

A-6**Slope Stability Analyses for SCA Final Cover Design**

(Same as submitted and approved as part of the SCA Final Cover Design Report 2015 Construction [Parsons and Beech and Bonaparte 2015].)

Beech and Bonaparte ▶
engineering p.c.

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CALCULATION PACKAGE COVER SHEET

Client: Honeywell **Project:** Onondaga Lake SCA Final Cover Design **Project/Proposal #:** GD5497

TITLE OF COMPUTATIONS

SLOPE STABILITY ANALYSES FOR SCA FINAL COVER DESIGN

COMPUTATIONS BY:

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02/09/15

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APPROVAL NOTES:

REVISIONS (Number and initial all revisions)

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497	Task No.:	03

SLOPE STABILITY ANALYSES FOR SCA FINAL COVER DESIGN

INTRODUCTION

This package was prepared in support of the design of the Sediment Consolidation Area (SCA) final cover for the Onondaga Lake remediation project. The SCA was constructed on Wastebed 13 (WB-13) as shown in Figure 1. Specifically, this package presents static slope stability analyses for the SCA site after placement of the final cover system when geotextile tube filling is completed and the final cover is constructed. For purposes of this calculation package, the SCA perimeter dike refers to the dike constructed between 2011 and 2012 around the containment and dewatering area, whereas the WB-13 perimeter dike refers to the historical exterior perimeter dike around WB-13.

Based on New York State Department of Environmental Conservation (NYSDEC) Regulations Section 360-2.7(b)(7) [NYSDEC, 1988], the SCA is not located in a seismic impact zone, therefore, seismic slope stability analyses were not performed. A detailed explanation regarding the seismic impact zone assessment was presented in Attachment 1 of the NYSDEC approved calculation package titled “*Slope Stability Analyses for SCA Design*” [Geosyntec, 2011b].

METHODOLOGY

Static Slope Stability

Static slope stability analyses were performed using Janbu’s method [Janbu, 1973] and Spencer’s method [Spencer, 1973] in the computer program SLIDE version 6.029 [Rocscience, 2014]. Two potential slip modes were evaluated in the analyses: (i) block slip mode within the interface of the liner system; and (ii) circular slip surfaces through dredge material contained in geotextile tubes and the foundation materials.

Spencer’s method [Spencer, 1973] satisfies both force and moment equilibrium and is therefore considered more rigorous than Janbu’s method [Janbu, 1973]. However, Spencer’s method often encounters numerical convergence difficulties when considering block slip surfaces. Therefore, Spencer’s method was used for the circular slip surface analysis and Janbu’s method was used for block slip surface analysis.

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Information required for the static slope stability analyses included the slope geometry; the subsurface soil stratigraphy; the groundwater table elevation; the material properties of the subsurface soils, dredge material, liner and cover system materials; and the external surface loading, if any, at the selected cross section locations.

Target Factor of Safety

Two target factors of safety (FSs) were considered for slope stability of the SCA site, one for the interim condition and one for the long-term condition. The interim condition is the condition shortly after completion of geotextile tube filling and construction of the final cover system. The long-term condition is the condition after placement of the final cover system of the SCA when increased excess porewater pressure due to geotextile tube filling and the final cover has been dissipated. In addition, both peak and residual interface shear strengths for geosynthetic layers were considered to calculate the FSs for liner stability in the final condition.

The target FS for the block and circular slip surface analyses corresponding to the peak interface shear strength and peak strength properties of subsurface materials was considered to be 1.3 for the interim condition and 1.5 for the long-term condition (in accordance with U.S. Army Engineer Waterways Experiment Station Technical Report D-77-9 [Hammer and Blackburn, 1977] and U.S. Army Corps of Engineers Engineering Manual 1110-2-1902 [USACE, 2003]).

The target FS for the block slip surface analysis corresponding to large displacement (i.e., residual) interface shear strength was considered to be 1.3 for the long-term condition, which is consistent with general engineering practice.

