6339	1269.02	Structural Fill	50	36	273.455	466.878	573.782	0	573.782
5	2.6339	1443.54	Structural Fill	50	36	297.038	507.142	629.204	0	629.204
6	2.6339	1468.45	Structural Fill	50	36	292.643	499.639	618.876	0	618.876
7	2.6339	1465.59	Structural Fill	50	36	283.623	484.238	597.676	0	597.676
8	2.6339	2332.45	Structural Fill	50	36	419.142	715.613	916.137	0	916.137
9	2.6339	2804.23	Structural Fill	50	36	482.78	824.264	1065.68	0	1065.68
10	2.6339	2585.23	Structural Fill	50	36	434.568	741.951	952.388	0	952.388
11	2.6339	2470.28	Structural Fill	50	36	404.578	690.748	881.912	0	881.912
12	2.6339	3513.94	Structural Fill	50	36	545.918	932.063	1214.05	0	1214.05
13	2.6339	4957.13	Structural Fill	50	36	735.083	1255.03	1658.59	0	1658.59

14	2.6339	4593.75	Structural Fill	50	36	662.942	1131.86	1489.05	0	1489.05
15	2.6339	4138.71	Structural Fill	50	36	582.04	993.735	1298.94	0	1298.94
16	2.6339	4136.88	Structural Fill	50	36	563.887	962.742	1256.28	0	1256.28
17	2.6339	5567.81	Structural Fill	50	36	725.302	1238.33	1635.6	0	1635.6
18	2.6339	5822.29	Structural Fill	50	36	732.536	1250.68	1652.59	0	1652.59
19	2.6339	5038.24	Structural Fill	50	36	616.284	1052.2	1379.41	0	1379.41
20	2.6339	4442.58	Structural Fill	50	36	527.719	900.99	1171.29	0	1171.29
21	2.6339	3791.21	Structural Fill	50	36	453.346	774.011	996.514	0	996.514
22	2.6339	3078.68	Structural Fill	50	36	416.454	711.024	909.822	0	909.822
23	2.6339	2298.18	Structural Fill	50	36	321.688	549.227	687.128	0	687.128
24	2.6339	1441.06	Structural Fill	50	36	226.079	385.991	462.454	0	462.454
25	2.6339	496.065	Structural Fill	50	36	129.571	221.221	235.665	0	235.665

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.70733

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	469.575	8683.08	0	0	0
2	472.209	8682.96	221.804	98.2702	23.8957
3	474.843	8682.92	638.868	283.05	23.8957
4	477.477	8682.97	1193.04	528.577	23.8958
5	480.111	8683.11	1834.98	812.984	23.8956
6	482.745	8683.33	2476.18	1097.07	23.8957
7	485.379	8683.65	3053.29	1352.76	23.8957
8	488.013	8684.05	3559.69	1577.12	23.8957
9	490.646	8684.55	4211.35	1865.84	23.8958
10	493.28	8685.13	4857.89	2152.28	23.8957
11	495.914	8685.82	5353.47	2371.85	23.8957
12	498.548	8686.6	5732.11	2539.61	23.8957
13	501.182	8687.48	6102.22	2703.58	23.8957
14	503.816	8688.46	6406.86	2838.55	23.8957
15	506.45	8689.55	6526.91	2891.74	23.8957
16	509.084	8690.76	6494.32	2877.3	23.8957
17	511.718	8692.08	6315.68	2798.16	23.8957
18	514.352	8693.54	5853.71	2593.48	23.8957
19	516.985	8695.12	5164.46	2288.11	23.8957
20	519.619	8696.85	4403.45	1950.95	23.8958
21	522.253	8698.74	3586.69	1589.08	23.8957
22	524.887	8700.79	2737.68	1212.93	23.8958
23	527.521	8703.03	1812.3	802.938	23.8957
24	530.155	8705.48	992.447	439.703	23.8957
25	532.789	8708.17	361.388	160.113	23.8957
26	535.423	8711.14	0	0	0

List Of Coordinates

Distributed Load

X	Y
539.566	8711.25
538.921	8711.23
538.381	8711.22
537.923	8711.2
537.53	8711.19
537.188	8711.18
536.888	8711.18
532.333	8711.06
524.325	8710.85

Distributed Load

X	Y
586.154	8711.81
584.154	8711.81

Distributed Load

X	Y
700.154	8711.81
614.503	8711.81
586.154	8711.81

Distributed Load

X	Y
702.154	8711.81
700.154	8711.81

External Boundary

X	Y
480.098	8687.26
460.119	8679.32
434.697	8670
412.587	8659.07
405.046	8655.94
405.046	8531.43
726.028	8531.43
726.153	8737.51
702.425	8732.02

702.154	8711.81
700.154	8711.81
614.503	8711.81
586.154	8711.81
584.154	8711.81
552.154	8705.43
543.525	8709.69
540.491	8711.19
540.34	8711.27
539.566	8711.25
538.921	8711.23
538.381	8711.22
537.923	8711.2
537.53	8711.19
537.188	8711.18
536.888	8711.18
532.333	8711.06
524.325	8710.85
523.452	8710.83
516.903	8710.66
514.316	8710.6
513.799	8709.56
510.312	8702.58
509.115	8702.42
506.237	8702.04
502.304	8701.53
499.073	8695.06
498.3	8693.51
496.671	8693.3
492.566	8692.76
490.293	8692.46
488.823	8689.65
488.635	8689.29
488.119	8688.31

Material Boundary

X	Y
488.119	8688.31
487.655	8687.37
490.86	8686.94
492.566	8692.76

Material Boundary

X	Y

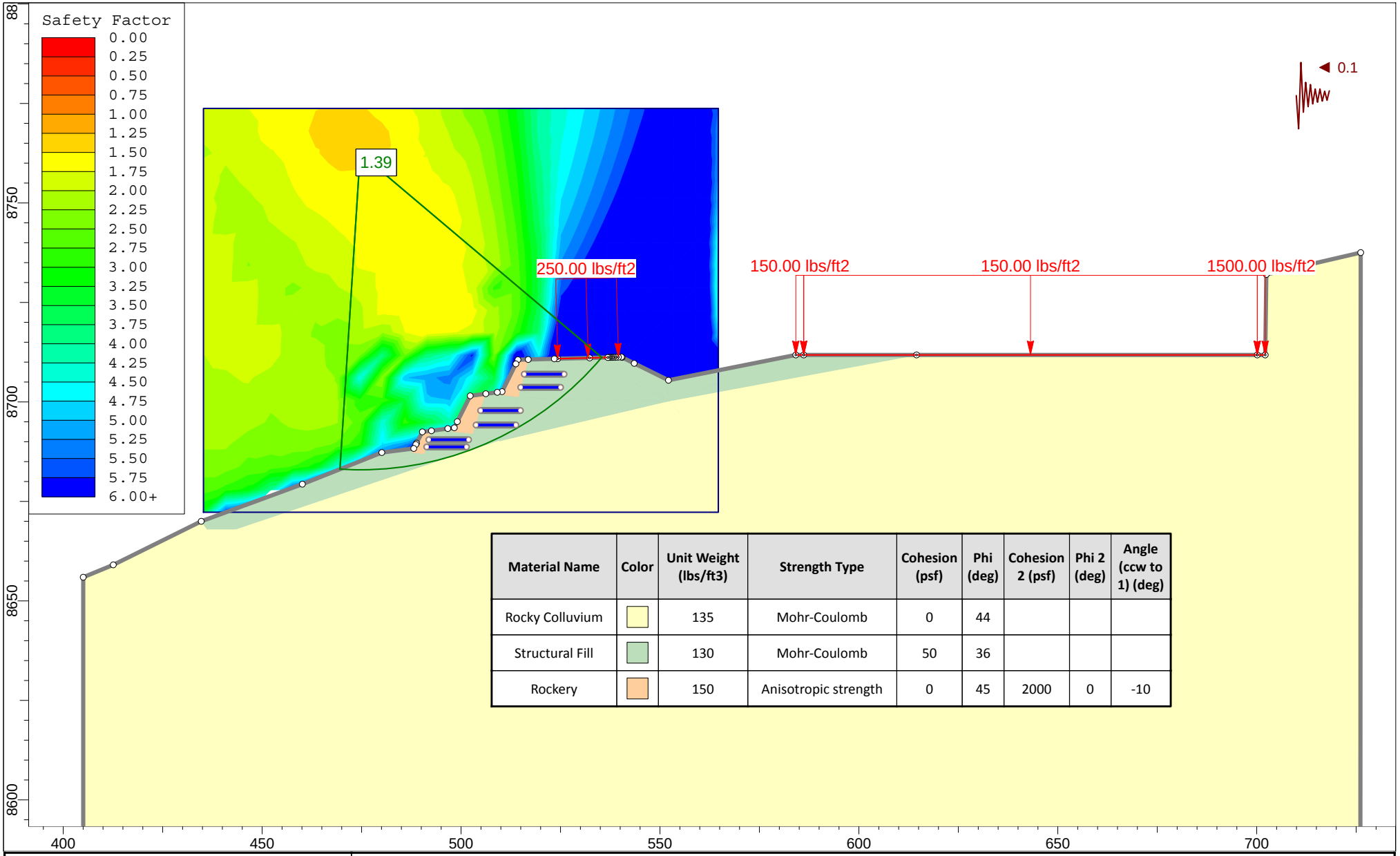
498.3	8693.51
497.854	8692.61
503.091	8692.02
506.237	8702.04

Material Boundary

X	Y
510.312	8702.58
509.865	8701.68
514.323	8701.1
516.903	8710.66

Material Boundary

X	Y
434.697	8670
436.308	8667.85
443.393	8667.85
509.561	8690.19
551.948	8700.19
614.503	8711.81



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 2-2'		
Drawn By	SL	*Scale* 1:400	*Company* IGES, INC.
Date	9-25-2015	*File Name*	P-Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
4 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 150
Orientation: Normal to boundary

Distributed Load 3

Distribution: Constant
Magnitude [psf]: 150
Orientation: Normal to boundary

Distributed Load 4

Distribution: Constant
Magnitude [psf]: 1500
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0

Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.389560
Center: 474.649, 8762.474
Radius: 79.553
Left Slip Surface Endpoint: 469.575, 8683.083
Right Slip Surface Endpoint: 535.423, 8711.139
Resisting Moment=4.1106e+006 lb-ft
Driving Moment=2.95819e+006 lb-ft
Resisting Horizontal Force=46117.2 lb
Driving Horizontal Force=33188.2 lb
Total Slice Area=531.088 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3206
Number of Invalid Surfaces: 1810

Error Codes:

Error Code -103 reported for 7 surfaces
Error Code -105 reported for 1 surface
Error Code -106 reported for 15 surfaces
Error Code -107 reported for 83 surfaces
Error Code -108 reported for 204 surfaces
Error Code -109 reported for 2 surfaces
Error Code -111 reported for 444 surfaces
Error Code -112 reported for 1054 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-109 = Soiltype for slice base not located. This error should occur very rarely, if at all. It may occur if a very low number of slices is combined with certain soil geometries, such that the midpoint of a slice base is actually outside the soil region,even though the slip surface is wholly within the soil region.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.38956

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.6339	200.509	Structural Fill	50	36	110.659	153.767	142.824	0	142.824
2	2.6339	586.572	Structural Fill	50	36	210.805	292.926	334.359	0	334.359
3	2.6339	942.745	Structural Fill	50	36	293.533	407.882	492.58	0	492.58
4	2.6339	1269.02	Structural Fill	50	36	361.122	501.8	621.851	0	621.851
5	2.6339	1443.54	Structural Fill	50	36	386.806	537.49	670.97	0	670.97
6	2.6339	1468.45	Structural Fill	50	36	376.39	523.016	651.052	0	651.052
7	2.6339	1465.59	Structural Fill	50	36	360.621	501.104	620.892	0	620.892
8	2.6339	2332.45	Structural Fill	50	36	525.42	730.103	936.081	0	936.081
9	2.6339	2804.23	Structural Fill	50	36	598.28	831.346	1075.43	0	1075.43
10	2.6339	2585.23	Structural Fill	50	36	533.473	741.293	951.484	0	951.484
11	2.6339	2470.28	Structural Fill	50	36	492.151	683.874	872.454	0	872.454
12	2.6339	3513.94	Structural Fill	50	36	656.732	912.569	1187.22	0	1187.22

13	2.6339	4957.13	Structural Fill	50	36	875.191	1216.13	1605.04	0	1605.04
14	2.6339	4593.75	Structural Fill	50	36	782.888	1087.87	1428.51	0	1428.51
15	2.6339	4138.71	Structural Fill	50	36	682.092	947.808	1235.73	0	1235.73
16	2.6339	4136.88	Structural Fill	50	36	655.567	910.949	1184.99	0	1184.99
17	2.6339	5567.81	Structural Fill	50	36	835.351	1160.77	1528.85	0	1528.85
18	2.6339	5822.29	Structural Fill	50	36	836.898	1162.92	1531.81	0	1531.81
19	2.6339	5038.24	Structural Fill	50	36	699.077	971.41	1268.21	0	1268.21
20	2.6339	4442.58	Structural Fill	50	36	594.329	825.856	1067.88	0	1067.88
21	2.6339	3791.21	Structural Fill	50	36	507.98	705.869	902.728	0	902.728
22	2.6339	3078.68	Structural Fill	50	36	466.813	648.665	823.991	0	823.991
23	2.6339	2298.18	Structural Fill	50	36	359.134	499.038	618.047	0	618.047
24	2.6339	1441.06	Structural Fill	50	36	252.383	350.702	413.882	0	413.882
25	2.6339	496.065	Structural Fill	50	36	146.764	203.938	211.878	0	211.878

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.38956

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	469.575	8683.08	0	0	0
2	472.209	8682.96	289.658	165.394	29.7263
3	474.843	8682.92	799.542	456.536	29.7262
4	477.477	8682.97	1454.96	830.78	29.7263
5	480.111	8683.11	2195.24	1253.48	29.7263
6	482.745	8683.33	2920.13	1667.39	29.7263
7	485.379	8683.65	3561.85	2033.81	29.7263
8	488.013	8684.05	4116.05	2350.25	29.7262
9	490.646	8684.55	4805.87	2744.14	29.7263
10	493.28	8685.13	5471.99	3124.49	29.7262
11	495.914	8685.82	5971.53	3409.73	29.7263
12	498.548	8686.6	6342.41	3621.5	29.7263
13	501.182	8687.48	6678.24	3813.26	29.7263
14	503.816	8688.46	6911.07	3946.2	29.7262
15	506.45	8689.55	6955.77	3971.73	29.7263
16	509.084	8690.76	6850.75	3911.76	29.7263
17	511.718	8692.08	6595.96	3766.28	29.7263
18	514.352	8693.54	6024.01	3439.7	29.7263
19	516.985	8695.12	5220.93	2981.13	29.7262
20	519.619	8696.85	4368.13	2494.19	29.7262
21	522.253	8698.74	3478.89	1986.44	29.7263
22	524.887	8700.79	2588.58	1478.07	29.7262
23	527.521	8703.03	1681.51	960.141	29.7263
24	530.155	8705.48	900.685	514.289	29.7263
25	532.789	8708.17	326.041	186.169	29.7263
26	535.423	8711.14	0	0	0

List Of Coordinates

Distributed Load

X	Y
539.566	8711.25
538.921	8711.23
538.381	8711.22
537.923	8711.2
537.53	8711.19
537.188	8711.18
536.888	8711.18
532.333	8711.06
524.325	8710.85

Distributed Load

X	Y
586.154	8711.81
584.154	8711.81

Distributed Load

X	Y
700.154	8711.81
614.503	8711.81
586.154	8711.81

Distributed Load

X	Y
702.154	8711.81
700.154	8711.81

External Boundary

X	Y
480.098	8687.26
460.119	8679.32
434.697	8670
412.587	8659.07
405.046	8655.94
405.046	8531.43
726.028	8531.43
726.153	8737.51

702.425	8732.02
702.154	8711.81
700.154	8711.81
614.503	8711.81
586.154	8711.81
584.154	8711.81
552.154	8705.43
543.525	8709.69
540.491	8711.19
540.34	8711.27
539.566	8711.25
538.921	8711.23
538.381	8711.22
537.923	8711.2
537.53	8711.19
537.188	8711.18
536.888	8711.18
532.333	8711.06
524.325	8710.85
523.452	8710.83
516.903	8710.66
514.316	8710.6
513.799	8709.56
510.312	8702.58
509.115	8702.42
506.237	8702.04
502.304	8701.53
499.073	8695.06
498.3	8693.51
496.671	8693.3
492.566	8692.76
490.293	8692.46
488.823	8689.65
488.635	8689.29
488.119	8688.31

Material Boundary

X	Y
488.119	8688.31
487.655	8687.37
490.86	8686.94
492.566	8692.76

Material Boundary

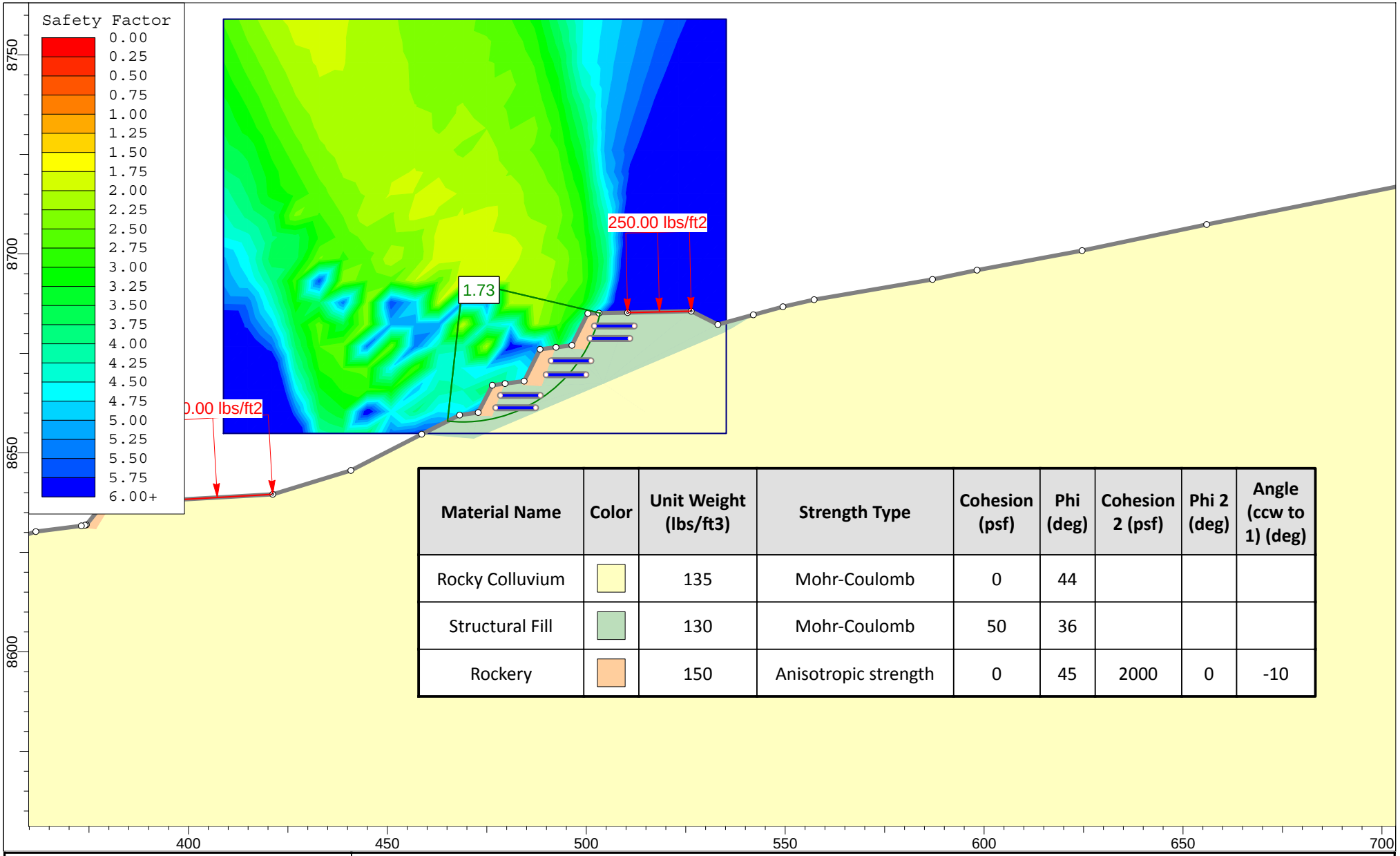
X	Y
498.3	8693.51
497.854	8692.61
503.091	8692.02
506.237	8702.04

Material Boundary

X	Y
510.312	8702.58
509.865	8701.68
514.323	8701.1
516.903	8710.66

Material Boundary

X	Y
434.697	8670
436.308	8667.85
443.393	8667.85
509.561	8690.19
551.948	8700.19
614.503	8711.81



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 3-3'		
Drawn By	SL	Scale 1:400	Company IGES, INC.
Date	9-25-2015		File Name Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.728260
Center: 468.985, 8693.256
Radius: 35.494
Left Slip Surface Endpoint: 465.128, 8657.972
Right Slip Surface Endpoint: 503.534, 8685.117
Resisting Moment=1.11574e+006 lb-ft
Driving Moment=645588 lb-ft
Resisting Horizontal Force=28557.2 lb
Driving Horizontal Force=16523.7 lb
Total Slice Area=255.003 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3871
Number of Invalid Surfaces: 969

Error Codes:

Error Code -103 reported for 496 surfaces
Error Code -107 reported for 30 surfaces
Error Code -108 reported for 66 surfaces
Error Code -111 reported for 125 surfaces
Error Code -112 reported for 252 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between

them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.72826

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	1.53624	91.0256	Structural Fill	50	36	79.6193	137.603	120.575	0	120.575
2	1.53624	266.354	Structural Fill	50	36	144.026	248.914	273.782	0	273.782
3	1.53624	368.8	Structural Fill	50	36	174.05	300.804	345.202	0	345.202
4	1.53624	404.091	Structural Fill	50	36	177.447	306.674	353.282	0	353.282
5	1.53624	429.457	Structural Fill	50	36	177.178	306.21	352.642	0	352.642
6	1.53624	774.534	Structural Fill	50	36	276.226	477.39	588.252	0	588.252
7	1.53624	1417.42	Structural Fill	50	36	453.284	783.393	1009.43	0	1009.43
8	1.53624	1869.07	Structural Fill	50	36	559.168	966.388	1261.3	0	1261.3
9	1.53624	1755.73	Structural Fill	50	36	503.094	869.478	1127.91	0	1127.91
10	1.53624	1608.49	Structural Fill	50	36	442.721	765.137	984.303	0	984.303
11	1.53624	1532.18	Structural Fill	50	36	404.28	698.701	892.861	0	892.861
12	1.53624	1449.56	Structural Fill	50	36	366.98	634.237	804.134	0	804.134
13	1.53624	1442.97	Structural Fill	50	36	496.763	858.536	1112.86	0	1112.86
14	1.53624	1915.15	Structural Fill	50	36	432.186	746.929	959.239	0	959.239
15	1.53624	2449.95	Structural Fill	50	36	518.378	895.892	1164.27	0	1164.27
16	1.53624	2694.54	Structural Fill	50	36	538.755	931.109	1212.75	0	1212.75
			Structural							

			Fill							
18	1.53624	2076.52	Structural Fill	50	36	377.339	652.14	828.773	0	828.773
19	1.53624	1803.38	Structural Fill	50	36	311.413	538.203	671.952	0	671.952
20	1.53624	1528.34	Structural Fill	50	36	348.52	602.333	760.222	0	760.222
21	1.53624	1379.45	Structural Fill	50	36	211.707	365.884	434.776	0	434.776
22	1.53624	1644.98	Structural Fill	50	36	307.545	531.517	662.752	0	662.752
23	1.53624	1859.2	Structural Fill	50	36	225.394	389.539	467.334	0	467.334
24	1.53624	1472.93	Structural Fill	50	36	176.045	304.252	349.949	0	349.949
25	1.53624	525.724	Structural Fill	50	36	68.683	118.702	94.5603	0	94.5603

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.72826

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	465.128	8657.97	0	0	0
2	466.664	8657.84	138.575	83.7852	31.158
3	468.2	8657.77	378.393	228.783	31.1579
4	469.737	8657.77	646.189	390.698	31.1579
5	471.273	8657.84	895.695	541.554	31.1579
6	472.809	8657.97	1121.23	677.913	31.1578
7	474.345	8658.17	1427.9	863.335	31.1579
8	475.881	8658.44	1852.79	1120.23	31.1579
9	477.418	8658.78	2283.71	1380.77	31.1579
10	478.954	8659.19	2591.87	1567.1	31.1581
11	480.49	8659.68	2792.38	1688.33	31.158
12	482.026	8660.24	2908.22	1758.36	31.1579
13	483.563	8660.89	2950.44	1783.89	31.1579
14	485.099	8661.63	4003.85	2420.8	31.1579
15	486.635	8662.46	3871.1	2340.54	31.1579
16	488.171	8663.39	3581.75	2165.59	31.1579
17	489.708	8664.44	3142.81	1900.2	31.1579
18	491.244	8665.61	2652.25	1603.6	31.1579
19	492.78	8666.92	2146.15	1297.6	31.1579
20	494.316	8668.39	1634.39	988.184	31.158
21	495.853	8670.06	2011.42	1216.14	31.1579
22	497.389	8671.97	1506.9	911.098	31.1579
23	498.925	8674.19	1617.28	977.838	31.1579

24	500.461	8676.85	720.617	435.698	31.1579
25	501.998	8680.22	150.992	91.2925	31.1579
26	503.534	8685.12	0	0	0

List Of Coordinates

Distributed Load

X	Y
526.379	8685.61
510.378	8685.26

Distributed Load

X	Y
421.181	8639.59
393.295	8638

External Boundary

X	Y
440.831	8645.59
421.181	8639.59
393.295	8638
380.649	8637.31
378.561	8637.19
374.318	8631.91
373.988	8631.83
373.068	8631.67
361.645	8630.22
359.063	8629.4
355.702	8629.09
346.687	8627.67
336.161	8625
332.942	8624.55
328.731	8623.66
320.329	8621.56
313.544	8619.77
308.424	8619
301.704	8618.47
293.567	8617.14
284.996	8615.9
275.351	8614.1
267.191	8613.02
267.191	8509.63
734.667	8509.63

734.667	8722.08
709.533	8718.07
655.938	8707.4
624.624	8700.84
598.226	8695.91
587.034	8693.6
557.261	8688.49
549.449	8686.73
541.984	8684.7
533.081	8682.27
526.379	8685.61
510.378	8685.26
503.19	8685.11
500.375	8685.05
496.374	8677.04
492.368	8676.54
488.372	8676.03
484.371	8668.03
479.585	8667.42
476.368	8667.02
472.836	8660.14
468.161	8659.51
458.639	8654.69

Material Boundary

X	Y
458.639	8654.69
471.723	8653.68
504.285	8667.49
535.195	8680.55

Material Boundary

X	Y
535.195	8680.55
541.984	8684.7

Material Boundary

X	Y
472.836	8660.14
472.4	8659.27
476.399	8659.17
479.585	8667.42

Material Boundary

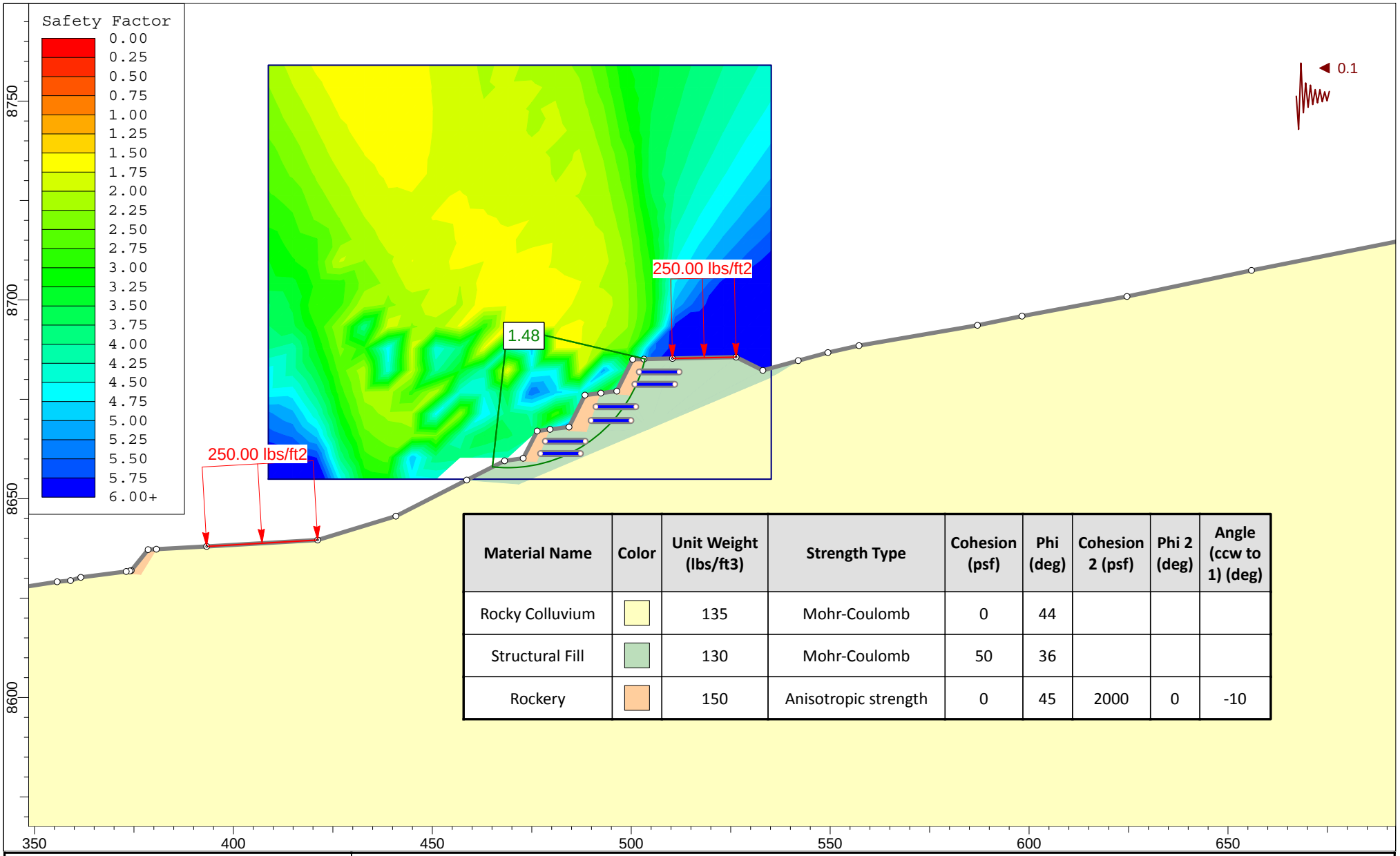
X	Y
484.371	8668.03
483.923	8667.13
488.916	8666.85
492.368	8676.54

Material Boundary

X	Y
496.374	8677.04
495.927	8676.15
499.919	8675.91
503.19	8685.11

Material Boundary

X	Y
374.318	8631.91
373.743	8631.17
376.736	8630.96
380.649	8637.31



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 3-3'		
Drawn By	SL	*Scale* 1:400	*Company* IGES, INC.
Date	9-25-2015	*File Name*	P-Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.483730
Center: 468.985, 8693.256
Radius: 35.494
Left Slip Surface Endpoint: 465.128, 8657.972
Right Slip Surface Endpoint: 503.534, 8685.117
Resisting Moment=1.08422e+006 lb-ft
Driving Moment=730739 lb-ft
Resisting Horizontal Force=28057.1 lb
Driving Horizontal Force=18909.9 lb
Total Slice Area=255.003 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3445
Number of Invalid Surfaces: 1395

Error Codes:

Error Code -103 reported for 496 surfaces
Error Code -107 reported for 9 surfaces
Error Code -108 reported for 107 surfaces
Error Code -111 reported for 358 surfaces
Error Code -112 reported for 425 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.48373

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	1.53624	91.0256	Structural Fill	50	36	113.26	168.048	162.48	0	162.48
2	1.53624	266.354	Structural Fill	50	36	195.964	290.758	331.376	0	331.376
3	1.53624	368.8	Structural Fill	50	36	229.734	340.863	400.339	0	400.339
4	1.53624	404.091	Structural Fill	50	36	228.499	339.031	397.817	0	397.817
5	1.53624	429.457	Structural Fill	50	36	223.158	331.106	386.909	0	386.909
6	1.53624	774.534	Structural Fill	50	36	338.339	502.003	622.13	0	622.13
7	1.53624	1417.42	Structural Fill	50	36	541.789	803.869	1037.61	0	1037.61
8	1.53624	1869.07	Structural Fill	50	36	655.595	972.726	1270.02	0	1270.02
9	1.53624	1755.73	Structural Fill	50	36	580.837	861.806	1117.36	0	1117.36
10	1.53624	1608.49	Structural Fill	50	36	504.092	747.936	960.628	0	960.628
11	1.53624	1532.18	Structural Fill	50	36	454.336	674.112	859.019	0	859.019
12	1.53624	1449.56	Structural Fill	50	36	407.474	604.581	763.318	0	763.318
13	1.53624	1442.97	Structural Fill	50	36	646.433	959.132	1251.31	0	1251.31
14	1.53624	1915.15	Structural Fill	50	36	467.296	693.341	885.483	0	885.483
15	1.53624	2449.95	Structural Fill	50	36	552.921	820.385	1060.35	0	1060.35
			Structural							

			Fill							
17	1.53624	2407.26	Structural Fill	50	36	479.046	710.775	909.478	0	909.478
18	1.53624	2076.52	Structural Fill	50	36	390.56	579.486	728.778	0	728.778
19	1.53624	1803.38	Structural Fill	50	36	319.799	474.495	584.268	0	584.268
20	1.53624	1528.34	Structural Fill	50	36	414.538	615.063	777.744	0	777.744
21	1.53624	1379.45	Structural Fill	50	36	214.965	318.95	370.178	0	370.178
22	1.53624	1644.98	Structural Fill	50	36	352.102	522.425	650.237	0	650.237
23	1.53624	1859.2	Structural Fill	50	36	228.132	338.486	397.066	0	397.066
24	1.53624	1472.93	Structural Fill	50	36	188.058	279.028	315.232	0	315.232
25	1.53624	525.724	Structural Fill	50	36	71.7641	106.479	77.736	0	77.736

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.48373

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	465.128	8657.97	0	0	0
2	466.664	8657.84	186.134	146.669	38.2372
3	468.2	8657.77	481.858	379.693	38.2373
4	469.737	8657.77	797.037	628.045	38.2372
5	471.273	8657.84	1080.31	851.259	38.2373
6	472.809	8657.97	1327.69	1046.19	38.2373
7	474.345	8658.17	1643.58	1295.1	38.2372
8	475.881	8658.44	2051.94	1616.88	38.2373
9	477.418	8658.78	2437.29	1920.52	38.2372
10	478.954	8659.19	2690.27	2119.87	38.2373
11	480.49	8659.68	2832.8	2232.18	38.2373
12	482.026	8660.24	2888.81	2276.31	38.2372
13	483.563	8660.89	2872.37	2263.36	38.2373
14	485.099	8661.63	4088.57	3221.69	38.2372
15	486.635	8662.46	3876.78	3054.81	38.2373
16	488.171	8663.39	3489.18	2749.39	38.2373
17	489.708	8664.44	2949.46	2324.1	38.2372
18	491.244	8665.61	2378.72	1874.37	38.2372
19	492.78	8666.92	1814.01	1429.39	38.2371
20	494.316	8668.39	1262.14	994.535	38.2372
21	495.853	8670.06	1739	1370.29	38.2373

22	497.389	8671.97	1223.57	964.145	38.2373
23	498.925	8674.19	1446.55	1139.84	38.2371
24	500.461	8676.85	553.723	436.32	38.2372
25	501.998	8680.22	26.5325	20.907	38.2373
26	503.534	8685.12	0	0	0

List Of Coordinates

Distributed Load

X	Y
526.379	8685.61
510.378	8685.26

Distributed Load

X	Y
421.181	8639.59
393.295	8638

External Boundary

X	Y
440.831	8645.59
421.181	8639.59
393.295	8638
380.649	8637.31
378.561	8637.19
374.318	8631.91
373.988	8631.83
373.068	8631.67
361.645	8630.22
359.063	8629.4
355.702	8629.09
346.687	8627.67
336.161	8625
332.942	8624.55
328.731	8623.66
320.329	8621.56
313.544	8619.77
308.424	8619
301.704	8618.47
293.567	8617.14
284.996	8615.9
275.351	8614.1
267.191	8613.02

267.191	8509.63
734.667	8509.63
734.667	8722.08
709.533	8718.07
655.938	8707.4
624.624	8700.84
598.226	8695.91
587.034	8693.6
557.261	8688.49
549.449	8686.73
541.984	8684.7
533.081	8682.27
526.379	8685.61
510.378	8685.26
503.19	8685.11
500.375	8685.05
496.374	8677.04
492.368	8676.54
488.372	8676.03
484.371	8668.03
479.585	8667.42
476.368	8667.02
472.836	8660.14
468.161	8659.51
458.639	8654.69

Material Boundary

X	Y
458.639	8654.69
471.723	8653.68
504.285	8667.49
535.195	8680.55

Material Boundary

X	Y
535.195	8680.55
541.984	8684.7

Material Boundary

X	Y
472.836	8660.14
472.4	8659.27
476.399	8659.17

479.585	8667.42

Material Boundary

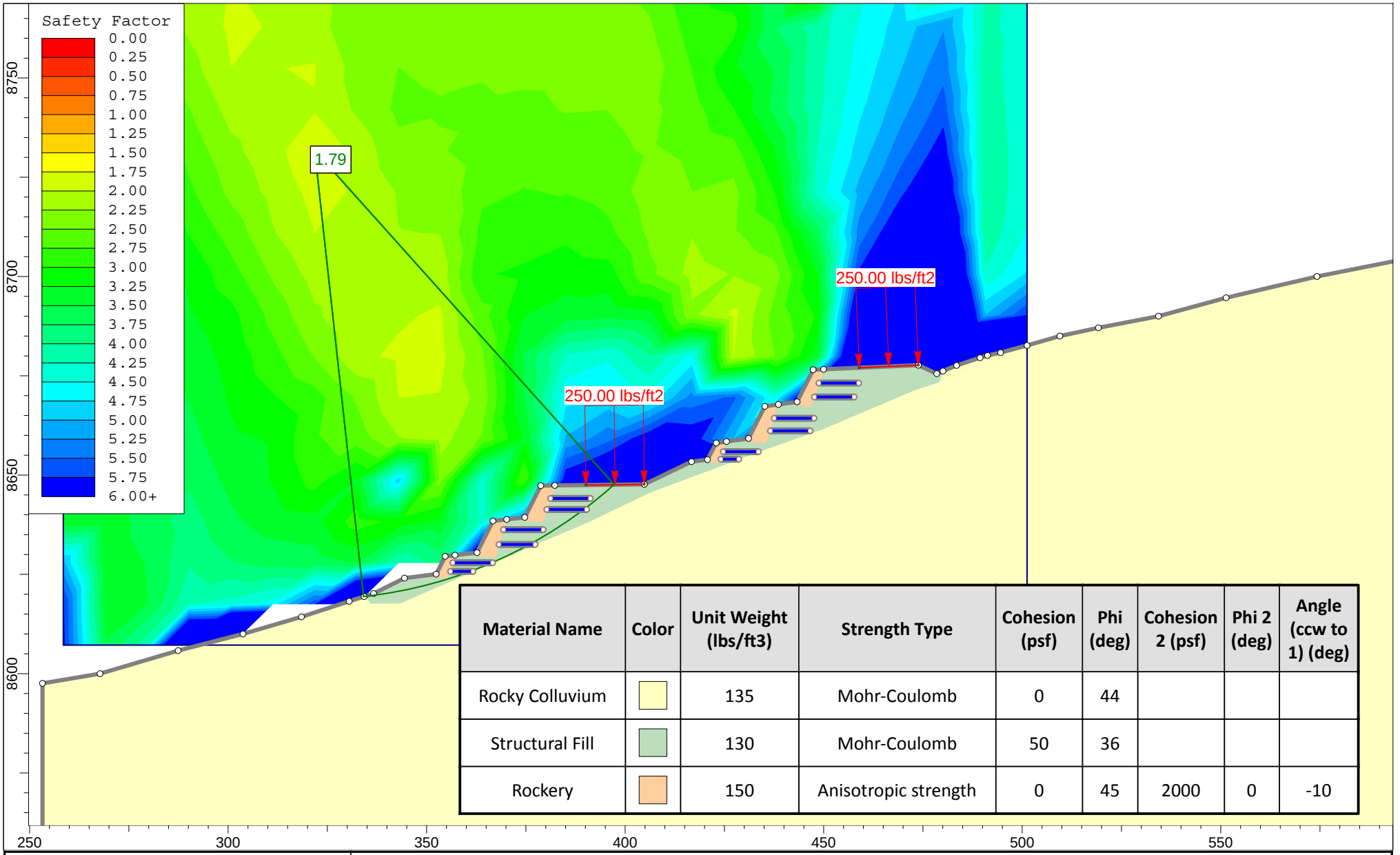
X	Y
484.371	8668.03
483.923	8667.13
488.916	8666.85
492.368	8676.54

Material Boundary

X	Y
496.374	8677.04
495.927	8676.15
499.919	8675.91
503.19	8685.11

Material Boundary

X	Y
374.318	8631.91
373.743	8631.17
376.736	8630.96
380.649	8637.31



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 4-4'		
Drawn By	SL	Scale 1:400	Company IGES, INC.
Date	9-25-2015		File Name Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.788680
Center: 321.818, 8731.753
Radius: 113.059
Left Slip Surface Endpoint: 334.104, 8619.364
Right Slip Surface Endpoint: 397.280, 8647.564
Resisting Moment=4.58962e+006 lb-ft
Driving Moment=2.56593e+006 lb-ft
Resisting Horizontal Force=36906.9 lb
Driving Horizontal Force=20633.6 lb
Total Slice Area=361.439 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3922
Number of Invalid Surfaces: 1094

Error Codes:

Error Code -103 reported for 121 surfaces
Error Code -106 reported for 32 surfaces
Error Code -107 reported for 3 surfaces
Error Code -108 reported for 79 surfaces
Error Code -111 reported for 112 surfaces
Error Code -112 reported for 747 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.78868

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	0.169004	0.401064	Rocky Colluvium	0	44	1.4585	2.60879	2.70148	0	2.70148
2	2.62528	100.856	Structural Fill	50	36	48.4655	86.6893	50.4985	0	50.4985
3	2.62528	361.953	Structural Fill	50	36	90.3532	161.613	153.622	0	153.622
4	2.62528	667.833	Structural Fill	50	36	137.662	246.234	270.092	0	270.092
5	2.62528	948.968	Structural Fill	50	36	179.14	320.425	372.208	0	372.208
6	2.62528	1001.1	Structural Fill	50	36	183.781	328.726	383.635	0	383.635
7	2.62528	904.907	Structural Fill	50	36	165.897	296.737	339.605	0	339.605
8	2.62528	799.27	Structural Fill	50	36	147.283	263.442	293.777	0	293.777
9	2.62528	1779.35	Structural Fill	50	36	285.868	511.327	634.962	0	634.962
10	2.62528	2022.2	Structural Fill	50	36	314.64	562.79	705.796	0	705.796
11	2.62528	1703.45	Structural Fill	50	36	264.411	472.947	582.138	0	582.138
12	2.62528	1523.4	Structural Fill	50	36	253.83	454.02	556.084	0	556.084
13	2.62528	2599.52	Structural Fill	50	36	373.089	667.337	849.692	0	849.692
14	2.62528	3835.31	Structural Fill	50	36	534.014	955.181	1245.87	0	1245.87
15	2.62528	3317.79	Structural Fill	50	36	449.485	803.985	1037.77	0	1037.77
16	2.62528	2890.74	Structural Fill	50	36	387.011	692.239	883.967	0	883.967
17	2.62528	2903.35	Structural Fill	50	36	436.557	780.86	1005.94	0	1005.94
18	2.62528	4316.83	Structural Fill	50	36	540.52	966.818	1261.89	0	1261.89
19	2.62528	4557.98	Structural Fill	50	36	556.647	995.663	1301.59	0	1301.59
20	2.62528	3703.26	Structural Fill	50	36	446.951	799.452	1031.53	0	1031.53
21	2.62528	3104.07	Structural Fill	50	36	370.185	662.142	842.54	0	842.54
22	2.62528	2485.55	Structural Fill	50	36	294.531	526.821	656.287	0	656.287
23	2.62528	1827.84	Structural Fill	50	36	290.453	519.527	646.248	0	646.248
24	2.62528	1128.3	Structural Fill	50	36	208.605	373.128	444.748	0	444.748
25	2.62528	383.858	Structural Fill	50	36	129.686	231.967	250.456	0	250.456

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.78868

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	334.104	8619.36	0	0	0
2	334.273	8619.38	0.196209	0.084643	23.335
3	336.898	8619.7	111.153	47.9502	23.3348
4	339.524	8620.09	289.225	124.769	23.3349
5	342.149	8620.54	529.581	228.457	23.335
6	344.774	8621.05	809.227	349.093	23.3349
7	347.4	8621.63	1070.29	461.713	23.3349
8	350.025	8622.27	1287.41	555.376	23.3349
9	352.65	8622.98	1465.4	632.162	23.335
10	355.275	8623.76	1721.43	742.608	23.3349
11	357.901	8624.61	1948.45	840.542	23.3349
12	360.526	8625.53	2106.85	908.875	23.3349
13	363.151	8626.52	2544.85	1097.82	23.3348
14	365.777	8627.59	2615.61	1128.35	23.3349
15	368.402	8628.74	2728.92	1177.23	23.3349
16	371.027	8629.97	2634.53	1136.51	23.3349
17	373.652	8631.28	2491.13	1074.65	23.3349
18	376.278	8632.68	3302.72	1424.76	23.3349
19	378.903	8634.16	2842.65	1226.29	23.3349
20	381.528	8635.75	2242.36	967.336	23.335
21	384.153	8637.43	1679.1	724.349	23.3349
22	386.779	8639.22	1143.97	493.498	23.3349
23	389.404	8641.12	670.333	289.176	23.335
24	392.029	8643.14	619.372	267.192	23.335
25	394.655	8645.28	220.981	95.3293	23.335
26	397.28	8647.56	0	0	0

List Of Coordinates

Distributed Load

X	Y
404.829	8647.66
390.115	8647.48

Distributed Load

X	Y
473.862	8677.66

458.966	8677.03

External Boundary

X	Y
336.648	8620.18
334.248	8619.41
330.517	8618.22
318.467	8614.3
303.763	8610
287.416	8605.81
267.75	8600
253.242	8597.56
253.242	8472.79
645.903	8472.79
645.903	8715
624.575	8710.77
601.156	8705.33
574.249	8700
551.356	8694.63
534.337	8690
519.227	8687.08
509.483	8685
501.223	8682.65
494.567	8680.82
491.297	8680.1
489.397	8679.54
483.474	8677.61
480.052	8676.19
478.466	8675.53
473.862	8677.66
449.973	8676.65
447.379	8676.54
443.306	8668.45
438.615	8667.79
435.161	8667.3
431.088	8659.22
425.543	8658.44
422.943	8658.07
420.729	8653.89
416.729	8653.39
404.829	8647.66
382.29	8647.38
378.747	8647.34
374.734	8639.37
370.173	8638.84

366.709	8638.43
362.696	8630.46
357.151	8629.82
354.671	8629.53
352.422	8625.06
344.422	8624.06

Material Boundary

X	Y
334.248	8619.41
335.8	8617.72
343.202	8617.72
376.173	8632.02
390.511	8638.12
406.184	8645.63
423.426	8652.06
434.631	8656.28
449.753	8661.59
472.773	8671.38
478.006	8673.12
479.175	8673.61

Material Boundary

X	Y
352.422	8625.06
352.073	8624.37
355.55	8623.97
357.151	8629.82

Material Boundary

X	Y
362.696	8630.46
362.246	8629.57
367.238	8629.29
370.173	8638.84

Material Boundary

X	Y
374.734	8639.37
374.284	8638.48
379.278	8638.22
382.29	8647.38

Material Boundary

X	Y
420.729	8653.89
420.291	8653.06
423.79	8652.97
425.543	8658.44

Material Boundary

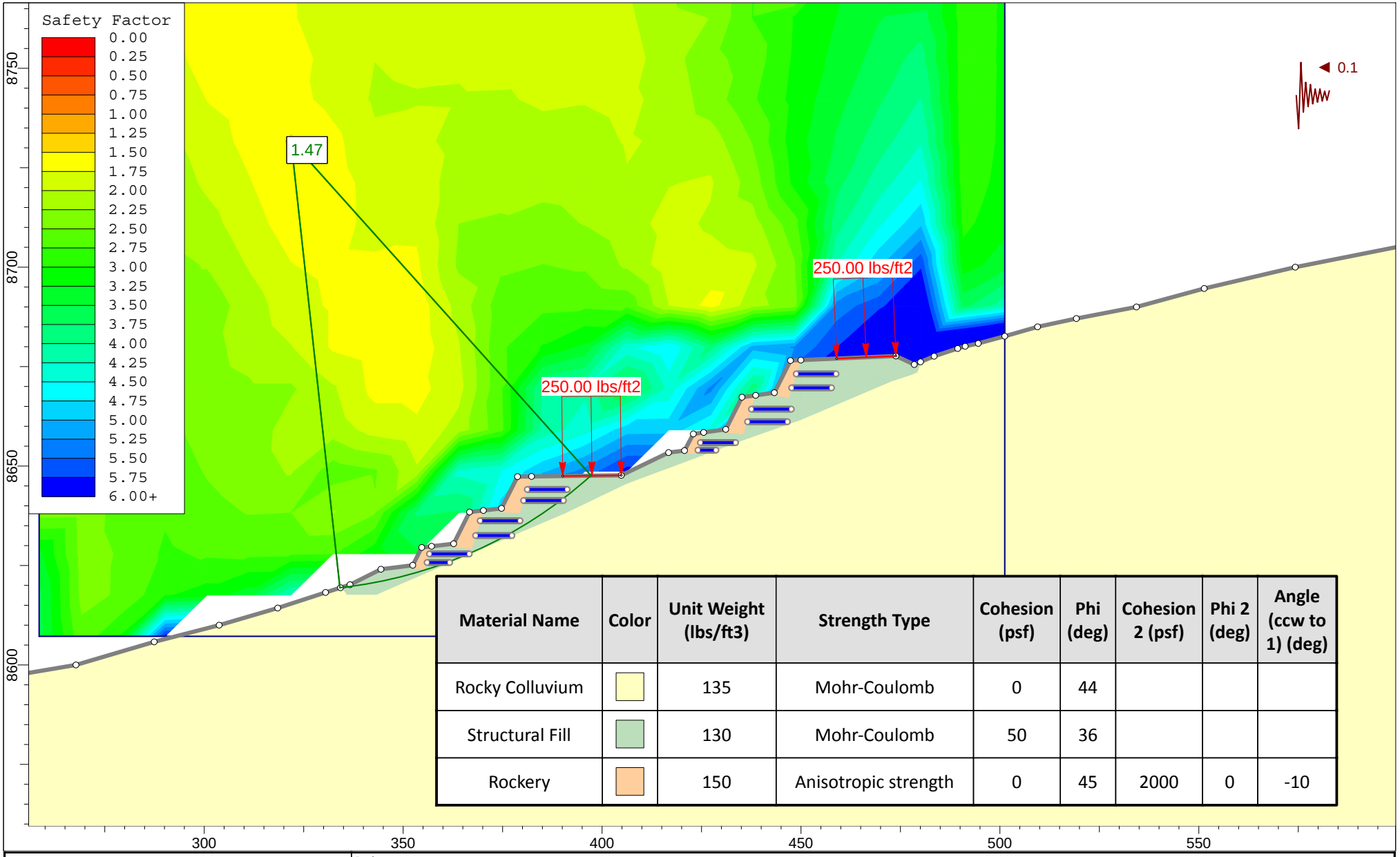
X	Y
431.088	8659.22
430.638	8658.33
435.618	8657.88
438.615	8667.79

Material Boundary

X	Y
443.306	8668.45
442.856	8667.56
446.832	8667.12
449.973	8676.65

Material Boundary

X	Y
479.175	8673.61
480.052	8676.19



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 4-4'		
Drawn By	SL	Scale 1:400	Company IGES, INC.
Date	9-25-2015		File Name P-Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.466280
Center: 321.818, 8731.753
Radius: 113.059
Left Slip Surface Endpoint: 334.104, 8619.364
Right Slip Surface Endpoint: 397.280, 8647.564
Resisting Moment=4.4523e+006 lb-ft
Driving Moment=3.03646e+006 lb-ft
Resisting Horizontal Force=35822.9 lb
Driving Horizontal Force=24431.1 lb
Total Slice Area=361.439 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3579
Number of Invalid Surfaces: 1437

Error Codes:

Error Code -103 reported for 121 surfaces
Error Code -106 reported for 32 surfaces
Error Code -107 reported for 1 surface
Error Code -108 reported for 162 surfaces
Error Code -111 reported for 279 surfaces
Error Code -112 reported for 842 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.46628

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	0.169004	0.401064	Rocky Colluvium	0	44	2.02971	2.97613	3.08187	0	3.08187
2	2.62528	100.856	Structural Fill	50	36	67.3283	98.7222	67.0602	0	67.0602
3	2.62528	361.953	Structural Fill	50	36	120.753	177.058	174.881	0	174.881
4	2.62528	667.833	Structural Fill	50	36	179.899	263.782	294.246	0	294.246
5	2.62528	948.968	Structural Fill	50	36	230.406	337.839	396.178	0	396.178
6	2.62528	1001.1	Structural Fill	50	36	233.907	342.973	403.245	0	403.245
7	2.62528	904.907	Structural Fill	50	36	209.561	307.275	354.108	0	354.108
8	2.62528	799.27	Structural Fill	50	36	184.841	271.028	304.218	0	304.218
9	2.62528	1779.35	Structural Fill	50	36	350.559	514.017	638.665	0	638.665
10	2.62528	2022.2	Structural Fill	50	36	381.6	559.532	701.312	0	701.312
11	2.62528	1703.45	Structural Fill	50	36	318.497	467.006	573.96	0	573.96
12	2.62528	1523.4	Structural Fill	50	36	327.83	480.69	592.792	0	592.792
13	2.62528	2599.52	Structural Fill	50	36	438.823	643.438	816.796	0	816.796
14	2.62528	3835.31	Structural Fill	50	36	630.009	923.769	1202.64	0	1202.64
15	2.62528	3317.79	Structural Fill	50	36	517.881	759.359	976.35	0	976.35
16	2.62528	2890.74	Structural Fill	50	36	442.717	649.147	824.654	0	824.654
17	2.62528	2903.35	Structural Fill	50	36	564.765	828.103	1070.97	0	1070.97
18	2.62528	4316.83	Structural Fill	50	36	605.15	887.319	1152.47	0	1152.47
19	2.62528	4557.98	Structural Fill	50	36	617.661	905.664	1177.72	0	1177.72
20	2.62528	3703.26	Structural Fill	50	36	492.972	722.835	926.077	0	926.077
21	2.62528	3104.07	Structural Fill	50	36	406.011	595.326	750.577	0	750.577
22	2.62528	2485.55	Structural Fill	50	36	321.73	471.746	580.482	0	580.482
23	2.62528	1827.84	Structural Fill	50	36	344.414	505.008	626.265	0	626.265
24	2.62528	1128.3	Structural Fill	50	36	231.664	339.684	398.716	0	398.716
25	2.62528	383.858	Structural Fill	50	36	147.179	215.806	228.212	0	228.212

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.46628

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	334.104	8619.36	0	0	0
2	334.273	8619.38	0.246005	0.171301	34.8507
3	336.898	8619.7	145.529	101.336	34.8506
4	339.524	8620.09	359.444	250.293	34.8508
5	342.149	8620.54	633.687	441.256	34.8507
6	344.774	8621.05	941.528	655.616	34.8507
7	347.4	8621.63	1223.55	851.998	34.8508
8	350.025	8622.27	1456.19	1013.99	34.8507
9	352.65	8622.98	1646.07	1146.21	34.8507
10	355.275	8623.76	1892.3	1317.67	34.8507
11	357.901	8624.61	2097.99	1460.9	34.8508
12	360.526	8625.53	2236.64	1557.45	34.8508
13	363.151	8626.52	2752.51	1916.66	34.8507
14	365.777	8627.59	2772.56	1930.62	34.8507
15	368.402	8628.74	2837.09	1975.55	34.8506
16	371.027	8629.97	2667.66	1857.58	34.8508
17	373.652	8631.28	2460.73	1713.48	34.8507
18	376.278	8632.68	3465.32	2413.01	34.8507
19	378.903	8634.16	2908.24	2025.1	34.8507
20	381.528	8635.75	2210.63	1539.34	34.8509
21	384.153	8637.43	1577.07	1098.17	34.8509
22	386.779	8639.22	991.456	690.383	34.8507
23	389.404	8641.12	485.781	338.265	34.8507
24	392.029	8643.14	541.852	377.309	34.8507
25	394.655	8645.28	190.692	132.785	34.8507
26	397.28	8647.56	0	0	0

List Of Coordinates

Distributed Load

X	Y
404.829	8647.66
390.115	8647.48

Distributed Load

X	Y

473.862	8677.66
458.966	8677.03

External Boundary

X	Y
336.648	8620.18
334.248	8619.41
330.517	8618.22
318.467	8614.3
303.763	8610
287.416	8605.81
267.75	8600
253.242	8597.56
253.242	8472.79
645.903	8472.79
645.903	8715
624.575	8710.77
601.156	8705.33
574.249	8700
551.356	8694.63
534.337	8690
519.227	8687.08
509.483	8685
501.223	8682.65
494.567	8680.82
491.297	8680.1
489.397	8679.54
483.474	8677.61
480.052	8676.19
478.466	8675.53
473.862	8677.66
449.973	8676.65
447.379	8676.54
443.306	8668.45
438.615	8667.79
435.161	8667.3
431.088	8659.22
425.543	8658.44
422.943	8658.07
420.729	8653.89
416.729	8653.39
404.829	8647.66
382.29	8647.38
378.747	8647.34
374.734	8639.37

370.173	8638.84
366.709	8638.43
362.696	8630.46
357.151	8629.82
354.671	8629.53
352.422	8625.06
344.422	8624.06

Material Boundary

X	Y
334.248	8619.41
335.8	8617.72
343.202	8617.72
376.173	8632.02
390.511	8638.12
406.184	8645.63
423.426	8652.06
434.631	8656.28
449.753	8661.59
472.773	8671.38
478.006	8673.12
479.175	8673.61

Material Boundary

X	Y
352.422	8625.06
352.073	8624.37
355.55	8623.97
357.151	8629.82

Material Boundary

X	Y
362.696	8630.46
362.246	8629.57
367.238	8629.29
370.173	8638.84

Material Boundary

X	Y
374.734	8639.37
374.284	8638.48
379.278	8638.22

382.29	8647.38

Material Boundary

X	Y
420.729	8653.89
420.291	8653.06
423.79	8652.97
425.543	8658.44

Material Boundary

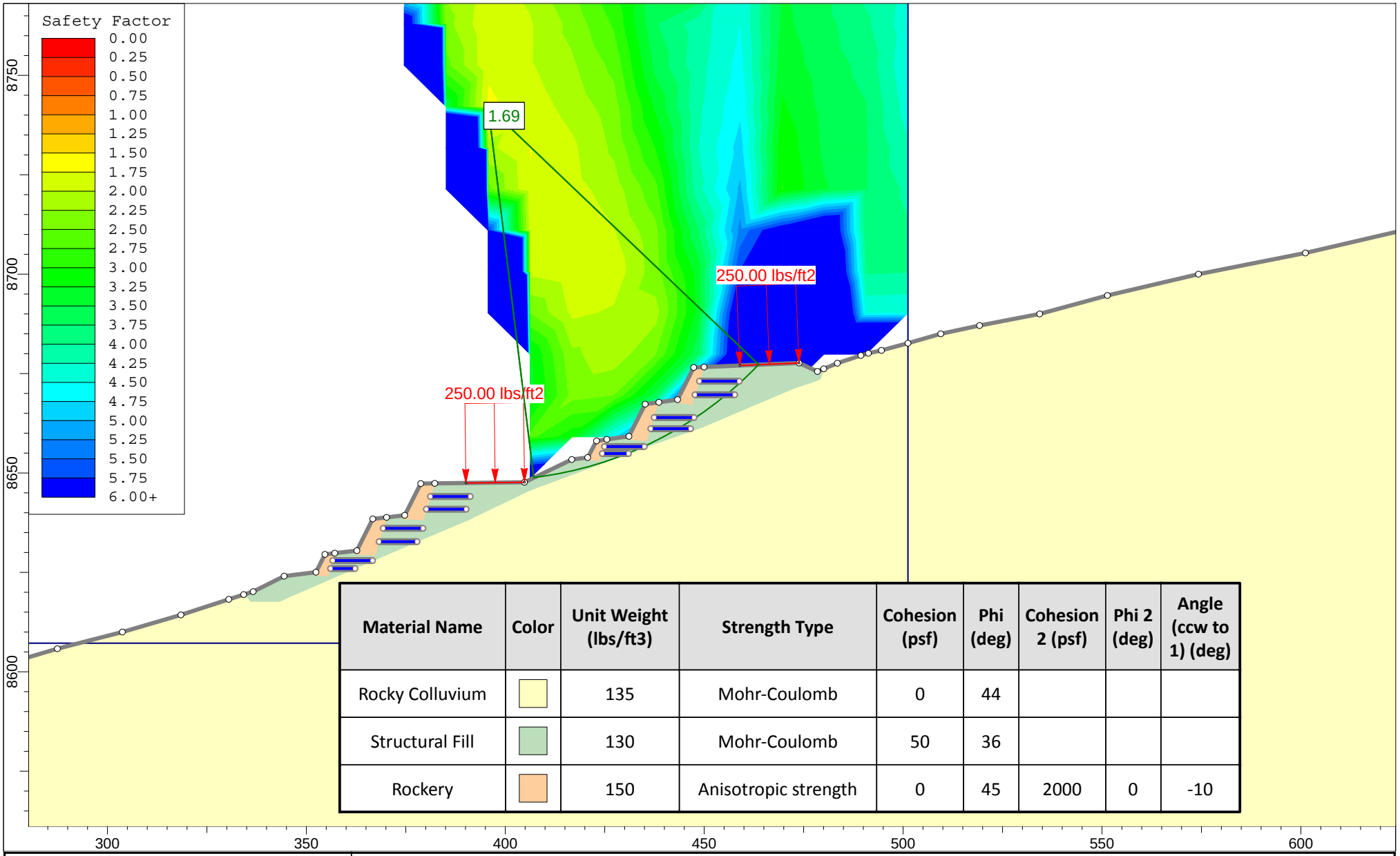
X	Y
431.088	8659.22
430.638	8658.33
435.618	8657.88
438.615	8667.79

Material Boundary

X	Y
443.306	8668.45
442.856	8667.56
446.832	8667.12
449.973	8676.65

Material Boundary

X	Y
479.175	8673.61
480.052	8676.19



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 4-4'		
Drawn By	SL	Scale	1:400
Company	IGES, INC.		
Date	9-25-2015	File Name	Static - upper.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static - upper
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.691980
Center: 395.690, 8742.134
Radius: 94.059
Left Slip Surface Endpoint: 407.159, 8648.778
Right Slip Surface Endpoint: 463.767, 8677.231
Resisting Moment=3.56124e+006 lb-ft
Driving Moment=2.10477e+006 lb-ft
Resisting Horizontal Force=34081.4 lb
Driving Horizontal Force=20142.9 lb
Total Slice Area=337.324 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 1570
Number of Invalid Surfaces: 3446

Error Codes:

Error Code -103 reported for 11 surfaces
Error Code -106 reported for 45 surfaces
Error Code -107 reported for 6 surfaces
Error Code -108 reported for 81 surfaces
Error Code -111 reported for 38 surfaces
Error Code -112 reported for 438 surfaces
Error Code -113 reported for 275 surfaces
Error Code -1000 reported for 2552 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-113 = Surface intersects outside slope limits.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.69198