SUBSURFACE STRATIGRAPHY

Detailed information regarding the subsurface stratigraphy was presented in the NYSDEC approved calculation package titled “*Subsurface Stratigraphy Model of Wastebed 13 for the Design of Sediment Consolidation Area*” [Geosyntec, 2011a], referred to herein as the Data Package. In summary, the subsurface stratigraphy consists primarily of three types of material: the Solvay waste (SOLW), the existing WB-13 perimeter dike soil, and the foundation soil, as shown schematically in Figure 2.

The groundwater table was estimated to be approximately 50 ft below the pre-construction ground surface (bgs) of WB-13 (or approximately at El. 375 ft) as presented in the Data Package. However, according to the site investigation results presented in the Data Package, “perched”

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water zones exist in WB-13. These “perched” water zones vary spatially and seasonally according to the piezometer data presented in the Data Package but have an average elevation of approximately 15 ft bgs. The slope stability analysis presented in this package conservatively assumes the “perched” water zones are connected to the groundwater table. The groundwater table was, therefore, modeled using a single groundwater table at 15 ft bgs (see Figure 3). Additionally, within the gravel drainage layer above the geomembrane liner, a second water table of one foot above the top of the geomembrane liner was assumed in the slope stability models (see Figure 4). This represents the one-foot maximum allowable head within the gravel drainage layer. This water table is confined by the geomembrane liner.

ANALYZED CROSS-SECTIONS

The SCA is surrounded by the SCA perimeter dike as shown in Figure 1. The as-built heights of the SCA perimeter dikes vary from 2 ft to 10 ft above the existing ground surface and were used in slope stability analysis. The maximum dike height is approximately 10 ft, located near the western sump area. The SCA perimeter dike is approximately 2 ft wide at the top along the northern side and approximately 28 ft wide at the top along the eastern, western, and southern sides. The side slopes of the SCA perimeter dike are 2.5 horizontal:1 vertical (2.5H:1V). The setback distance between the edge of the lowest geotextile tube layer and the dikes varies from 10 ft to 60 ft. Two cross sections (i.e., Cross-Section A-A and B-B; see Figure 1) were selected for static slope stability analysis because they are considered representative of the most critical cross sections at the SCA. These cross sections were developed based on: (1) the survey of the SCA site conducted on 7 December 2014 after geotextile tube filling was completed; and (2) the final cover design grading plan.

Cross-Section A-A

Cross-Section A-A runs approximately west-east. In the direction of Cross-Section A-A, each additional stack of geotextile tubes straddles geotextile tubes that are already in place. The geotextile tubes are approximately 36 ft wide. This results in each stack of geotextile tubes being offset approximately 18 ft from the layer below. Cross-Section A-A was selected because it follows the direction of minimum overlap between the geotextile tube stacks, which is expected to result in the lowest FS for block slip surface slope stability analysis. The analyses were performed at both the east and the west slopes of Cross-Section A-A.

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The modeled ground surface below the liner at Cross-Section A-A is the post-settlement top of SOLW. The thickness of the SOLW underneath the liner varies, but typically is between 50 ft and 60 ft. Cross-Section A-A was extended to include the constructed SCA perimeter dike, as shown in Figure 1.

Cross-Section B-B

Cross-Section B-B runs approximately north-south through WB-13. In this direction, the geotextile tubes are approximately 210 ft to 360 ft long. Based on the survey data provided by Parsons, it is estimated that there is an offset of approximately 7 ft to 30 ft between the edges of the first five layers of geotextile tubes. An offset of 85 ft was measured based on the SCA topographic survey dated 7 December 2014 after the final layer of geotextile tubes was filled at the north side of the SCA.

The thickness of the SOLW underneath the liner varies, but is typically between 30 ft and 70 ft. The slope stability analyses were performed at both the north and the south slopes of Cross-Section B-B.