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.26432	115.474	Structural Fill	50	36	59.5234	100.712	69.7997	0	69.7997
2	2.26432	338.134	Structural Fill	50	36	104.146	176.213	173.717	0	173.717
3	2.26432	544.122	Structural Fill	50	36	143.157	242.219	264.566	0	264.566
4	2.26432	733.223	Structural Fill	50	36	176.873	299.266	343.085	0	343.085
5	2.26432	834.07	Structural Fill	50	36	192.057	324.956	378.445	0	378.445
6	2.26432	760.941	Structural Fill	50	36	174.135	294.633	336.709	0	336.709
7	2.26432	1389.96	Structural Fill	50	36	283.978	480.485	592.513	0	592.513
8	2.26432	1863.22	Structural Fill	50	36	360.797	610.462	771.411	0	771.411
9	2.26432	1568.42	Structural Fill	50	36	301.547	510.212	633.426	0	633.426
10	2.26432	1420.12	Structural Fill	50	36	269.576	456.118	558.975	0	558.975
11	2.26432	1411.45	Structural Fill	50	36	268.209	453.805	555.789	0	555.789
12	2.26432	2453.61	Structural Fill	50	36	421.684	713.481	913.202	0	913.202
13	2.26432	3370.77	Structural Fill	50	36	564.573	955.247	1245.97	0	1245.97
			Structural							

			Fill							
15	2.26432	2593.56	Structural Fill	50	36	411.802	696.76	890.189	0	890.189
16	2.26432	2327.15	Structural Fill	50	36	363.125	614.401	776.831	0	776.831
17	2.26432	2839.11	Structural Fill	50	36	510.999	864.6	1121.2	0	1121.2
18	2.26432	3879.31	Structural Fill	50	36	555.264	939.496	1224.29	0	1224.29
19	2.26432	3634.81	Structural Fill	50	36	507.876	859.316	1113.93	0	1113.93
20	2.26432	3062.63	Structural Fill	50	36	420.392	711.295	910.193	0	910.193
21	2.26432	2586.16	Structural Fill	50	36	349.157	590.767	744.303	0	744.303
22	2.26432	2076.84	Structural Fill	50	36	349.683	591.657	745.527	0	745.527
23	2.26432	1532.11	Structural Fill	50	36	213.766	361.688	429.004	0	429.004
24	2.26432	948.923	Structural Fill	50	36	198.845	336.442	394.254	0	394.254
25	2.26432	323.654	Structural Fill	50	36	125.891	213.005	224.357	0	224.357

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.69198

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	407.159	8648.78	0	0	0
2	409.424	8649.08	113.377	61.9434	28.6499
3	411.688	8649.45	286.172	156.35	28.65
4	413.952	8649.87	499.275	272.778	28.6499
5	416.217	8650.34	735.955	402.088	28.6499
6	418.481	8650.88	967.933	528.829	28.6499
7	420.745	8651.47	1161.6	634.641	28.65
8	423.01	8652.13	1415.51	773.363	28.65
9	425.274	8652.85	1677.88	916.707	28.6499
10	427.538	8653.63	1864.9	1018.89	28.65
11	429.802	8654.48	2001.22	1093.37	28.6501
12	432.067	8655.39	2171.29	1186.28	28.6499
13	434.331	8656.38	2226.58	1216.49	28.6499
14	436.595	8657.44	2315.25	1264.93	28.6499
15	438.86	8658.57	2215.11	1210.23	28.6501
16	441.124	8659.78	2070.95	1131.46	28.6499
17	443.388	8661.07	1890.54	1032.9	28.6501
18	445.653	8662.44	2638.59	1441.59	28.6499

19	447.917	8663.91	2101.65	1148.24	28.6501
20	450.181	8665.47	1513.53	826.913	28.6499
21	452.446	8667.13	953.506	520.947	28.6499
22	454.71	8668.9	427.666	233.655	28.65
23	456.974	8670.78	948.256	518.079	28.65
24	459.239	8672.79	573.176	313.154	28.6499
25	461.503	8674.94	201.529	110.105	28.6499
26	463.767	8677.23	0	0	0

List Of Coordinates

Distributed Load

X	Y
404.829	8647.66
390.115	8647.48

Distributed Load

X	Y
473.862	8677.66
458.966	8677.03

External Boundary

X	Y
336.648	8620.18
334.248	8619.41
330.517	8618.22
318.467	8614.3
303.763	8610
287.416	8605.81
267.75	8600
253.242	8597.56
253.242	8472.79
645.903	8472.79
645.903	8715
624.575	8710.77
601.156	8705.33
574.249	8700
551.356	8694.63
534.337	8690
519.227	8687.08
509.483	8685
501.223	8682.65
494.567	8680.82

491.297	8680.1
489.397	8679.54
483.474	8677.61
480.052	8676.19
478.466	8675.53
473.862	8677.66
449.973	8676.65
447.379	8676.54
443.306	8668.45
438.615	8667.79
435.161	8667.3
431.088	8659.22
425.543	8658.44
422.943	8658.07
420.729	8653.89
416.729	8653.39
404.829	8647.66
382.29	8647.38
378.747	8647.34
374.734	8639.37
370.173	8638.84
366.709	8638.43
362.696	8630.46
357.151	8629.82
354.671	8629.53
352.422	8625.06
344.422	8624.06

Material Boundary

X	Y
334.248	8619.41
335.8	8617.72
343.202	8617.72
376.173	8632.02
390.511	8638.12
406.184	8645.63
423.426	8652.06
434.631	8656.28
449.753	8661.59
472.773	8671.38
478.006	8673.12
479.175	8673.61

Material Boundary

X	Y
352.422	8625.06
352.073	8624.37
355.55	8623.97
357.151	8629.82

Material Boundary

X	Y
362.696	8630.46
362.246	8629.57
367.238	8629.29
370.173	8638.84

Material Boundary

X	Y
374.734	8639.37
374.284	8638.48
379.278	8638.22
382.29	8647.38

Material Boundary

X	Y
420.729	8653.89
420.291	8653.06
423.79	8652.97
425.543	8658.44

Material Boundary

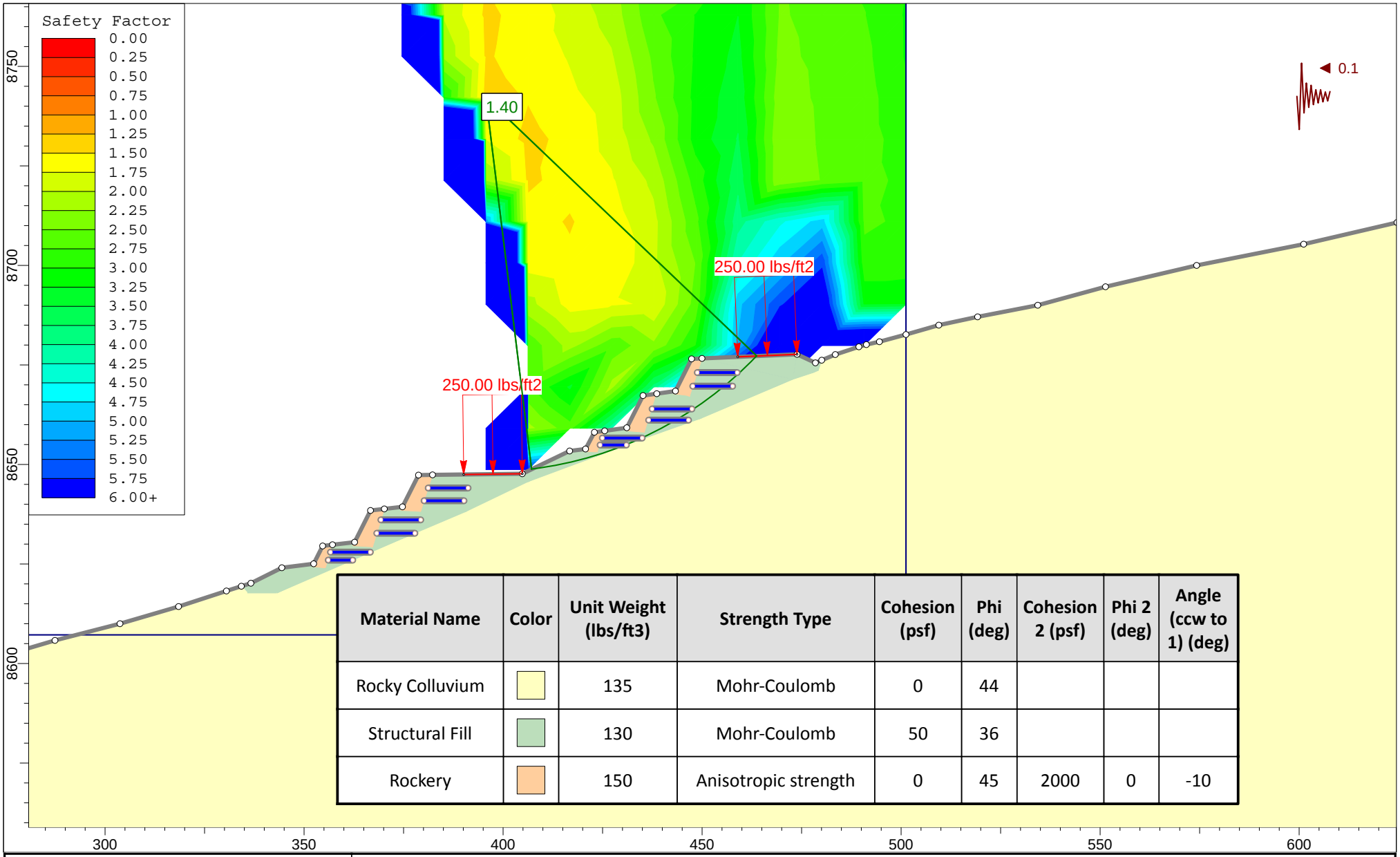
X	Y
431.088	8659.22
430.638	8658.33
435.618	8657.88
438.615	8667.79

Material Boundary

X	Y
443.306	8668.45
442.856	8667.56
446.832	8667.12
449.973	8676.65

Material Boundary

X	Y
479.175	8673.61
480.052	8676.19



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 4-4'		
Drawn By	SL	Scale 1:400	Company IGES, INC.
Date	9-25-2015		File Name P-Static - upper.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static - upper
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.397710
Center: 395.690, 8742.134
Radius: 94.059
Left Slip Surface Endpoint: 407.159, 8648.778
Right Slip Surface Endpoint: 463.767, 8677.231
Resisting Moment=3.43634e+006 lb-ft
Driving Moment=2.45855e+006 lb-ft
Resisting Horizontal Force=33020.2 lb
Driving Horizontal Force=23624.5 lb
Total Slice Area=337.324 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 1490
Number of Invalid Surfaces: 3526

Error Codes:

Error Code -103 reported for 11 surfaces
Error Code -106 reported for 45 surfaces
Error Code -107 reported for 4 surfaces
Error Code -108 reported for 101 surfaces
Error Code -111 reported for 85 surfaces
Error Code -112 reported for 453 surfaces
Error Code -113 reported for 275 surfaces
Error Code -1000 reported for 2552 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-113 = Surface intersects outside slope limits.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.39771

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.26432	115.474	Structural Fill	50	36	80.9219	113.105	86.8572	0	86.8572
2	2.26432	338.134	Structural Fill	50	36	136.754	191.143	194.267	0	194.267
3	2.26432	544.122	Structural Fill	50	36	184.363	257.686	285.855	0	285.855
4	2.26432	733.223	Structural Fill	50	36	224.411	313.662	362.9	0	362.9
5	2.26432	834.07	Structural Fill	50	36	240.898	336.706	394.616	0	394.616
6	2.26432	760.941	Structural Fill	50	36	216.846	303.088	348.346	0	348.346
7	2.26432	1389.96	Structural Fill	50	36	346.937	484.918	598.612	0	598.612
8	2.26432	1863.22	Structural Fill	50	36	435.152	608.217	768.318	0	768.318
9	2.26432	1568.42	Structural Fill	50	36	361.218	504.878	626.083	0	626.083
10	2.26432	1420.12	Structural Fill	50	36	320.577	448.074	547.903	0	547.903
11	2.26432	1411.45	Structural Fill	50	36	322.359	450.564	551.33	0	551.33
12	2.26432	2453.61	Structural Fill	50	36	489.263	683.848	872.419	0	872.419
			Structural							

			Fill							
14	2.26432	2972.27	Structural Fill	50	36	546.012	763.167	981.591	0	981.591
15	2.26432	2593.56	Structural Fill	50	36	465.6	650.774	826.896	0	826.896
16	2.26432	2327.15	Structural Fill	50	36	407.854	570.061	715.8	0	715.8
17	2.26432	2839.11	Structural Fill	50	36	647.502	905.02	1176.83	0	1176.83
18	2.26432	3879.31	Structural Fill	50	36	610.337	853.074	1105.34	0	1105.34
19	2.26432	3634.81	Structural Fill	50	36	554.404	774.896	997.732	0	997.732
20	2.26432	3062.63	Structural Fill	50	36	456.497	638.051	809.382	0	809.382
21	2.26432	2586.16	Structural Fill	50	36	377.432	527.54	657.278	0	657.278
22	2.26432	2076.84	Structural Fill	50	36	439.5	614.294	776.685	0	776.685
23	2.26432	1532.11	Structural Fill	50	36	231.084	322.988	375.735	0	375.735
24	2.26432	948.923	Structural Fill	50	36	219.305	306.525	353.077	0	353.077
25	2.26432	323.654	Structural Fill	50	36	142.117	198.639	204.584	0	204.584

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.39771

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	407.159	8648.78	0	0	0
2	409.424	8649.08	145.348	111.895	37.5906
3	411.688	8649.45	351.206	270.372	37.5905
4	413.952	8649.87	594.93	458.001	37.5905
5	416.217	8650.34	857.279	659.968	37.5905
6	418.481	8650.88	1108.64	853.477	37.5906
7	420.745	8651.47	1316.78	1013.71	37.5905
8	423.01	8652.13	1571.49	1209.8	37.5906
9	425.274	8652.85	1819.7	1400.87	37.5904
10	427.538	8653.63	1992.04	1533.55	37.5905
11	429.802	8654.48	2112.38	1626.19	37.5904
12	432.067	8655.39	2284.23	1758.49	37.5905
13	434.331	8656.38	2289.12	1762.26	37.5906
14	436.595	8657.44	2333.06	1796.09	37.5906
15	438.86	8658.57	2163.32	1665.41	37.5905
16	441.124	8659.78	1959.84	1508.77	37.5906

17	443.388	8661.07	1728.24	1330.47	37.5906
18	445.653	8662.44	2665.92	2052.33	37.5905
19	447.917	8663.91	2042.28	1572.23	37.5905
20	450.181	8665.47	1379.33	1061.86	37.5904
21	452.446	8667.13	763.9	588.081	37.5905
22	454.71	8668.9	198.746	153.003	37.5906
23	456.974	8670.78	896.568	690.214	37.5905
24	459.239	8672.79	515.349	396.736	37.5905
25	461.503	8674.94	184.275	141.862	37.5905
26	463.767	8677.23	0	0	0

List Of Coordinates

Distributed Load

X	Y
404.829	8647.66
390.115	8647.48

Distributed Load

X	Y
473.862	8677.66
458.966	8677.03

External Boundary

X	Y
336.648	8620.18
334.248	8619.41
330.517	8618.22
318.467	8614.3
303.763	8610
287.416	8605.81
267.75	8600
253.242	8597.56
253.242	8472.79
645.903	8472.79
645.903	8715
624.575	8710.77
601.156	8705.33
574.249	8700
551.356	8694.63
534.337	8690
519.227	8687.08
509.483	8685

501.223	8682.65
494.567	8680.82
491.297	8680.1
489.397	8679.54
483.474	8677.61
480.052	8676.19
478.466	8675.53
473.862	8677.66
449.973	8676.65
447.379	8676.54
443.306	8668.45
438.615	8667.79
435.161	8667.3
431.088	8659.22
425.543	8658.44
422.943	8658.07
420.729	8653.89
416.729	8653.39
404.829	8647.66
382.29	8647.38
378.747	8647.34
374.734	8639.37
370.173	8638.84
366.709	8638.43
362.696	8630.46
357.151	8629.82
354.671	8629.53
352.422	8625.06
344.422	8624.06

Material Boundary

X	Y
334.248	8619.41
335.8	8617.72
343.202	8617.72
376.173	8632.02
390.511	8638.12
406.184	8645.63
423.426	8652.06
434.631	8656.28
449.753	8661.59
472.773	8671.38
478.006	8673.12
479.175	8673.61

Material Boundary

X	Y
352.422	8625.06
352.073	8624.37
355.55	8623.97
357.151	8629.82

Material Boundary

X	Y
362.696	8630.46
362.246	8629.57
367.238	8629.29
370.173	8638.84

Material Boundary

X	Y
374.734	8639.37
374.284	8638.48
379.278	8638.22
382.29	8647.38

Material Boundary

X	Y
420.729	8653.89
420.291	8653.06
423.79	8652.97
425.543	8658.44

Material Boundary

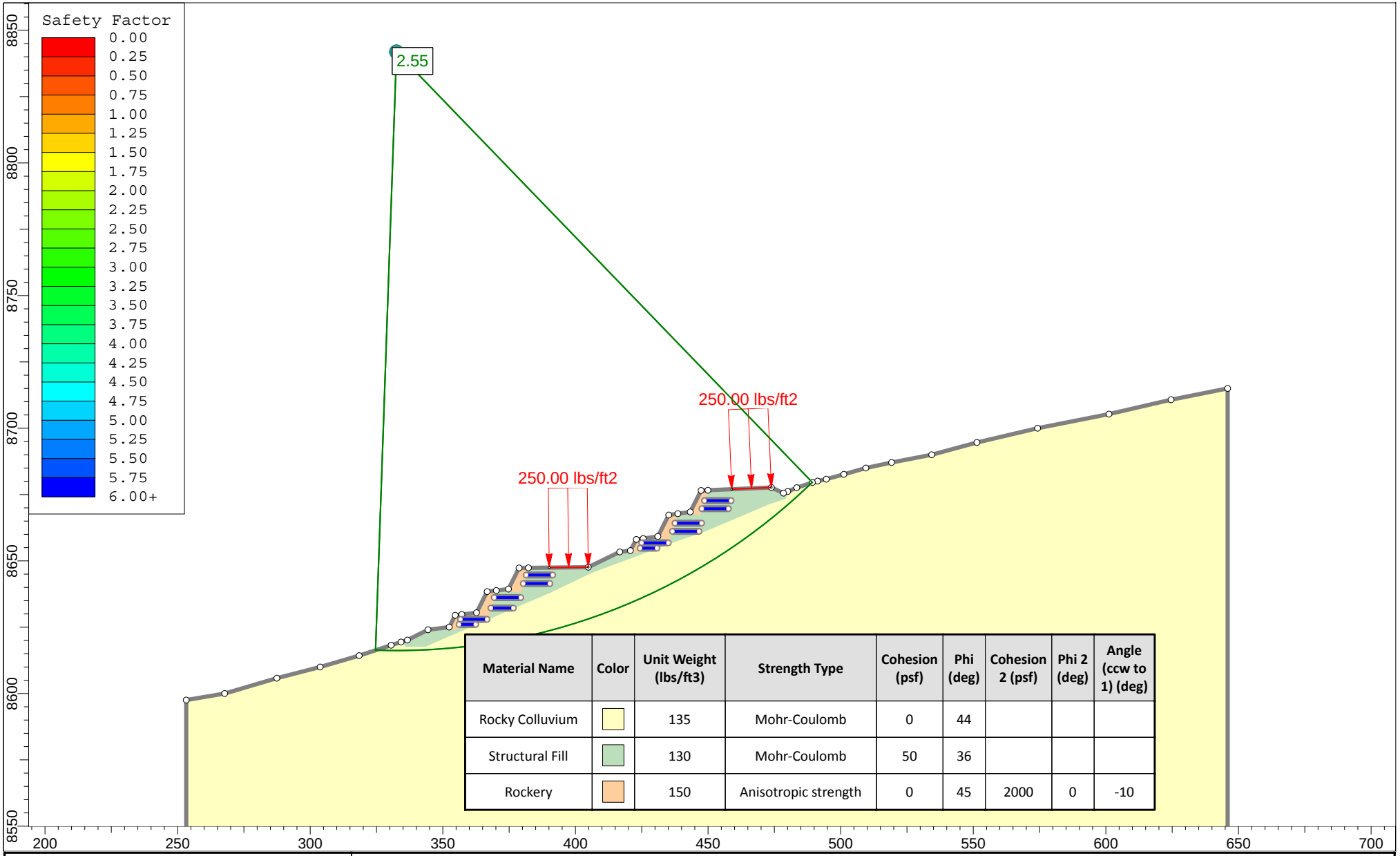
X	Y
431.088	8659.22
430.638	8658.33
435.618	8657.88
438.615	8667.79

Material Boundary

X	Y
443.306	8668.45
442.856	8667.56
446.832	8667.12
449.973	8676.65

Material Boundary

X	Y
479.175	8673.61
480.052	8676.19



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 4-4'		
Drawn By	SL	*Scale* 1:600	*Company* IGES, INC.
Date	9-25-2015		*File Name* Static - entire.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static - entire
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 2.553450
Center: 332.561, 8841.888
Radius: 225.731
Left Slip Surface Endpoint: 324.610, 8616.297
Right Slip Surface Endpoint: 489.397, 8679.540
Resisting Moment=7.81297e+007 lb-ft
Driving Moment=3.05977e+007 lb-ft
Resisting Horizontal Force=318508 lb
Driving Horizontal Force=124736 lb
Total Slice Area=2751.56 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 1
Number of Invalid Surfaces: 0

Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.55345

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	6.59151	1014.26	Rocky Colluvium	0	44	69.2424	176.807	183.089	0	183.089
2	6.59151	2918.32	Rocky Colluvium	0	44	194.207	495.899	513.519	0	513.519

3	6.59151	5234.42	Rocky Colluvium	0	44	339.726	867.474	898.296	0	898.296
4	6.59151	6766.53	Rocky Colluvium	0	44	428.491	1094.13	1133	0	1133
5	6.59151	9598.78	Rocky Colluvium	0	44	593.28	1514.91	1568.73	0	1568.73
6	6.59151	11108.4	Rocky Colluvium	0	44	670.332	1711.66	1772.48	0	1772.48
7	6.59151	17033.7	Rocky Colluvium	0	44	1003.79	2563.13	2654.2	0	2654.2
8	6.59151	17887.8	Rocky Colluvium	0	44	1029.58	2628.97	2722.38	0	2722.38
9	6.59151	23027	Rocky Colluvium	0	44	1294.64	3305.81	3423.27	0	3423.27
10	6.59151	21482.7	Rocky Colluvium	0	44	1185.51	3027.15	3134.71	0	3134.71
11	6.59151	20090.2	Rocky Colluvium	0	44	1166.66	2979.01	3084.85	0	3084.85
12	6.59151	18511.4	Rocky Colluvium	0	44	1056.81	2698.52	2794.39	0	2794.39
13	6.59151	17643.6	Rocky Colluvium	0	44	917.382	2342.49	2425.72	0	2425.72
14	6.59151	18255.3	Rocky Colluvium	0	44	912.217	2329.3	2412.06	0	2412.06
15	6.59151	18664.3	Rocky Colluvium	0	44	910.384	2324.62	2407.21	0	2407.21
16	6.59151	19367.5	Rocky Colluvium	0	44	921.78	2353.72	2437.35	0	2437.35
17	6.59151	21436.9	Rocky Colluvium	0	44	995.073	2540.87	2631.15	0	2631.15
18	6.59151	21689.6	Rocky Colluvium	0	44	981.382	2505.91	2594.95	0	2594.95
19	6.59151	24113.9	Rocky Colluvium	0	44	1062.82	2713.85	2810.27	0	2810.27
20	6.59151	22397.1	Rocky Colluvium	0	44	960.802	2453.36	2540.52	0	2540.52
21	6.59151	18874.5	Rocky Colluvium	0	44	830.402	2120.39	2195.73	0	2195.73
22	6.59151	15047.8	Rocky Colluvium	0	44	677.519	1730.01	1791.47	0	1791.47
23	6.59151	10708.5	Rocky Colluvium	0	44	463.154	1182.64	1224.65	0	1224.65
24	6.59151	5033.18	Rocky Colluvium	0	44	191.548	489.107	506.485	0	506.485
25	6.59151	1765.47	Rocky Colluvium	0	44	67.0293	171.156	177.237	0	177.237

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.55345

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	324.61	8616.3	0	0	0
2	331.201	8616.16	481.302	186.464	21.1772
3	337.793	8616.22	1732.36	671.146	21.1772
4	344.384	8616.47	3747.76	1451.94	21.1771
5	350.976	8616.91	6070.72	2351.9	21.1772
6	357.567	8617.55	8981.99	3479.77	21.1772
7	364.159	8618.38	11923.8	4619.46	21.1771
8	370.75	8619.41	15802.5	6122.15	21.1772
9	377.342	8620.64	19233.4	7451.34	21.1772
10	383.933	8622.08	22847.7	8851.56	21.1772
11	390.525	8623.73	25504.8	9880.99	21.1772
12	397.116	8625.58	27480.6	10646.4	21.1771
13	403.708	8627.66	28660.7	11103.6	21.1771
14	410.299	8629.97	29124.7	11283.4	21.1772
15	416.891	8632.5	29021.4	11243.4	21.1772
16	423.482	8635.28	28337.6	10978.4	21.1771
17	430.074	8638.31	27033.1	10473	21.1771
18	436.665	8641.6	24934.1	9659.86	21.1771
19	443.257	8645.16	22148.5	8580.7	21.1772
20	449.848	8649.02	18314.1	7095.17	21.1772
21	456.44	8653.19	14063	5448.25	21.1772
22	463.031	8657.68	9707.9	3761	21.1772
23	469.623	8662.53	5554.05	2151.73	21.1772
24	476.214	8667.77	2241.1	868.24	21.1772
25	482.806	8673.42	639.635	247.805	21.1772
26	489.397	8679.54	0	0	0

List Of Coordinates

Distributed Load

X	Y
404.829	8647.66
390.115	8647.48

Distributed Load

X	Y
473.862	8677.66
458.966	8677.03

External Boundary

X	Y
336.648	8620.18
334.248	8619.41
330.517	8618.22
318.467	8614.3
303.763	8610
287.416	8605.81
267.75	8600
253.242	8597.56
253.242	8472.79
645.903	8472.79
645.903	8715
624.575	8710.77
601.156	8705.33
574.249	8700
551.356	8694.63
534.337	8690
519.227	8687.08
509.483	8685
501.223	8682.65
494.567	8680.82
491.297	8680.1
489.397	8679.54
483.474	8677.61
480.052	8676.19
478.466	8675.53
473.862	8677.66
449.973	8676.65
447.379	8676.54
443.306	8668.45
438.615	8667.79
435.161	8667.3
431.088	8659.22
425.543	8658.44
422.943	8658.07
420.729	8653.89
416.729	8653.39
404.829	8647.66
382.29	8647.38
378.747	8647.34
374.734	8639.37
370.173	8638.84
366.709	8638.43
362.696	8630.46
357.151	8629.82
354.671	8629.53

352.422	8625.06
344.422	8624.06

Material Boundary

X	Y
334.248	8619.41
335.8	8617.72
343.202	8617.72
376.173	8632.02
390.511	8638.12
406.184	8645.63
423.426	8652.06
434.631	8656.28
449.753	8661.59
472.773	8671.38
478.006	8673.12
479.175	8673.61

Material Boundary

X	Y
352.422	8625.06
352.073	8624.37
355.55	8623.97
357.151	8629.82

Material Boundary

X	Y
362.696	8630.46
362.246	8629.57
367.238	8629.29
370.173	8638.84

Material Boundary

X	Y
374.734	8639.37
374.284	8638.48
379.278	8638.22
382.29	8647.38

Material Boundary

X	Y

420.729	8653.89
420.291	8653.06
423.79	8652.97
425.543	8658.44

Material Boundary

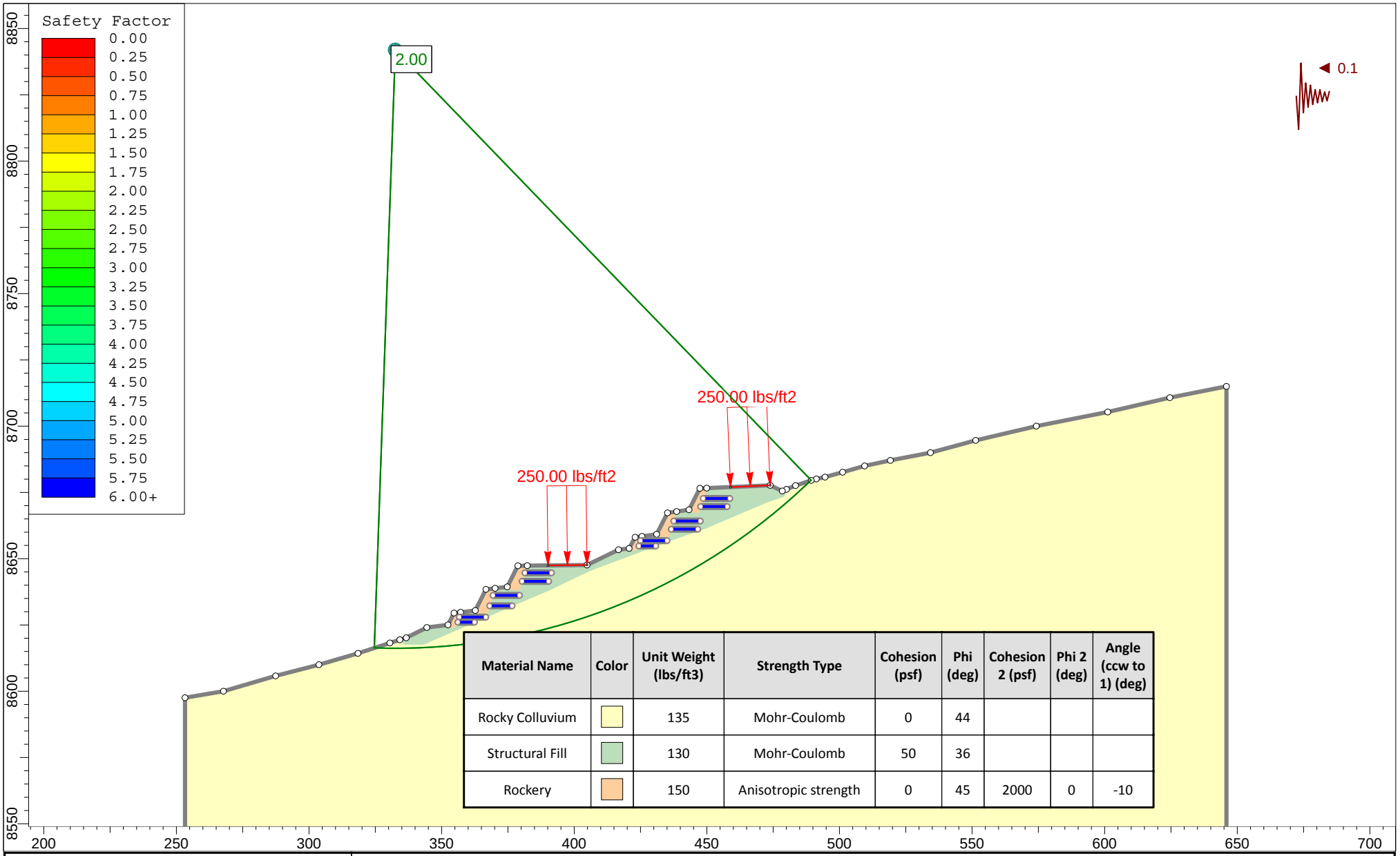
X	Y
431.088	8659.22
430.638	8658.33
435.618	8657.88
438.615	8667.79

Material Boundary

X	Y
443.306	8668.45
442.856	8667.56
446.832	8667.12
449.973	8676.65

Material Boundary

X	Y
479.175	8673.61
480.052	8676.19



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 4-4'		
Drawn By	SL	*Scale* 1:600	*Company* IGES, INC.
Date	9-25-2015		*File Name* P-Static - entire.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static - entire
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.995270
Center: 332.561, 8841.888
Radius: 225.731
Left Slip Surface Endpoint: 324.610, 8616.297
Right Slip Surface Endpoint: 489.397, 8679.540
Resisting Moment=7.55532e+007 lb-ft
Driving Moment=3.78661e+007 lb-ft
Resisting Horizontal Force=308858 lb
Driving Horizontal Force=154795 lb
Total Slice Area=2751.56 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 1
Number of Invalid Surfaces: 0

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.99527

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	6.59151	1014.26	Rocky Colluvium	0	44	96.1765	191.898	198.716	0	198.716

2	6.59151	2918.32	Rocky Colluvium	0	44	266.757	532.252	551.163	0	551.163
3	6.59151	5234.42	Rocky Colluvium	0	44	461.64	921.097	953.825	0	953.825
4	6.59151	6766.53	Rocky Colluvium	0	44	576.228	1149.73	1190.58	0	1190.58
5	6.59151	9598.78	Rocky Colluvium	0	44	789.828	1575.92	1631.92	0	1631.92
6	6.59151	11108.4	Rocky Colluvium	0	44	883.71	1763.24	1825.89	0	1825.89
7	6.59151	17033.7	Rocky Colluvium	0	44	1310.76	2615.32	2708.24	0	2708.24
8	6.59151	17887.8	Rocky Colluvium	0	44	1332	2657.69	2752.11	0	2752.11
9	6.59151	23027	Rocky Colluvium	0	44	1659.8	3311.74	3429.4	0	3429.4
10	6.59151	21482.7	Rocky Colluvium	0	44	1506.86	3006.6	3113.43	0	3113.43
11	6.59151	20090.2	Rocky Colluvium	0	44	1476.03	2945.08	3049.72	0	3049.72
12	6.59151	18511.4	Rocky Colluvium	0	44	1326.15	2646.02	2740.03	0	2740.03
13	6.59151	17643.6	Rocky Colluvium	0	44	1137.24	2269.11	2349.74	0	2349.74
14	6.59151	18255.3	Rocky Colluvium	0	44	1120.52	2235.74	2315.18	0	2315.18
15	6.59151	18664.3	Rocky Colluvium	0	44	1109.18	2213.11	2291.74	0	2291.74
16	6.59151	19367.5	Rocky Colluvium	0	44	1114.04	2222.82	2301.8	0	2301.8
17	6.59151	21436.9	Rocky Colluvium	0	44	1193.07	2380.5	2465.07	0	2465.07
18	6.59151	21689.6	Rocky Colluvium	0	44	1167.4	2329.27	2412.03	0	2412.03
19	6.59151	24113.9	Rocky Colluvium	0	44	1254.39	2502.85	2591.77	0	2591.77
20	6.59151	22397.1	Rocky Colluvium	0	44	1125.2	2245.07	2324.84	0	2324.84
21	6.59151	18874.5	Rocky Colluvium	0	44	968.074	1931.57	2000.21	0	2000.21
22	6.59151	15047.8	Rocky Colluvium	0	44	786.094	1568.47	1624.19	0	1624.19
23	6.59151	10708.5	Rocky Colluvium	0	44	532.975	1063.43	1101.21	0	1101.21
24	6.59151	5033.18	Rocky Colluvium	0	44	217.538	434.048	449.469	0	449.469
25	6.59151	1765.47	Rocky Colluvium	0	44	72.3446	144.347	149.476	0	149.476

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.99527

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	324.61	8616.3	0	0	0
2	331.201	8616.16	560.842	296.172	27.8378
3	337.793	8616.22	1999.78	1056.05	27.8378
4	344.384	8616.47	4287.78	2264.31	27.8378
5	350.976	8616.91	6890.25	3638.64	27.8379
6	357.567	8617.55	10107.7	5337.72	27.8378
7	364.159	8618.38	13312.6	7030.18	27.8378
8	370.75	8619.41	17473.5	9227.46	27.8378
9	377.342	8620.64	21090.5	11137.6	27.8379
10	383.933	8622.08	24822.7	13108.5	27.8379
11	390.525	8623.73	27505.3	14525.1	27.8378
12	397.116	8625.58	29596.6	15629.5	27.8378
13	403.708	8627.66	30831.8	16281.8	27.8378
14	410.299	8629.97	31171.2	16461	27.8378
15	416.891	8632.5	30876.3	16305.3	27.8378
16	423.482	8635.28	29972.2	15827.8	27.8378
17	430.074	8638.31	28423.8	15010.2	27.8379
18	436.665	8641.6	26048.9	13756	27.8378
19	443.257	8645.16	22988.8	12140	27.8378
20	449.848	8649.02	18865.6	9962.6	27.8378
21	456.44	8653.19	14372.3	7589.8	27.8379
22	463.031	8657.68	9929.46	5243.59	27.8378
23	469.623	8662.53	5808.58	3067.42	27.8378
24	476.214	8667.77	2538.46	1340.52	27.8378
25	482.806	8673.42	930.359	491.308	27.8378
26	489.397	8679.54	0	0	0

List Of Coordinates

Distributed Load

X	Y
404.829	8647.66
390.115	8647.48

Distributed Load

X	Y
473.862	8677.66
458.966	8677.03

External Boundary

X	Y
336.648	8620.18
334.248	8619.41
330.517	8618.22
318.467	8614.3
303.763	8610
287.416	8605.81
267.75	8600
253.242	8597.56
253.242	8472.79
645.903	8472.79
645.903	8715
624.575	8710.77
601.156	8705.33
574.249	8700
551.356	8694.63
534.337	8690
519.227	8687.08
509.483	8685
501.223	8682.65
494.567	8680.82
491.297	8680.1
489.397	8679.54
483.474	8677.61
480.052	8676.19
478.466	8675.53
473.862	8677.66
449.973	8676.65
447.379	8676.54
443.306	8668.45
438.615	8667.79
435.161	8667.3
431.088	8659.22
425.543	8658.44
422.943	8658.07
420.729	8653.89
416.729	8653.39
404.829	8647.66
382.29	8647.38
378.747	8647.34
374.734	8639.37
370.173	8638.84
366.709	8638.43
362.696	8630.46
357.151	8629.82

354.671	8629.53
352.422	8625.06
344.422	8624.06

Material Boundary

X	Y
334.248	8619.41
335.8	8617.72
343.202	8617.72
376.173	8632.02
390.511	8638.12
406.184	8645.63
423.426	8652.06
434.631	8656.28
449.753	8661.59
472.773	8671.38
478.006	8673.12
479.175	8673.61

Material Boundary

X	Y
352.422	8625.06
352.073	8624.37
355.55	8623.97
357.151	8629.82

Material Boundary

X	Y
362.696	8630.46
362.246	8629.57
367.238	8629.29
370.173	8638.84

Material Boundary

X	Y
374.734	8639.37
374.284	8638.48
379.278	8638.22
382.29	8647.38

Material Boundary

X	Y
420.729	8653.89
420.291	8653.06
423.79	8652.97
425.543	8658.44

Material Boundary

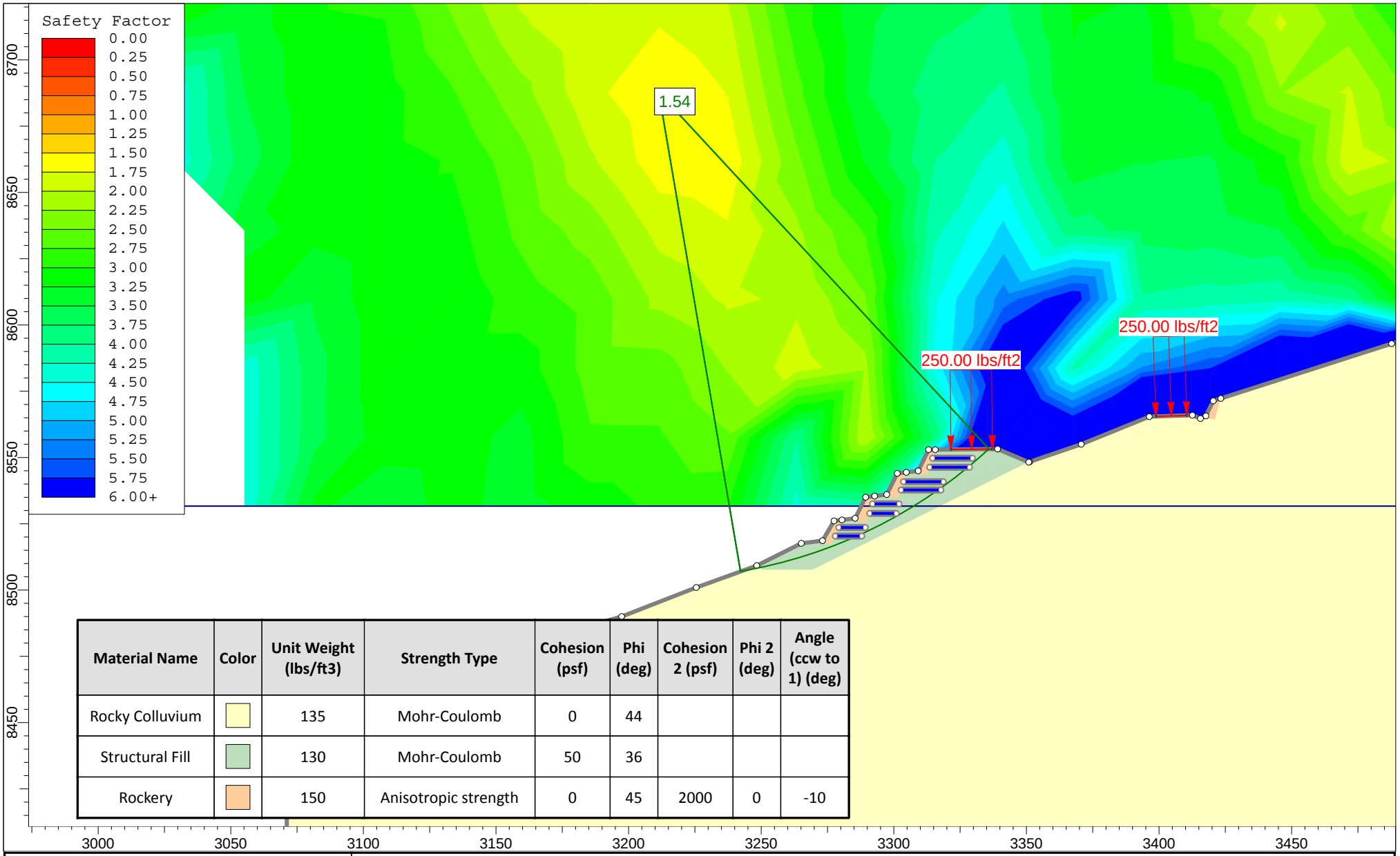
X	Y
431.088	8659.22
430.638	8658.33
435.618	8657.88
438.615	8667.79