MATERIAL PROPERTIES

The material properties used in the slope stability analyses were presented in the NYSDEC approved calculation package titled “*Slope Stability Analyses for SCA Design*” [Geosyntec, 2011b] and are also summarized in Table 1.

ANALYZED CASES

Both Cross-Sections A-A and B-B were analyzed for interim and final conditions as discussed below.

Block Stability (Liner and Geotextile Tube Interface Slip Surfaces) – Janbu’s Method

Block stability of the SCA after completion of geotextile tube filling and construction of the final cover was evaluated using potential liner/geotextile tube interface slip surfaces. For block stability, the critical case was assumed to be when the liner interface fails underneath the edge of the stacked geotextile tubes. The analysis was performed using the laboratory-measured (i) peak liner interface shear strength for interim and long-term cases, and (ii) residual liner interface

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shear strength for the long-term case presented in Attachment 4 of the NYSDEC approved calculation package titled “*Slope Stability Analyses for SCA Design*” [Geosyntec, 2011b]. The shear strengths assumed for the liner and geotextile tube interfaces are shown in Table 1.

Global Stability (Circular Slip Surfaces) – Spencer’s Method

Global stability of the SCA after completion of geotextile tube filling and construction of the final cover was evaluated with potential circular slip surfaces. The global slope stability through the foundation material in the interim condition was evaluated using undrained shear strength parameters (recommended design s_u profile shown in Figure 5) to represent the undrained shear strength of the SOLW layer. The global slope stability in the long-term condition was evaluated using drained shear strength parameters. The long-term global stability evaluation was performed assuming that the geotextile support of the geotextile tubes will be degraded and therefore have no shear strength. The long-term evaluation was also performed assuming the effective friction angle of the dredge materials will increase to 30 degrees due to consolidation of the dredge materials (i.e., the long-term value provided in Table 1).

RESULTS AND DISCUSSION

Slope Stability Analysis

The results of the slope stability analyses for Cross-Sections A-A and B-B are summarized in Tables 2, 3, and 4. The results of the analyses for selected cases are also shown graphically in Figures 6 through 25. The associated SLIDE runs are presented in Attachment 1 of this package.

The calculated slope stability FS for Cross-Section A-A (summarized in Table 2) and Cross-Section B-B (summarized in Table 3) indicate that the calculated FSs for the interim and long-term cases satisfy the target FS of 1.3 and 1.5, respectively.

The calculated slope stability FS using the residual interface shear strengths within the geosynthetic components of the liner system are summarized in Table 4 and indicate that the calculated FS values meet the required target FS of 1.3.

SUMMARY AND CONCLUSIONS

This package evaluates the static slope stability of the SCA after completion of geotextile tube filling and construction of the final cover system. Two potential slip modes were evaluated

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using the computer program SLIDE: (i) block slip mode for liner and geotextile tube interfaces; and (ii) circular slip mode through dredge material and WB-13 foundation materials.

Analyses of two critical cross-sections indicate that the calculated FSs for the two potential slip modes meet the target FSs for interim and long-term conditions.

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Tables

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Table 1. Summary of Material Properties for Slope Stability Analysis

Material	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Drained Shear Strength Effective Stress Friction Angle (degree)
SOLW	82	From Figure 5	34
SCA Perimeter Dike Soil	120	---	35
Foundation Soil (including WB-13 perimeter dike)	120	---	37
Liner Interface (peak strength)	100	---	19
Liner Interface (residual strength)	100	--	17
Gravel Drainage	120	---	38
Geotextile tube-Gravel Interface	86	---	24 ^[1]
Geotextile tube	---	Design Tensile Strength = 1600 lb/ft ^[2]	
Dredge Material (Short Term)	86	---	15 ^[3]
Dredge Material (Long-Term)	86	---	30
Geotextile tube-Geotextile tube Interface (Vertical)	43 ^[4]	---	0.1 ^[5]
Geotextile tube-Geotextile tube Interface (Horizontal)	86	---	15 ^[6]
Final Cover Soil	120	---	30

Notes:

1. A typical value of interface effective friction angle between woven geotextile and sand was assumed using Koerner [1994].
2. The design tensile strength was modeled using a two-end anchored geotextile sheet. Based on commercially available products, the ultimate tensile strength of geotextile tubes was assumed to be 4800-lb/ft and a strength reduction factor of 3.0 was applied to calculate the design tensile strength. This reduction factor takes into account creep deformation, chemical degradation, and strength loss within seams, connections, and joints [GRI, 1992].
3. Under short-term conditions, the dredge material was assumed to have half of the effective friction angle of the dredge material under long-term conditions.
4. The vertical interface was assumed to have a unit weight equal to half of the unit weight of the dredge material. This was based on the geometry of the geotextile tubes after deformation. The volume of material in the vertical interface after deformation was assumed to be approximately half the total volume available if the geotextile tubes could be placed in direct contact with each other along the entire interface.
5. The geotextile tube-geotextile tube vertical interface has insignificant side friction resistance, but a small value of friction angle was necessary for numerical stability of the SLIDE calculation program.
6. The value presented in this table (i.e., 15 degrees) is the measured peak effective friction angles for the geotextile tube-geotextile tube horizontal interface from [Geosyntec, 2011b].

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Table 2. Summary of Slope Stability Analysis: Cross-Section A-A

Case	Slope Direction	Interim Condition				Long-Term Condition ^[3]			
		Calculated FS ^[1]		Figure Number	Target FS	Calculated FS ^[1]		Figure Number	Target FS
		Spencer's Method ^[2]	Janbu's Method ^[2]			Spencer's Method ^[2]	Janbu's Method ^[2]		
Foundation Stability (Circular Mode)	East	1.78	--	6	1.30	1.93	--	10	1.50
Liner Stability (Block Mode)	East	--	2.13	7	1.30	--	1.93	11	1.50
Foundation Stability (Circular Mode)	West	1.78	--	8	1.30	1.96	--	12	1.50
Liner Stability (Block Mode)	West	--	2.05	9	1.30	--	1.72	13	1.50

Notes:

1. The calculated FS are calculated using the peak effective stress friction angle for the geotextile tube-geotextile tube horizontal interface (15 degrees) and the liner (19 degrees) reported in Geosyntec [2011b].
2. Spencer's method is considered more rigorous than Janbu's method because Spencer's method satisfies both force and moment equilibrium. However, Spencer's method often encounters numerical convergence difficulty when complicated block slip surfaces are considered, as in this analysis. Therefore, Spencer's method was used for the circular mode analysis, while Janbu's method was used for the block mode analysis
3. For long-term, the geotextile of the geotextile tubes was assumed to be degraded and therefore have no shear strength. The dredge material was modeled with the long-term friction angle of 30 degrees.

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Table 3. Summary of Slope Stability Analysis: Cross-Section B-B

Case	Slope Direction	Interim Condition				Long-Term Condition ^[3]			
		Calculated FS ^[1]		Figure Number	Target FS	Calculated FS ^[1]		Figure Number	Target FS
		Spencer's Method ^[2]	Janbu's Method ^[2]			Spencer's Method ^[2]	Janbu's Method ^[2]		
Foundation Stability (Circular Mode)	North	2.05	--	14	1.30	2.78	--	18	1.50
Liner Stability (Block Mode)	North	--	3.12	15	1.30	--	2.83	19	1.50
Foundation Stability (Circular Mode)	South	1.77	--	16	1.30	2.14	--	20	1.50
Liner Stability (Block Mode)	South	--	2.26	17	1.30	--	2.10	21	1.50

Notes:

1. The calculated FS are calculated using the peak effective stress friction angle for the geotextile tube-geotextile tube horizontal interface (15 degrees) and the liner (19 degrees) reported in Geosyntec [2011b].
2. Spencer's method is considered more rigorous than Janbu's method because Spencer's method satisfies both force and moment equilibrium. However, Spencer's method often encounters numerical convergence difficulty when complicated block slip surfaces are considered, as in this analysis. Therefore, Spencer's method was used for the circular mode analysis, while Janbu's method was used for the block mode analysis
3. For long-term, the geotextile of the geotextile tubes was assumed to be degraded and therefore have no shear strength. The dredge material was modeled with the long-term friction angle of 30 degrees.

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Table 4. Summary of Slope Stability Analysis: Residual Conditions

Case		Slope Direction	Long-Term Condition ^[3]		
			Calculated FS ^[1]	Figure Number	Target FS
Liner Stability (Block Mode)	Cross-Section A-A	East	1.85	22	1.30
	Cross-Section A-A	West	1.61	23	1.30
Liner Stability (Block Mode)	Cross-Section B-B	North	2.67	24	1.30
	Cross-Section B-B	South	1.99	25	1.30

Notes:

1. The calculated FS are calculated using the residual effective stress friction angle for the geotextile tube-geotextile tube horizontal interface (12 degrees) and the liner (17 degrees) reported in Geosyntec [2011b].
2. Janbu's method was used for the block mode analyses presented here because Spencer's method often encounters numerical convergence difficulty with these types of analyses.

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Figures

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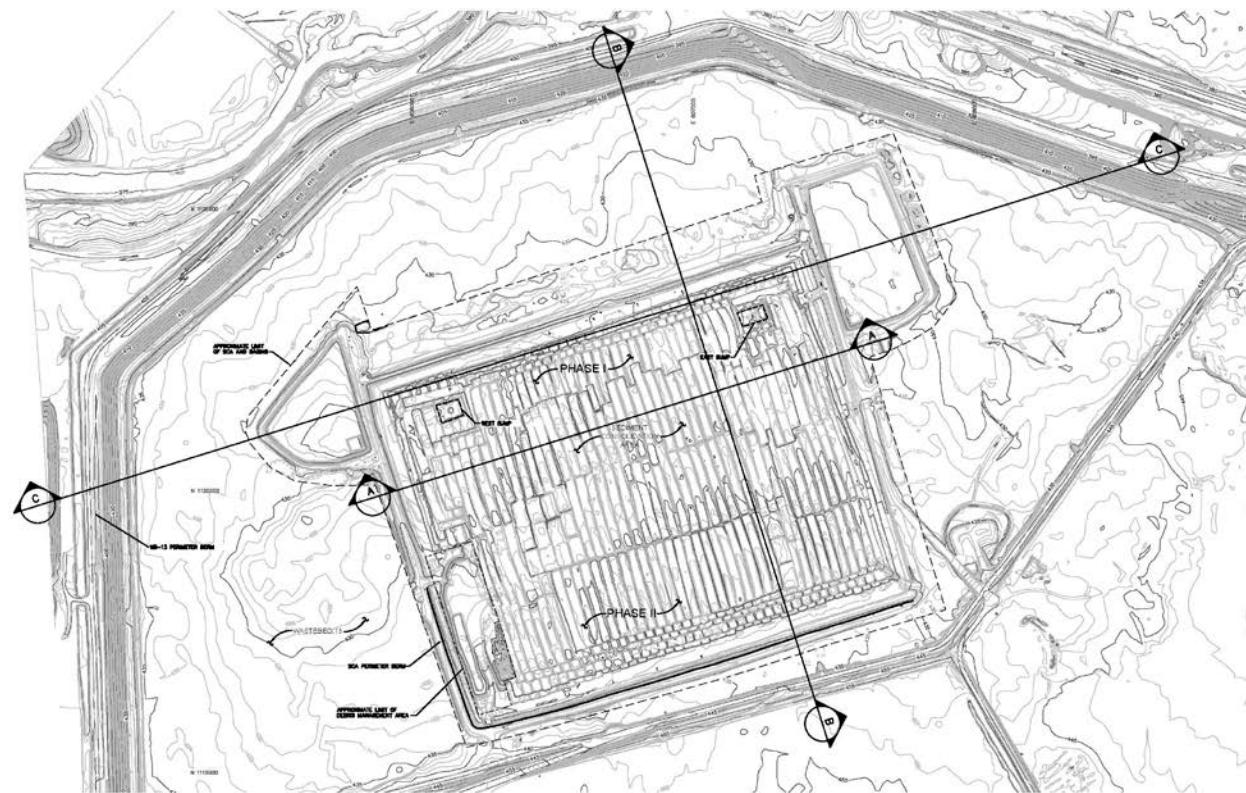