Material Boundary

X	Y
443.306	8668.45
442.856	8667.56
446.832	8667.12
449.973	8676.65

Material Boundary

X	Y
479.175	8673.61
480.052	8676.19



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 5-5'		
Drawn By	SL	*Scale* 1:600	*Company* IGES, INC.
Date	9-25-2015		*File Name* Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

3 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 3

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.540910
Center: 3211.376, 8687.759
Radius: 183.369
Left Slip Surface Endpoint: 3242.235, 8507.005
Right Slip Surface Endpoint: 3335.925, 8553.179
Resisting Moment=1.42561e+007 lb-ft
Driving Moment=9.25172e+006 lb-ft
Resisting Horizontal Force=68865.5 lb
Driving Horizontal Force=44691.3 lb
Total Slice Area=756.574 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4252
Number of Invalid Surfaces: 599

Error Codes:

Error Code -102 reported for 13 surfaces
Error Code -103 reported for 9 surfaces
Error Code -106 reported for 51 surfaces
Error Code -107 reported for 3 surfaces

Error Code -108 reported for 29 surfaces
Error Code -111 reported for 58 surfaces
Error Code -112 reported for 128 surfaces
Error Code -1000 reported for 308 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.54091

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.66338	162.915	Rocky Colluvium	0	44	32.1208	49.4953	51.2538	0	51.2538
2	3.66338	479.046	Rocky Colluvium	0	44	91.9223	141.644	146.677	0	146.677
3	3.75493	940.371	Structural Fill	50	36	160.209	246.867	270.963	0	270.963
4	3.75493	1426.09	Structural Fill	50	36	218.681	336.967	394.976	0	394.976
5	3.75493	1870.81	Structural Fill	50	36	269.313	414.987	502.362	0	502.362
6	3.75493	2273.84	Structural Fill	50	36	312.474	481.494	593.902	0	593.902
7	3.75493	2388.23	Structural Fill	50	36	319.312	492.031	608.402	0	608.402
8	3.75493	2026.31	Structural Fill	50	36	270.496	416.81	504.872	0	504.872
9	3.75493	2553.07	Structural Fill	50	36	324.349	499.793	619.086	0	619.086
10	3.75493	4668.74	Structural Fill	50	36	551.322	849.537	1100.47	0	1100.47
11	3.75493	4049.08	Structural Fill	50	36	472.07	727.418	932.384	0	932.384
12	3.75493	3915.15	Structural Fill	50	36	522.81	805.603	1040	0	1040
13	3.75493	6452.92	Structural Fill	50	36	699.003	1077.1	1413.68	0	1413.68
14	3.75493	6001.29	Structural Fill	50	36	637.515	982.353	1283.28	0	1283.28
15	3.75493	5343.56	Structural Fill	50	36	558.158	860.071	1114.97	0	1114.97
16	3.75493	7530.97	Structural Fill	50	36	754.976	1163.35	1532.4	0	1532.4

17	3.75493	7464.15	Structural Fill	50	36	730.782	1126.07	1481.09	0	1481.09
18	3.75493	6398.91	Structural Fill	50	36	615.951	949.125	1237.54	0	1237.54
19	3.75493	7968.76	Structural Fill	50	36	740.621	1141.23	1501.95	0	1501.95
20	3.75493	8121.2	Structural Fill	50	36	796.594	1227.48	1620.66	0	1620.66
21	3.75493	6680.62	Structural Fill	50	36	594.971	916.796	1193.04	0	1193.04
22	3.75493	5332.05	Structural Fill	50	36	532.832	821.046	1061.26	0	1061.26
23	3.75493	3908.45	Structural Fill	50	36	441.546	680.383	867.648	0	867.648
24	3.75493	2405.06	Structural Fill	50	36	289.865	446.656	545.951	0	545.951
25	3.75493	816.388	Structural Fill	50	36	163.952	252.636	278.905	0	278.905

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.54091

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	3242.23	8507.01	0	0	0
2	3245.9	8507.67	83.6564	48.0076	29.8501
3	3249.56	8508.41	311.728	178.891	29.8502
4	3253.32	8509.25	685.52	393.398	29.8501
5	3257.07	8510.17	1141.7	655.182	29.85
6	3260.83	8511.18	1646.23	944.72	29.8502
7	3264.58	8512.28	2169.36	1244.92	29.85
8	3268.34	8513.46	2648.89	1520.11	29.8501
9	3272.09	8514.73	3022.34	1734.42	29.8501
10	3275.85	8516.1	3396.05	1948.88	29.8501
11	3279.6	8517.55	3862.43	2216.52	29.8501
12	3283.36	8519.11	4186.53	2402.51	29.8501
13	3287.11	8520.76	5675.87	3257.2	29.8501
14	3290.87	8522.52	5820.67	3340.29	29.8501
15	3294.62	8524.37	5828.49	3344.78	29.8501
16	3298.38	8526.34	5730.03	3288.27	29.8501
17	3302.13	8528.42	5376.29	3085.28	29.8501
18	3305.89	8530.62	4864.84	2791.77	29.8501
19	3309.64	8532.94	4306.25	2471.22	29.8501
20	3313.4	8535.39	3410.32	1957.07	29.8501
21	3317.15	8537.97	3461.34	1986.35	29.8501
22	3320.91	8540.7	2446.37	1403.89	29.8501
23	3324.66	8543.57	1405.99	806.851	29.8501
24	3328.42	8546.6	969.892	556.589	29.8501
25	3332.17	8549.8	320.434	183.886	29.85
26	3335.92	8553.18	0	0	0

List Of Coordinates

Distributed Load

X	Y
3337.17	8553.19
3321.56	8553.04

Distributed Load

X	Y
3557.63	8619.65
3538.26	8619.23

Distributed Load

X	Y
3410.51	8565.9
3398.86	8565.51

External Boundary

X	Y
3248.35	8509.21
3225.52	8500.97
3197.41	8490
3176.59	8484.11
3126.28	8468.24
3114.23	8465.04
3108.16	8463.75
3103.82	8462.48
3094.3	8459.55
3071.13	8454.48
3071.13	8090.89
3771.89	8090.89
3771.89	8682.15
3734.92	8670.21
3693.28	8658.77
3670.74	8650
3654.61	8644.82
3616.95	8632.84
3595.91	8625.14
3584.79	8621.79
3566.98	8616.54
3560.21	8619.71
3525.76	8618.95
3522.45	8618.88
3518.44	8610.88
3513.83	8610.29

3510.42	8609.86
3506.41	8601.86
3501.48	8601.23
3498.39	8600.85
3495.61	8595.49
3487.73	8592.96
3423.33	8572.29
3420.47	8571.38
3417.68	8565.72
3415.64	8564.72
3412.59	8565.97
3396.37	8565.43
3370.67	8555
3351.24	8548.4
3350.88	8548.28
3339.16	8553.21
3315.66	8552.99
3313.16	8552.96
3309.21	8544.99
3304.72	8544.44
3301.3	8544.03
3297.34	8536.04
3292.82	8535.49
3289.41	8535.07
3285.44	8527.08
3280.48	8526.47
3277.49	8526.1
3273.16	8518.62
3265.16	8517.62

Material Boundary

X	Y
3273.16	8518.62
3272.65	8517.76
3276.62	8517.24
3280.48	8526.47

Material Boundary

X	Y
3285.44	8527.08
3284.99	8526.18
3289.96	8525.6
3292.82	8535.49

Material Boundary

X	Y
3297.34	8536.04
3296.89	8535.15
3301.86	8534.57
3304.72	8544.44

Material Boundary

X	Y
3309.21	8544.99
3308.75	8544.1
3312.73	8543.67
3315.66	8552.99

Material Boundary

X	Y
3417.68	8565.72
3417.24	8564.83
3421.17	8564.12
3423.33	8572.29

Material Boundary

X	Y
3495.61	8595.49
3495.16	8594.59
3499.14	8594.2
3501.48	8601.23

Material Boundary

X	Y
3506.41	8601.86
3505.96	8600.96
3510.92	8600.32
3513.83	8610.29

Material Boundary

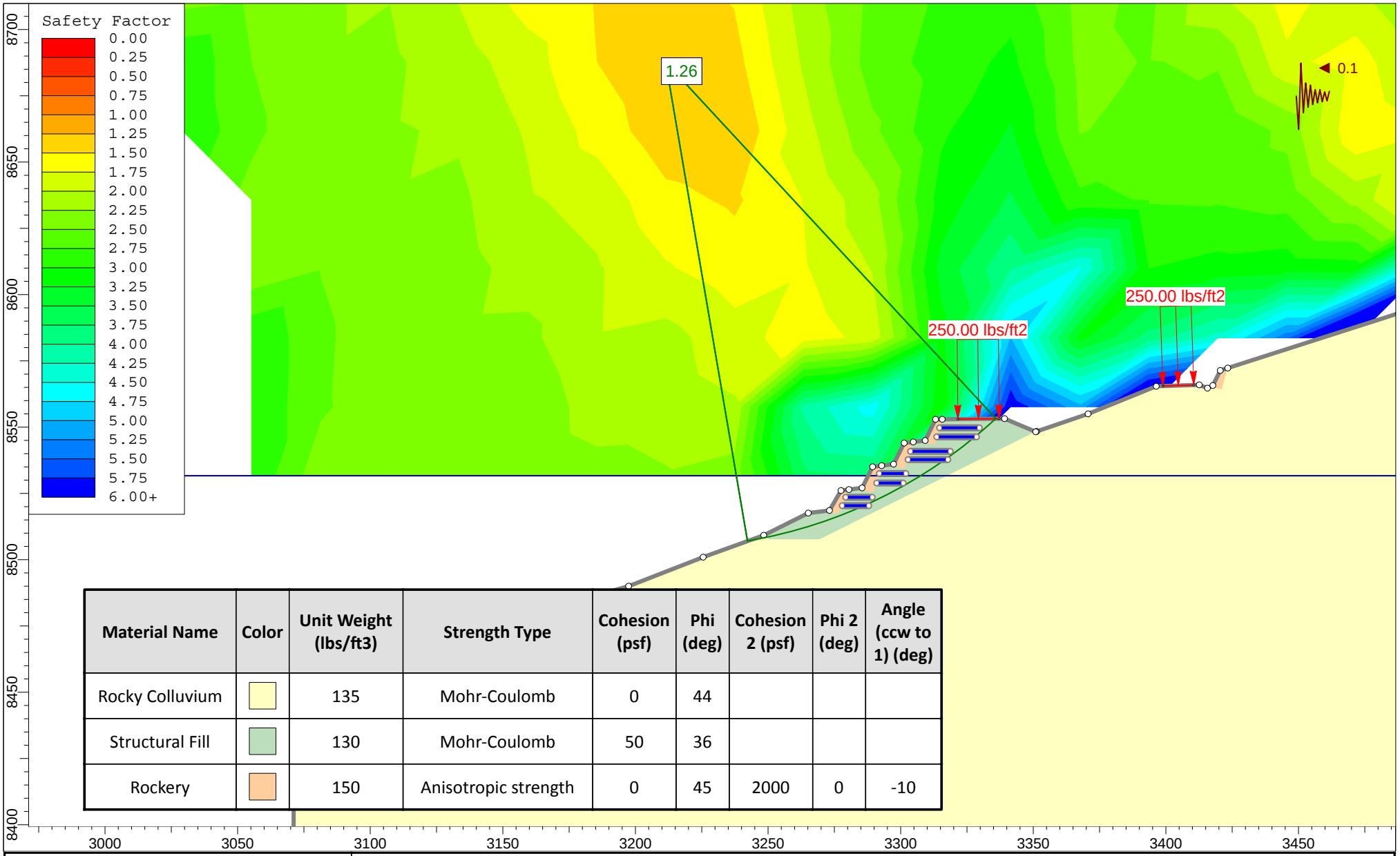
X	Y
3518.44	8610.88
3517.99	8609.98
3522.95	8609.34
3525.76	8618.95

Material Boundary

X	Y
3248.35	8509.21
3250.85	8507.55
3269.41	8507.55
3351.24	8548.4

Material Boundary

X	Y
3487.73	8592.96
3491.12	8589.59
3507.02	8589.59
3566.98	8616.54



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 5-5'		
Drawn By	SL	*Scale* 1:600	*Company* IGES, INC.
Date	9-25-2015	*File Name*	P-Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
3 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 3

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None

Ru Value	0	0	0

Support Properties

Mirafi 3XT

Support Type: GeoTextile
Force Application: Passive
Force Orientation: Parallel to Reinforcement
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 1918 lb/ft
Default Pullout Strength Adhesion: 5 psf
Default Pullout Strength Friction Angle: 40 degrees
and Material Dependent

Pullout Strength Dependency:

Material	Adhesion (psf)	Friction Angle (deg)
Structural Fill	50	36

Global Minimums

Method: spencer

FS: 1.261400
Center: 3211.376, 8687.759
Radius: 183.369
Left Slip Surface Endpoint: 3242.235, 8507.005
Right Slip Surface Endpoint: 3335.925, 8553.179
Resisting Moment=1.36359e+007 lb-ft
Driving Moment=1.08101e+007 lb-ft
Resisting Horizontal Force=66189.7 lb
Driving Horizontal Force=52473 lb
Total Slice Area=756.574 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4113
Number of Invalid Surfaces: 738

Error Codes:

Error Code -102 reported for 13 surfaces
Error Code -103 reported for 9 surfaces
Error Code -106 reported for 51 surfaces

Error Code -107 reported for 1 surface
Error Code -108 reported for 49 surfaces
Error Code -111 reported for 142 surfaces
Error Code -112 reported for 165 surfaces
Error Code -1000 reported for 308 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.2614

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.66338	162.915	Rocky Colluvium	0	44	40.9819	51.6946	53.5312	0	53.5312
2	3.66338	479.046	Rocky Colluvium	0	44	116.463	146.907	152.127	0	152.127
3	3.75493	940.371	Structural Fill	50	36	199.875	252.122	278.196	0	278.196
4	3.75493	1426.09	Structural Fill	50	36	269.947	340.511	399.855	0	399.855
5	3.75493	1870.81	Structural Fill	50	36	329.784	415.989	503.74	0	503.74
6	3.75493	2273.84	Structural Fill	50	36	380.002	479.334	590.928	0	590.928
7	3.75493	2388.23	Structural Fill	50	36	386.226	487.186	601.734	0	601.734
8	3.75493	2026.31	Structural Fill	50	36	326.13	411.38	497.396	0	497.396
9	3.75493	2553.07	Structural Fill	50	36	388.3	489.801	605.333	0	605.333
10	3.75493	4668.74	Structural Fill	50	36	653.908	824.84	1066.47	0	1066.47
11	3.75493	4049.08	Structural Fill	50	36	557.73	703.52	899.493	0	899.493
12	3.75493	3915.15	Structural Fill	50	36	658.831	831.05	1075.02	0	1075.02
13	3.75493	6452.92	Structural Fill	50	36	815.868	1029.14	1347.67	0	1347.67
14	3.75493	6001.29	Structural Fill	50	36	740.895	934.565	1217.5	0	1217.5
15	3.75493	5343.56	Structural Fill	50	36	646.105	814.997	1052.93	0	1052.93
16	3.75493	7530.97	Structural Fill	50	36	868.361	1095.35	1438.8	0	1438.8

17	3.75493	7464.15	Structural Fill	50	36	836.737	1055.46	1383.9	0	1383.9
18	3.75493	6398.91	Structural Fill	50	36	702.643	886.314	1151.09	0	1151.09
19	3.75493	7968.76	Structural Fill	50	36	840.122	1059.73	1389.78	0	1389.78
20	3.75493	8121.2	Structural Fill	50	36	935.27	1179.75	1554.97	0	1554.97
21	3.75493	6680.62	Structural Fill	50	36	669.596	844.628	1093.71	0	1093.71
22	3.75493	5332.05	Structural Fill	50	36	602.492	759.983	977.208	0	977.208
23	3.75493	3908.45	Structural Fill	50	36	513.319	647.5	822.388	0	822.388
24	3.75493	2405.06	Structural Fill	50	36	329.719	415.907	503.628	0	503.628
25	3.75493	816.388	Structural Fill	50	36	187.76	236.84	257.164	0	257.164

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.2614

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	3242.23	8507.01	0	0	0
2	3245.9	8507.67	98.5284	65.3113	33.5391
3	3249.56	8508.41	365.168	242.058	33.5391
4	3253.32	8509.25	788.852	522.904	33.5391
5	3257.07	8510.17	1291.85	856.327	33.5392
6	3260.83	8511.18	1836.74	1217.52	33.5392
7	3264.58	8512.28	2391.32	1585.13	33.5391
8	3268.34	8513.46	2893.24	1917.83	33.539
9	3272.09	8514.73	3284.21	2176.99	33.539
10	3275.85	8516.1	3663.56	2428.45	33.5391
11	3279.6	8517.55	4101.31	2718.62	33.5391
12	3283.36	8519.11	4396.21	2914.1	33.5391
13	3287.11	8520.76	6226.25	4127.17	33.539
14	3290.87	8522.52	6284.74	4165.95	33.5391
15	3294.62	8524.37	6206.86	4114.32	33.5391
16	3298.38	8526.34	6029.82	3996.97	33.5391
17	3302.13	8528.42	5548.13	3677.67	33.5391
18	3305.89	8530.62	4906.2	3252.15	33.539
19	3309.64	8532.94	4237.58	2808.95	33.5391
20	3313.4	8535.39	3197.49	2119.51	33.5391
21	3317.15	8537.97	3407.55	2258.75	33.5391
22	3320.91	8540.7	2278.81	1510.55	33.5391
23	3324.66	8543.57	1211.43	803.016	33.5391
24	3328.42	8546.6	910.605	603.61	33.5391
25	3332.17	8549.8	307.454	203.801	33.5391
26	3335.92	8553.18	0	0	0

List Of Coordinates

Distributed Load

X	Y
3337.17	8553.19
3321.56	8553.04

Distributed Load

X	Y
3557.63	8619.65
3538.26	8619.23

Distributed Load

X	Y
3410.51	8565.9
3398.86	8565.51

External Boundary

X	Y
3248.35	8509.21
3225.52	8500.97
3197.41	8490
3176.59	8484.11
3126.28	8468.24
3114.23	8465.04
3108.16	8463.75
3103.82	8462.48
3094.3	8459.55
3071.13	8454.48
3071.13	8090.89
3771.89	8090.89
3771.89	8682.15
3734.92	8670.21
3693.28	8658.77
3670.74	8650
3654.61	8644.82
3616.95	8632.84
3595.91	8625.14
3584.79	8621.79
3566.98	8616.54
3560.21	8619.71
3525.76	8618.95
3522.45	8618.88
3518.44	8610.88
3513.83	8610.29

3510.42	8609.86
3506.41	8601.86
3501.48	8601.23
3498.39	8600.85
3495.61	8595.49
3487.73	8592.96
3423.33	8572.29
3420.47	8571.38
3417.68	8565.72
3415.64	8564.72
3412.59	8565.97
3396.37	8565.43
3370.67	8555
3351.24	8548.4
3350.88	8548.28
3339.16	8553.21
3315.66	8552.99
3313.16	8552.96
3309.21	8544.99
3304.72	8544.44
3301.3	8544.03
3297.34	8536.04
3292.82	8535.49
3289.41	8535.07
3285.44	8527.08
3280.48	8526.47
3277.49	8526.1
3273.16	8518.62
3265.16	8517.62