Figure 1. Footprint of the SCA Site

Note: Cross Sections A-A and B-B were used for the slope stability analyses. Cross Section C-C is shown in Figure 2.

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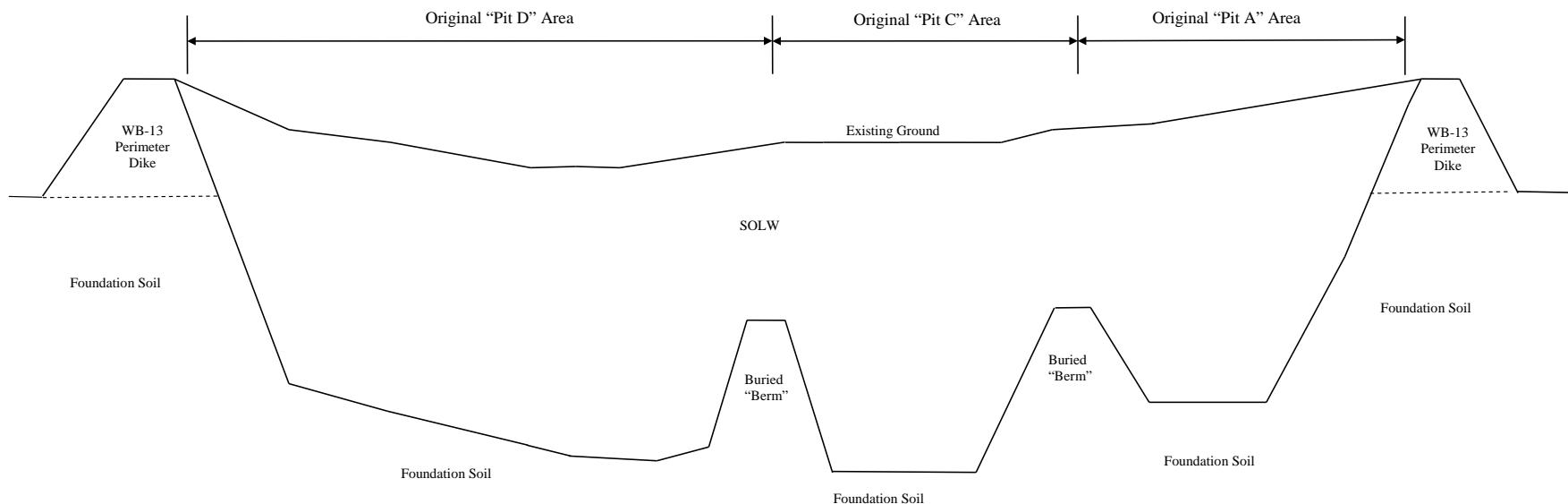


Figure 2. Schematic of Subsurface Profile at Cross Section C-C (See Figure 1 for location of this cross section)
[not to scale; for purpose of showing subsurface stratigraphy only]