Material Boundary

X	Y
3273.16	8518.62
3272.65	8517.76
3276.62	8517.24
3280.48	8526.47

Material Boundary

X	Y
3285.44	8527.08
3284.99	8526.18
3289.96	8525.6
3292.82	8535.49

Material Boundary

X	Y
3297.34	8536.04
3296.89	8535.15
3301.86	8534.57
3304.72	8544.44

Material Boundary

X	Y
3309.21	8544.99
3308.75	8544.1
3312.73	8543.67
3315.66	8552.99

Material Boundary

X	Y
3417.68	8565.72
3417.24	8564.83
3421.17	8564.12
3423.33	8572.29

Material Boundary

X	Y
3495.61	8595.49
3495.16	8594.59
3499.14	8594.2
3501.48	8601.23

Material Boundary

X	Y
3506.41	8601.86
3505.96	8600.96
3510.92	8600.32
3513.83	8610.29

Material Boundary

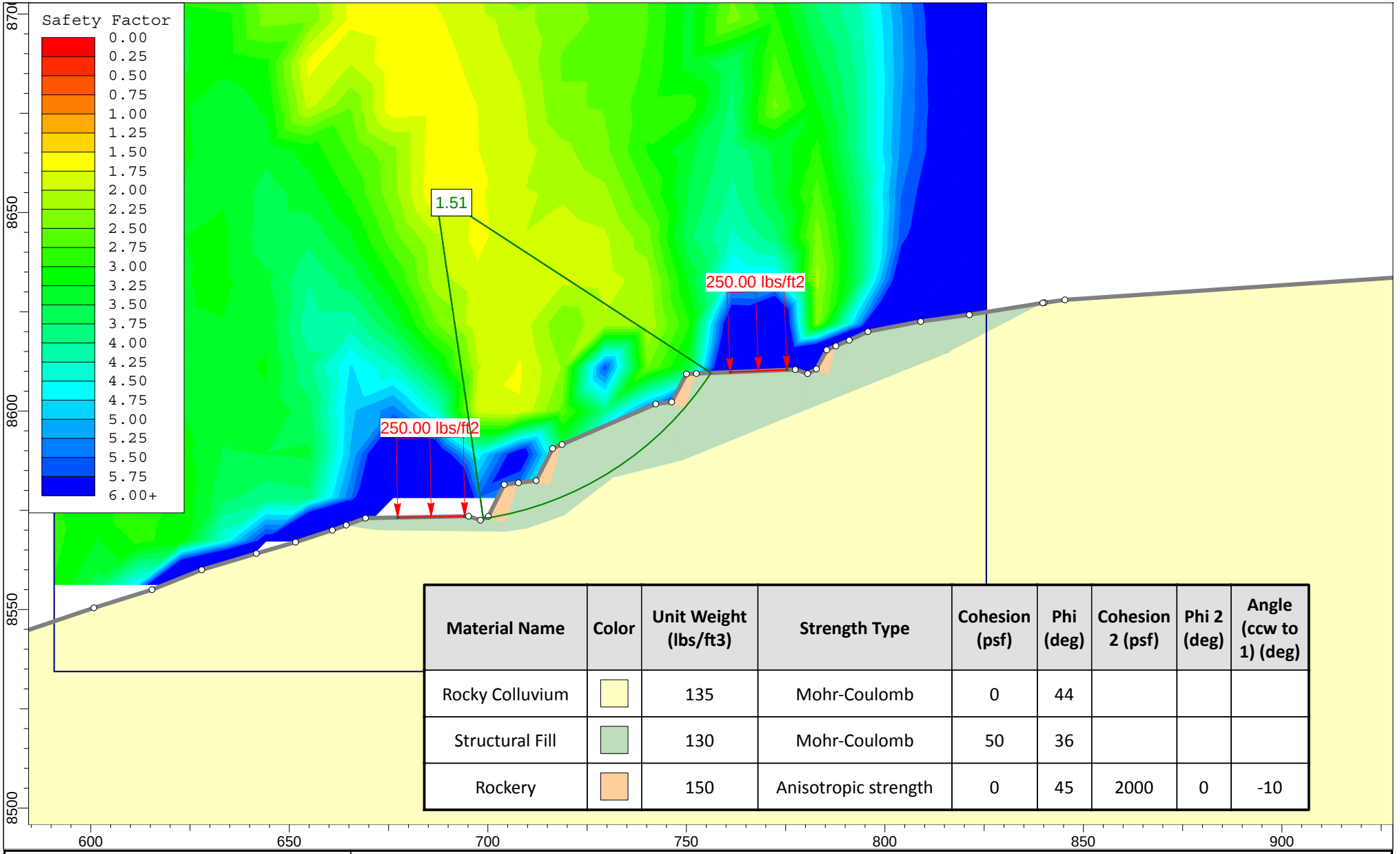
X	Y
3518.44	8610.88
3517.99	8609.98
3522.95	8609.34
3525.76	8618.95

Material Boundary

X	Y
3248.35	8509.21
3250.85	8507.55
3269.41	8507.55
3351.24	8548.4

Material Boundary

X	Y
3487.73	8592.96
3491.12	8589.59
3507.02	8589.59
3566.98	8616.54



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 6-6'		
Drawn By	SL	Scale	1:400
Company	IGES, INC.		
Date	9-25-2015	File Name	Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: spencer

FS: 1.507160
Center: 686.824, 8654.806
Radius: 82.828
Left Slip Surface Endpoint: 698.866, 8572.857
Right Slip Surface Endpoint: 756.228, 8609.599
Resisting Moment=4.07178e+006 lb-ft
Driving Moment=2.70162e+006 lb-ft
Resisting Horizontal Force=42382.2 lb
Driving Horizontal Force=28120.6 lb
Total Slice Area=502.741 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3227
Number of Invalid Surfaces: 1580

Error Codes:

Error Code -103 reported for 771 surfaces
Error Code -106 reported for 6 surfaces
Error Code -107 reported for 3 surfaces
Error Code -108 reported for 34 surfaces
Error Code -111 reported for 128 surfaces
Error Code -112 reported for 638 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.50716

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]

1	1.03808	24.0974	Structural Fill	50	36	53.0378	79.9364	41.204	0	41.204
2	2.69095	993.414	Rockery	234.651	39.7204	421.274	634.927	481.787	0	481.787
3	2.69095	2762.58	Rockery	278.905	38.7247	807.971	1217.74	1170.82	0	1170.82
4	2.46687	2559.6	Structural Fill	50	36	547.069	824.521	1066.04	0	1066.04
5	2.46687	2268.33	Structural Fill	50	36	473.402	713.492	913.217	0	913.217
6	2.46687	2185.43	Structural Fill	50	36	442.797	667.366	849.731	0	849.731
7	2.46687	3225.6	Structural Fill	50	36	615.254	927.286	1207.48	0	1207.48
8	2.46687	4400.54	Structural Fill	50	36	798.999	1204.22	1588.66	0	1588.66
9	2.46687	4278.91	Structural Fill	50	36	752.302	1133.84	1491.77	0	1491.77
10	2.46687	4238.4	Structural Fill	50	36	720.793	1086.35	1426.4	0	1426.4
11	2.46687	4201.06	Structural Fill	50	36	690.797	1041.14	1364.19	0	1364.19
12	2.46687	4130.8	Structural Fill	50	36	656.729	989.796	1293.52	0	1293.52
13	2.46687	4025.84	Structural Fill	50	36	618.77	932.586	1214.77	0	1214.77
14	2.46687	3884.09	Structural Fill	50	36	577.085	869.76	1128.3	0	1128.3
15	2.46687	3703.13	Structural Fill	50	36	531.827	801.548	1034.42	0	1034.42
16	2.46687	3480.06	Structural Fill	50	36	483.134	728.16	933.408	0	933.408
17	2.46687	3211.45	Structural Fill	50	36	431.138	649.794	825.544	0	825.544
18	2.46687	2893.12	Structural Fill	50	36	375.961	566.633	711.084	0	711.084
19	2.46687	2399.2	Structural Fill	50	36	303.906	458.035	561.613	0	561.613
20	2.46687	1861.37	Structural Fill	50	36	232.046	349.731	412.545	0	412.545
21	2.46687	2464.48	Structural Fill	50	36	284.197	428.33	520.726	0	520.726
22	0.166705	197.122	Rockery	1483.69	11.6171	1016.07	1531.38	231.973	0	231.973
23	2.12406	2143.88	Structural Fill	50	36	272.724	411.039	496.926	0	496.926
24	2.12406	1220.95	Structural Fill	50	36	159.67	240.648	262.405	0	262.405
25	2.12406	416.709	Structural Fill	50	36	68.4197	103.12	73.1128	0	73.1128

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.50716

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	698.866	8572.86	0	0	0
2	699.904	8573.02	48.4624	27.6355	29.6938
3	702.595	8573.49	952.093	542.928	29.6938
4	705.286	8574.06	2459.49	1402.51	29.6937
5	707.753	8574.66	3164.38	1804.48	29.6938
6	710.219	8575.35	3705.85	2113.25	29.6938
7	712.686	8576.12	4144.62	2363.46	29.6939
8	715.153	8576.97	4630.18	2640.34	29.6938
9	717.62	8577.92	5102.46	2909.66	29.6938
10	720.087	8578.95	5413.87	3087.24	29.6938
11	722.554	8580.08	5578.71	3181.24	29.6938
12	725.021	8581.31	5603.36	3195.29	29.6937
13	727.487	8582.65	5494.84	3133.41	29.6938
14	729.954	8584.09	5262.82	3001.11	29.6938
15	732.421	8585.66	4919.81	2805.5	29.6938
16	734.888	8587.35	4481.39	2555.5	29.6938
17	737.355	8589.18	3966.67	2261.98	29.6938
18	739.822	8591.15	3398.78	1938.14	29.6938
19	742.289	8593.29	2805.66	1599.92	29.6938
20	744.756	8595.61	2253.48	1285.04	29.6938
21	747.222	8598.13	1786.35	1018.66	29.6938
22	749.689	8600.87	1055.5	601.896	29.6938
23	749.856	8601.07	1179.57	672.643	29.6937
24	751.98	8603.67	468.371	267.087	29.6938
25	754.104	8606.49	65.0888	37.1167	29.6938
26	756.228	8609.6	0	0	0

List Of Coordinates

Distributed Load

X	Y
694.18	8573.48
677.313	8573.18

Distributed Load

X	Y
775.378	8610.38
761.042	8609.79

External Boundary

X	Y
712.158	8582.47
707.692	8581.92
704.147	8581.48
700.142	8573.49
698.139	8572.5
695.135	8573.5
669.186	8573.04
664.324	8571.26
660.858	8570
651.579	8566.97
641.697	8564.12
627.949	8560
615.417	8555
600.766	8550.43
576.666	8542.29
576.666	8484.11
933.571	8484.11
933.826	8633.99
845.33	8628.01
840.152	8627.29
839.773	8627.23
821.282	8624.26
809.037	8622.55
795.725	8620
791.035	8617.83
787.674	8616.39
785.358	8615.39
782.743	8610.58
780.553	8609.43
777.452	8610.46
752.516	8609.45
750.033	8609.35
746.292	8602.28
742.292	8601.78
718.697	8591.6
716.295	8590.56

Material Boundary

X	Y
746.292	8602.28
745.825	8601.39
749.79	8600.86
752.516	8609.45

Material Boundary

X	Y
700.142	8573.49
699.694	8572.6
704.661	8572.02
707.692	8581.92

Material Boundary

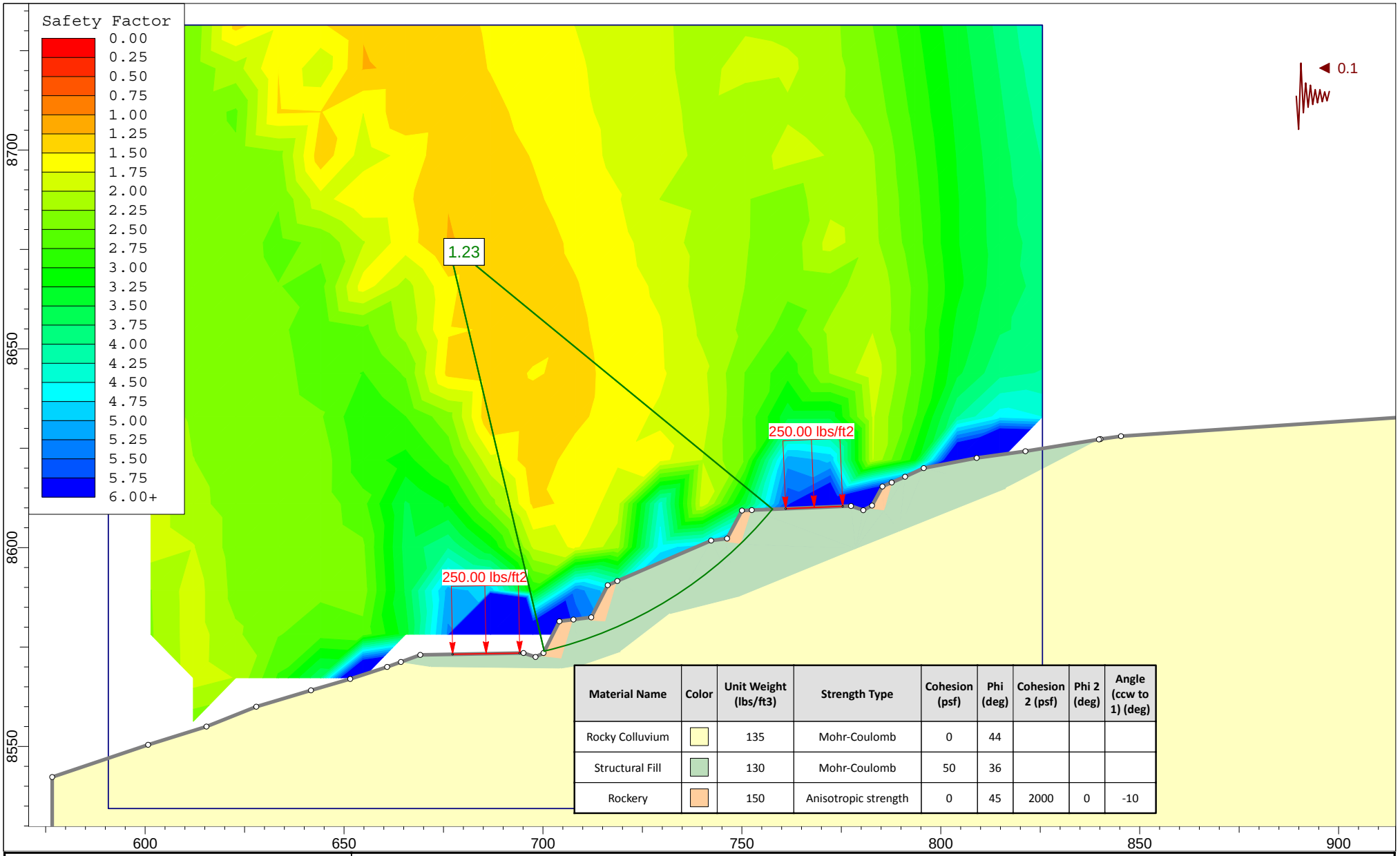
X	Y
712.158	8582.47
711.7	8581.58
715.694	8581.35
718.697	8591.6

Material Boundary

X	Y
782.743	8610.58
782.247	8609.72
785.719	8609.28
787.674	8616.39

Material Boundary

X	Y
664.324	8571.26
671.862	8570.09
704.542	8569.71
709.945	8570.55
719.592	8573.92
731.958	8583.42
749.265	8587.78
778.566	8599.76
789.567	8604.18
816.212	8614.87
839.773	8627.23



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)
Rocky Colluvium		135	Mohr-Coulomb	0	44			
Structural Fill		130	Mohr-Coulomb	50	36			
Rockery		150	Anisotropic strength	0	45	2000	0	-10

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 6-6'		
Drawn By	SL	Scale 1:400	Company IGES, INC.
Date	9-25-2015		File Name P-Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: spencer

FS: 1.233410
Center: 676.152, 8676.697
Radius: 105.599
Left Slip Surface Endpoint: 700.350, 8573.908
Right Slip Surface Endpoint: 757.744, 8609.661
Resisting Moment=4.40715e+006 lb-ft
Driving Moment=3.57313e+006 lb-ft
Resisting Horizontal Force=36234 lb
Driving Horizontal Force=29377 lb
Total Slice Area=441.684 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3049
Number of Invalid Surfaces: 1758

Error Codes:

Error Code -102 reported for 12 surfaces
Error Code -103 reported for 417 surfaces
Error Code -106 reported for 20 surfaces
Error Code -107 reported for 1 surface
Error Code -108 reported for 100 surfaces
Error Code -111 reported for 188 surfaces
Error Code -112 reported for 707 surfaces
Error Code -113 reported for 181 surfaces
Error Code -1000 reported for 132 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-113 = Surface intersects outside slope limits.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.23341

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.65834	925.582	Rockery	330.628	37.5609	575.855	710.265	493.665	0	493.665
2	2.65834	2437.59	Rockery	370.2	36.6705	930.012	1147.09	1043.39	0	1043.39
3	2.31518	1981.7	Structural Fill	50	36	530.185	653.936	831.245	0	831.245
4	2.31518	1718.3	Structural Fill	50	36	452.27	557.834	698.974	0	698.974
5	2.31518	1607.23	Structural Fill	50	36	413.418	509.914	633.018	0	633.018
6	2.31518	2477.34	Structural Fill	50	36	592.25	730.487	936.612	0	936.612
7	2.31518	3594.96	Structural Fill	50	36	811.972	1001.5	1309.62	0	1309.62
8	2.31518	3537.91	Structural Fill	50	36	775.101	956.017	1247.02	0	1247.02
9	2.31518	3461.11	Structural Fill	50	36	735.765	907.5	1180.25	0	1180.25
10	2.31518	3426.8	Structural Fill	50	36	706.275	871.127	1130.18	0	1130.18
11	2.31518	3371.24	Structural Fill	50	36	673.842	831.123	1075.12	0	1075.12
12	2.31518	3293.61	Structural Fill	50	36	638.642	787.707	1015.37	0	1015.37
13	2.31518	3192.99	Structural Fill	50	36	600.841	741.083	951.192	0	951.192
14	2.31518	3068.36	Structural Fill	50	36	560.592	691.44	882.865	0	882.865
15	2.31518	2918.54	Structural Fill	50	36	518.041	638.957	810.63	0	810.63
16	2.31518	2742.25	Structural Fill	50	36	473.323	583.801	734.712	0	734.712
17	2.31518	2537.98	Structural Fill	50	36	426.564	526.128	655.335	0	655.335
18	2.31518	2300.56	Structural Fill	50	36	377.374	465.457	571.827	0	571.827
19	2.31518	1893.27	Structural Fill	50	36	306.827	378.443	452.065	0	452.065
20	2.31518	1552.9	Structural Fill	50	36	249.814	308.123	355.278	0	355.278
21	2.31518	2253.56	Structural Fill	50	36	333.105	410.855	496.676	0	496.676
22	0.202432	238.294	Rockery	1315.28	15.4062	1151.5	1420.27	380.994	0	380.994
23	2.62858	2604.1	Structural Fill	50	36	324	399.625	481.218	0	481.218
24	2.62858	1484.28	Structural Fill	50	36	191.938	236.738	257.023	0	257.023

25	2.62858	507.514	Structural Fill	50	36	85.5659	105.538	76.4412	0	76.4412

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.23341

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	700.35	8573.91	0	0	0
2	703.009	8574.57	1115.62	797.996	35.5759
3	705.667	8575.31	2582.86	1847.5	35.5759
4	707.982	8576.01	3031.42	2168.35	35.5758
5	710.297	8576.77	3377.44	2415.86	35.5759
6	712.613	8577.59	3656.66	2615.58	35.5758
7	714.928	8578.48	3957.19	2830.55	35.5759
8	717.243	8579.42	4244.21	3035.85	35.5758
9	719.558	8580.43	4429.53	3168.41	35.5759
10	721.873	8581.51	4519.6	3232.84	35.5759
11	724.189	8582.66	4520.24	3233.3	35.5759
12	726.504	8583.88	4437.01	3173.76	35.5759
13	728.819	8585.17	4276.74	3059.12	35.5759
14	731.134	8586.54	4047.61	2895.23	35.5759
15	733.449	8587.99	3759.18	2688.92	35.5759
16	735.764	8589.53	3422.47	2448.07	35.5759
17	738.08	8591.16	3050.05	2181.68	35.5759
18	740.395	8592.89	2656.2	1899.96	35.5759
19	742.71	8594.71	2257.83	1615.01	35.5759
20	745.025	8596.65	1906.07	1363.4	35.5759
21	747.34	8598.7	1601.84	1145.78	35.5758
22	749.656	8600.88	1068.15	764.044	35.576
23	749.858	8601.08	1203.11	860.579	35.576
24	752.487	8603.73	519.48	371.581	35.5759
25	755.115	8606.58	143.707	102.792	35.5757
26	757.744	8609.66	0	0	0

List Of Coordinates

Distributed Load

X	Y
694.18	8573.48
677.313	8573.18

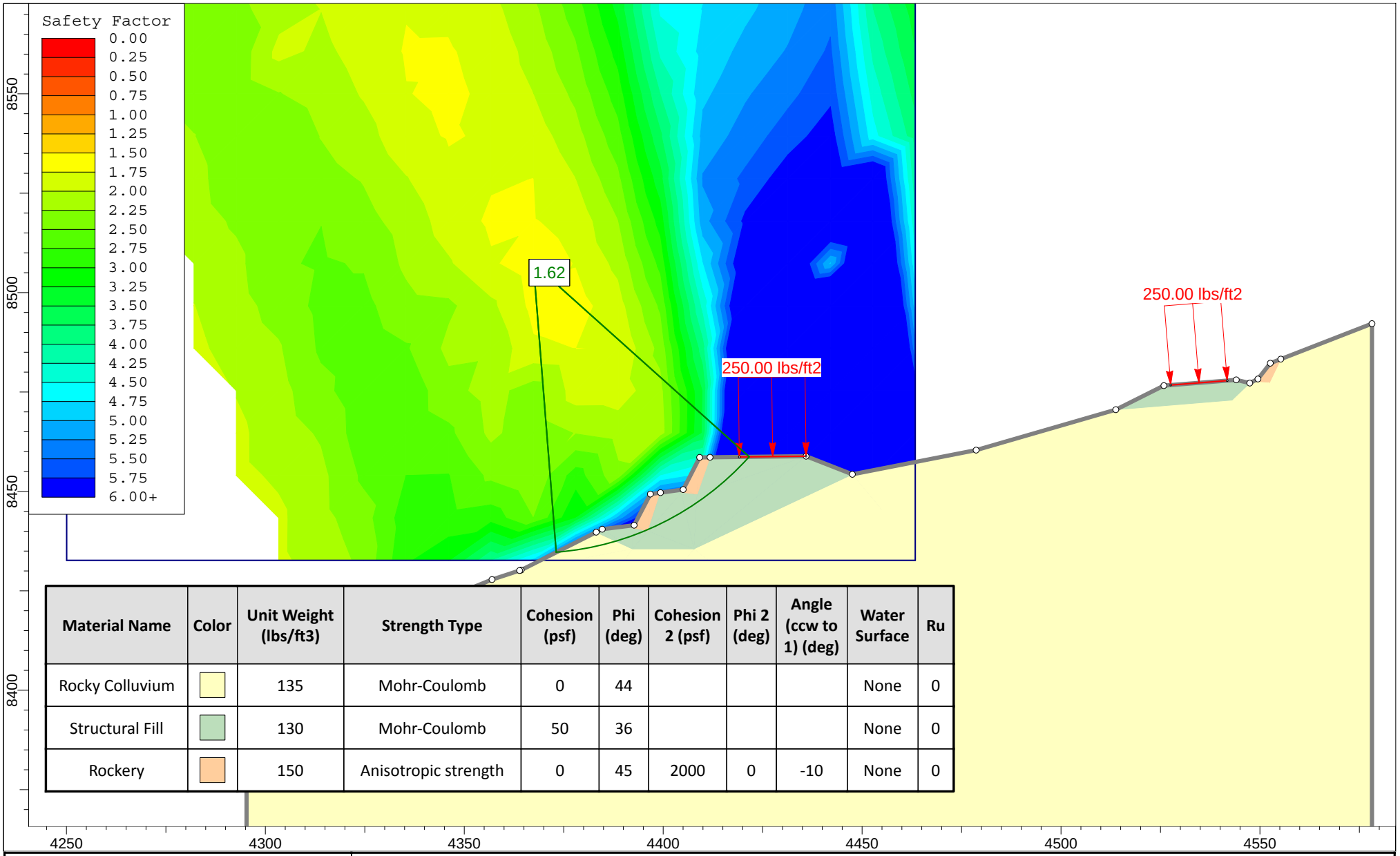
Distributed Load

X	Y
775.378	8610.38
761.042	8609.79

External Boundary

X	Y
712.158	8582.47
707.692	8581.92
704.147	8581.48
700.142	8573.49
698.139	8572.5
695.135	8573.5
669.186	8573.04
664.324	8571.26
660.858	8570
651.579	8566.97
641.697	8564.12
627.949	8560
615.417	8555
600.766	8550.43
576.666	8542.29
576.666	8484.11
933.571	8484.11
933.826	8633.99
845.33	8628.01
840.152	8627.29
839.773	8627.23
821.282	8624.26
809.037	8622.55
795.725	8620
791.035	8617.83
787.674	8616.39
785.358	8615.39
782.743	8610.58
780.553	8609.43
777.452	8610.46
752.516	8609.45
750.033	8609.35
746.292	8602.28
742.292	8601.78
718.697	8591.6
716.295	8590.56