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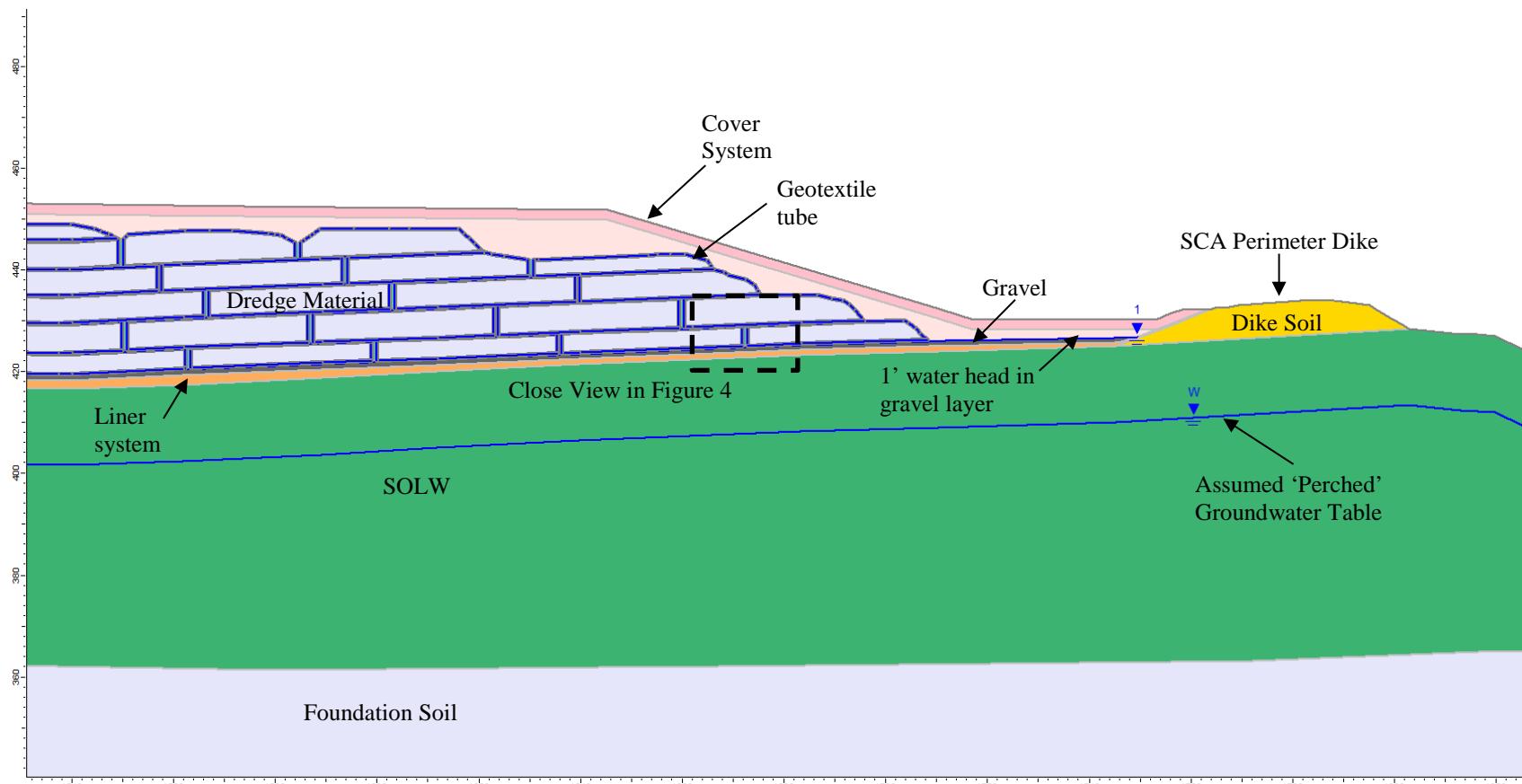


Figure 3. Geometry and Subsurface Materials Used in the Slope Stability Analysis (SLIDE Model)