Material Boundary



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)	Water Surface	Ru
Rocky Colluvium		135	Mohr-Coulomb	0	44				None	0
Structural Fill		130	Mohr-Coulomb	50	36				None	0
Rockery		150	Anisotropic strength	0	45	2000	0	-10	None	0

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITION - SECTION 7-7'		
Drawn By	SL	Scale	1:400
Company	IGES, INC.		
Date	9-25-2015	File Name	Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: spencer

FS: 1.623560
Center: 4367.362, 8507.319
Radius: 72.876
Left Slip Surface Endpoint: 4373.120, 8434.671
Right Slip Surface Endpoint: 4421.639, 8458.689
Resisting Moment=1.8668e+006 lb-ft
Driving Moment=1.14982e+006 lb-ft
Resisting Horizontal Force=22391.7 lb
Driving Horizontal Force=13791.7 lb
Total Slice Area=241.237 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4030
Number of Invalid Surfaces: 821

Error Codes:

Error Code -102 reported for 1 surface
Error Code -103 reported for 7 surfaces
Error Code -106 reported for 28 surfaces
Error Code -107 reported for 64 surfaces
Error Code -108 reported for 49 surfaces
Error Code -111 reported for 82 surfaces
Error Code -112 reported for 161 surfaces
Error Code -1000 reported for 429 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.62356

					Base			Base		Effective

Slice Number	Width [ft]	Weight [lbs]	Base Material	Cohesion [psf]	Friction Angle [degrees]	Stress [psf]	Strength [psf]	Normal Stress [psf]	Pressure [psf]	Normal Stress [psf]
1	2.14165	126.877	Rocky Colluvium	0	44	43.2804	70.2684	72.7648	0	72.7648
2	2.14165	371.367	Rocky Colluvium	0	44	122.04	198.14	205.181	0	205.181
3	2.14165	597.227	Rocky Colluvium	0	44	189.196	307.171	318.085	0	318.085
4	2.14165	804.226	Rocky Colluvium	0	44	245.728	398.954	413.128	0	413.128
5	2.14165	991.029	Rocky Colluvium	0	44	292.183	474.376	491.229	0	491.229
6	2.14165	1101.48	Rocky Colluvium	0	44	313.459	508.919	527.004	0	527.004
7	2.14165	1019.65	Rocky Colluvium	0	44	280.15	454.841	471.001	0	471.001
8	1.84809	791.135	Structural Fill	50	36	212.028	344.24	404.986	0	404.986
9	1.84809	701.759	Structural Fill	50	36	187.355	304.182	349.852	0	349.852
10	1.84809	753.051	Structural Fill	50	36	193.987	314.95	364.672	0	364.672
11	1.84809	1480.93	Structural Fill	50	36	341.603	554.613	694.538	0	694.538
12	0.835688	931.229	Rockery	595.597	31.5991	731.561	1187.73	962.539	0	962.539
13	1.94608	2360.36	Structural Fill	50	36	482.118	782.748	1008.54	0	1008.54
14	1.94608	2022.57	Structural Fill	50	36	406.472	659.932	839.5	0	839.5
15	1.94608	1809.46	Structural Fill	50	36	357.028	579.656	729.009	0	729.009
16	1.94608	1609.17	Structural Fill	50	36	312.152	506.797	628.727	0	628.727
17	1.94608	1561.81	Structural Fill	50	36	295.433	479.653	591.367	0	591.367
18	1.94608	2269.69	Structural Fill	50	36	403.906	655.765	833.763	0	833.763
19	1.94608	2901.69	Structural Fill	50	36	493.076	800.539	1033.03	0	1033.03
20	1.94608	2534.43	Structural Fill	50	36	421.034	683.574	872.039	0	872.039
21	1.94608	2065.74	Structural Fill	50	36	337.482	547.922	685.331	0	685.331
22	1.94608	1663.16	Structural Fill	50	36	268.203	435.443	530.516	0	530.516
23	1.94608	1230.37	Structural Fill	50	36	198.75	322.683	375.316	0	375.316
24	1.94608	764.339	Structural Fill	50	36	147.982	240.257	261.866	0	261.866
25	1.94608	261.295	Structural Fill	50	36	125.878	204.37	212.472	0	212.472

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.62356

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	4373.12	8434.67	0	0	0
2	4375.26	8434.87	78.1731	39.2185	26.6424
3	4377.4	8435.14	285.455	143.209	26.6423
4	4379.55	8435.47	586.19	294.084	26.6423
5	4381.69	8435.86	949.647	476.426	26.6423

6	4383.83	8436.33	1349.01	676.78	26.6423
7	4385.97	8436.86	1741.56	873.717	26.6423
8	4388.11	8437.46	2059.58	1033.27	26.6424
9	4389.96	8438.04	2218.9	1113.2	26.6425
10	4391.81	8438.67	2345.2	1176.56	26.6424
11	4393.66	8439.35	2453.99	1231.14	26.6424
12	4395.5	8440.1	2569.48	1289.08	26.6424
13	4396.34	8440.45	2839.18	1424.38	26.6423
14	4398.29	8441.33	2894.02	1451.89	26.6423
15	4400.23	8442.28	2890.94	1450.35	26.6424
16	4402.18	8443.3	2842.84	1426.22	26.6424
17	4404.12	8444.39	2761.41	1385.36	26.6423
18	4406.07	8445.57	2640.6	1324.76	26.6424
19	4408.02	8446.84	2374.39	1191.2	26.6423
20	4409.96	8448.19	1936.22	971.376	26.6423
21	4411.91	8449.64	1490.75	747.892	26.6424
22	4413.85	8451.2	1081.59	542.62	26.6423
23	4415.8	8452.87	717.96	360.192	26.6424
24	4417.75	8454.67	431.431	216.444	26.6424
25	4419.69	8456.6	215.118	107.922	26.6423
26	4421.64	8458.69	0	0	0

List Of Coordinates

Distributed Load

X	Y
4435.9	8458.85
4419.14	8458.66

Distributed Load

X	Y
4541.78	8477.86
4527.59	8476.73

External Boundary

X	Y
4364.31	8430.23
4363.92	8430.1
4356.96	8427.82
4350.03	8425
4336.26	8420.12
4322.94	8414.14
4308.1	8406.75

4300	8404
4295.28	8404.05
4295.28	8297.19
4578.16	8297.19
4578.16	8492.19
4555.26	8483.29
4552.6	8482.25
4549.49	8478.28
4547.45	8477.25
4544.04	8478.04
4525.85	8476.6
4513.76	8470.55
4478.68	8460.38
4447.56	8454.3
4435.9	8458.85
4411.77	8458.57
4409.16	8458.54
4405.03	8450.47
4399.32	8449.68
4396.77	8449.33
4392.68	8441.5
4384.68	8440.5
4383.17	8439.74

Material Boundary

X	Y
4392.68	8441.5
4392.24	8440.6
4396.19	8439.99
4399.32	8449.68

Material Boundary

X	Y
4405.03	8450.47
4404.53	8449.6
4408.51	8449.15
4411.77	8458.57

Material Boundary

X	Y
4549.49	8478.28
4548.87	8477.49
4552.37	8477.28

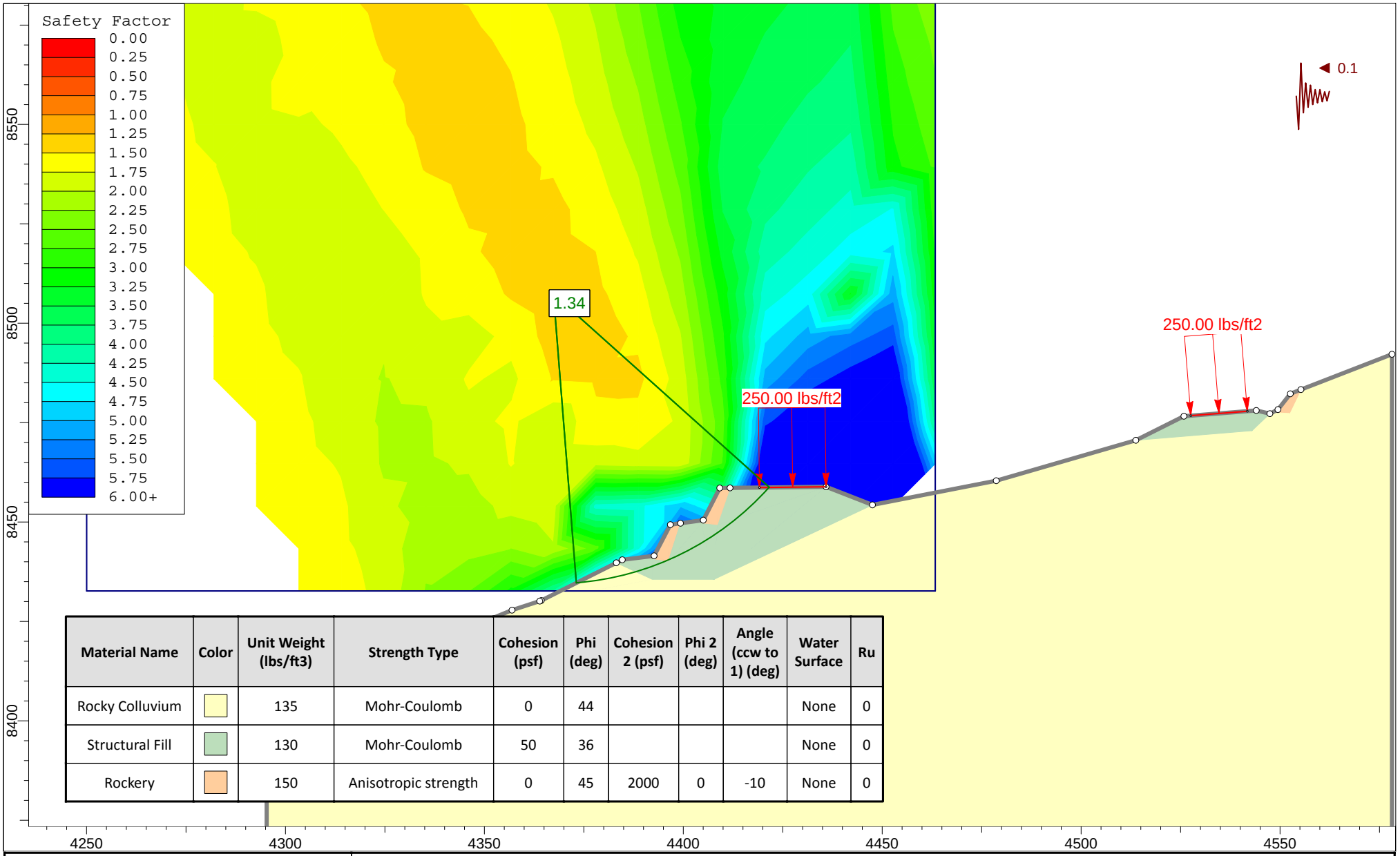
4555.26	8483.29

Material Boundary

X	Y
4383.17	8439.74
4392.23	8435.56
4407.72	8435.56
4447.56	8454.3

Material Boundary

X	Y
4513.76	8470.55
4542.97	8472.96
4547.45	8477.25



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Angle (ccw to 1) (deg)	Water Surface	Ru
Rocky Colluvium		135	Mohr-Coulomb	0	44				None	0
Structural Fill		130	Mohr-Coulomb	50	36				None	0
Rockery		150	Anisotropic strength	0	45	2000	0	-10	None	0

IGES®

SLIDEINTERPRET 6.029

Project	ROCKERY DESIGN - SUMMIT POWDER MOUNTAIN PHASE 1E/1F/1G		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITION - SECTION 7-7'		
Drawn By	SL	Scale 1:400	Company IGES, INC.
Date	9-25-2015		File Name P-Static.slim

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: P-Static
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/13/2015, 2:54:03 PM

General Settings

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

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.1
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 250
Orientation: Normal to boundary

Material Properties

Property	Rocky Colluvium	Structural Fill	Rockery
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Anisotropic strength
Unit Weight [lbs/ft3]	135	130	150
Cohesion [psf]	0	50	
Friction Angle [deg]	44	36	
Cohesion 1 [psf]			0
Cohesion 2 [psf]			2000
Friction Angle 1 [deg]			45
Friction Angle 2 [deg]			0
Angle from 1 [deg]			-10
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: spencer

FS: 1.343240
Center: 4367.362, 8507.319
Radius: 72.876
Left Slip Surface Endpoint: 4373.120, 8434.671
Right Slip Surface Endpoint: 4421.639, 8458.689
Resisting Moment=1.80756e+006 lb-ft
Driving Moment=1.34567e+006 lb-ft
Resisting Horizontal Force=21733.2 lb
Driving Horizontal Force=16179.7 lb
Total Slice Area=241.237 ft2

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3895
Number of Invalid Surfaces: 956

Error Codes:

Error Code -102 reported for 1 surface
Error Code -103 reported for 7 surfaces
Error Code -106 reported for 28 surfaces
Error Code -107 reported for 28 surfaces
Error Code -108 reported for 104 surfaces
Error Code -111 reported for 158 surfaces
Error Code -112 reported for 201 surfaces
Error Code -1000 reported for 429 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.34324

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.14165	126.877	Rocky Colluvium	0	44	59.2548	79.5934	82.4212	0	82.4212
2	2.14165	371.367	Rocky Colluvium	0	44	164.047	220.355	228.184	0	228.184
3	2.14165	597.227	Rocky Colluvium	0	44	249.973	335.774	347.705	0	347.705
4	2.14165	804.226	Rocky Colluvium	0	44	319.443	429.089	444.335	0	444.335
5	2.14165	991.029	Rocky Colluvium	0	44	374.072	502.469	520.323	0	520.323
6	2.14165	1101.48	Rocky Colluvium	0	44	395.56	531.332	550.212	0	550.212
7	2.14165	1019.65	Rocky Colluvium	0	44	348.731	468.429	485.073	0	485.073
8	1.84809	791.135	Structural Fill	50	36	256.341	344.327	405.106	0	405.106
9	1.84809	701.759	Structural Fill	50	36	225.275	302.599	347.672	0	347.672
10	1.84809	753.051	Structural Fill	50	36	231.358	310.769	358.918	0	358.918
11	1.84809	1480.93	Structural Fill	50	36	401.045	538.7	672.639	0	672.639
12	0.835688	931.229	Rockery	595.597	31.5991	888.362	1193.28	971.563	0	971.563
13	1.94608	2360.36	Structural Fill	50	36	558.232	749.84	963.245	0	963.245
14	1.94608	2022.57	Structural Fill	50	36	467.952	628.572	796.335	0	796.335
15	1.94608	1809.46	Structural Fill	50	36	408.684	548.961	686.76	0	686.76
16	1.94608	1609.17	Structural Fill	50	36	355.422	477.417	588.291	0	588.291
17	1.94608	1561.81	Structural Fill	50	36	334.334	449.091	549.299	0	549.299
18	1.94608	2269.69	Structural Fill	50	36	452.213	607.431	767.237	0	767.237
19	1.94608	2901.69	Structural Fill	50	36	547.141	734.942	942.744	0	942.744
20	1.94608	2534.43	Structural Fill	50	36	464.588	624.053	790.117	0	790.117
21	1.94608	2065.74	Structural Fill	50	36	370.658	497.882	616.457	0	616.457
22	1.94608	1663.16	Structural Fill	50	36	293.376	394.075	473.579	0	473.579
23	1.94608	1230.37	Structural Fill	50	36	217.028	291.521	332.425	0	332.425
24	1.94608	764.339	Structural Fill	50	36	163.037	218.998	232.606	0	232.606
25	1.94608	261.295	Structural Fill	50	36	138.776	186.409	187.751	0	187.751

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.34324

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	4373.12	8434.67	0	0	0
2	4375.26	8434.87	97.8624	63.406	32.9396
3	4377.4	8435.14	352.163	228.17	32.9396
4	4379.55	8435.47	714.001	462.608	32.9396

5	4381.69	8435.86	1143.11	740.63	32.9395
6	4383.83	8436.33	1605.92	1040.49	32.9396
7	4385.97	8436.86	2052.49	1329.83	32.9396
8	4388.11	8437.46	2407.54	1559.87	32.9396
9	4389.96	8438.04	2569.92	1665.08	32.9397
10	4391.81	8438.67	2697.8	1747.93	32.9396
11	4393.66	8439.35	2804.6	1817.13	32.9396
12	4395.5	8440.1	2898.66	1878.07	32.9396
13	4396.34	8440.45	3203.6	2075.65	32.9397
14	4398.29	8441.33	3210.99	2080.43	32.9396
15	4400.23	8442.28	3166.79	2051.8	32.9397
16	4402.18	8443.3	3081.92	1996.81	32.9396
17	4404.12	8444.39	2968.59	1923.38	32.9396
18	4406.07	8445.57	2817.28	1825.34	32.9396
19	4408.02	8446.84	2502.71	1621.53	32.9396
20	4409.96	8448.19	2002.52	1297.46	32.9398
21	4411.91	8449.64	1507.87	976.961	32.9395
22	4413.85	8451.2	1064.35	689.602	32.9396
23	4415.8	8452.87	678.865	439.843	32.9396
24	4417.75	8454.67	382.132	247.587	32.9396
25	4419.69	8456.6	175.455	113.679	32.9396
26	4421.64	8458.69	0	0	0

List Of Coordinates

Distributed Load

X	Y
4435.9	8458.85
4419.14	8458.66

Distributed Load

X	Y
4541.78	8477.86
4527.59	8476.73

External Boundary

X	Y
4364.31	8430.23
4363.92	8430.1
4356.96	8427.82
4350.03	8425
4336.26	8420.12

4322.94	8414.14
4308.1	8406.75
4300	8404
4295.28	8404.05
4295.28	8297.19
4578.16	8297.19
4578.16	8492.19
4555.26	8483.29
4552.6	8482.25
4549.49	8478.28
4547.45	8477.25
4544.04	8478.04
4525.85	8476.6
4513.76	8470.55
4478.68	8460.38
4447.56	8454.3
4435.9	8458.85
4411.77	8458.57
4409.16	8458.54
4405.03	8450.47
4399.32	8449.68
4396.77	8449.33
4392.68	8441.5
4384.68	8440.5
4383.17	8439.74

Material Boundary

X	Y
4392.68	8441.5
4392.24	8440.6
4396.19	8439.99
4399.32	8449.68

Material Boundary

X	Y
4405.03	8450.47
4404.53	8449.6
4408.51	8449.15
4411.77	8458.57

Material Boundary

X	Y
4549.49	8478.28

4548.87	8477.49
4552.37	8477.28
4555.26	8483.29

Material Boundary

X	Y
4383.17	8439.74
4392.23	8435.56
4407.72	8435.56
4447.56	8454.3

Material Boundary

X	Y
4513.76	8470.55
4542.97	8472.96
4547.45	8477.25

X	Y
746.292	8602.28
745.825	8601.39
749.79	8600.86
752.516	8609.45

Material Boundary

X	Y
700.142	8573.49
699.694	8572.6
704.661	8572.02
707.692	8581.92

Material Boundary

X	Y
712.158	8582.47
711.7	8581.58
715.694	8581.35
718.697	8591.6

Material Boundary

X	Y
782.743	8610.58
782.247	8609.72
785.719	8609.28
787.674	8616.39

Material Boundary

X	Y
664.324	8571.26
671.862	8570.09
704.542	8569.71
709.945	8570.55
719.592	8573.92
731.958	8583.42
749.265	8587.78
778.566	8599.76
789.567	8604.18
816.212	8614.87
839.773	8627.23