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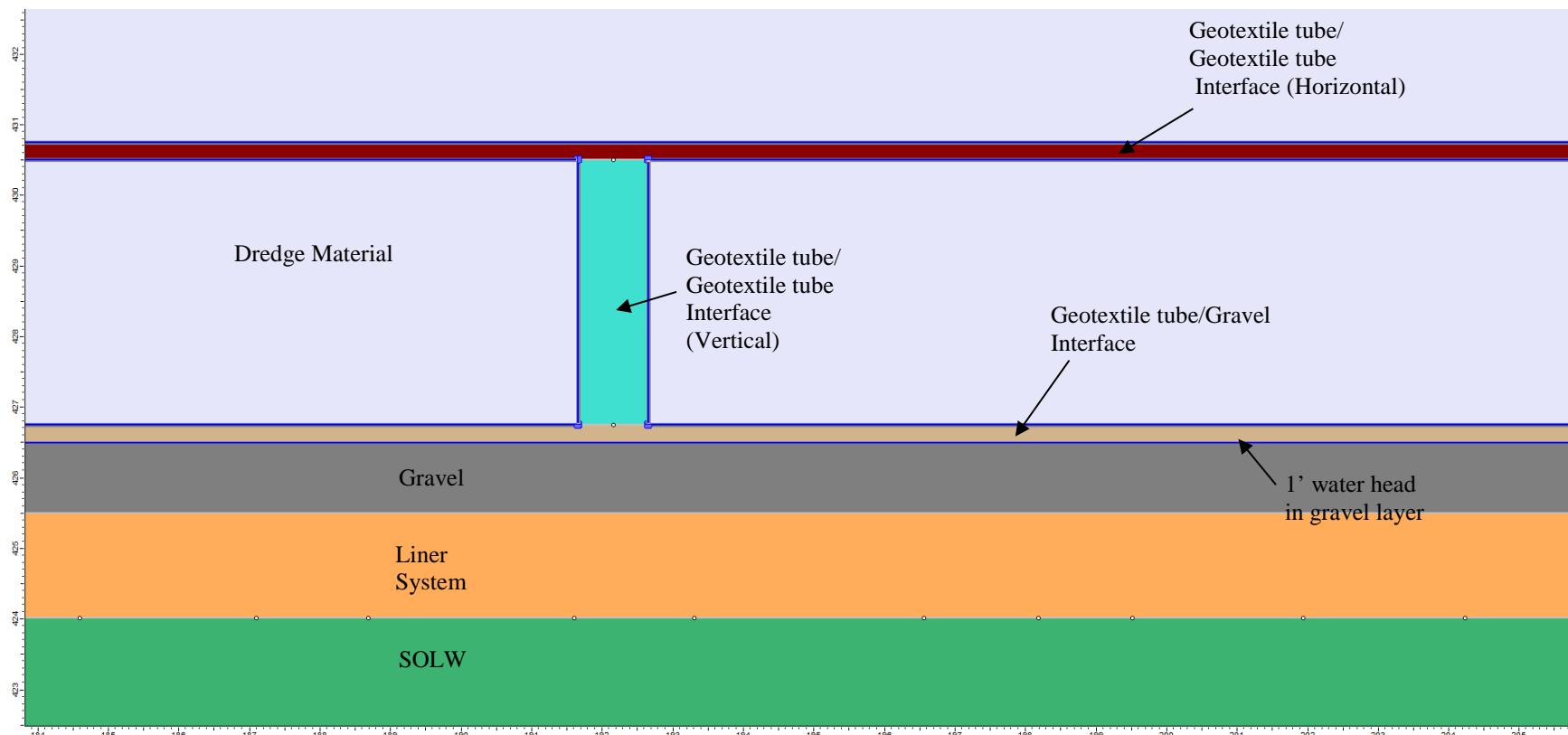


Figure 4. Close View of Layers included in Slope Stability Analysis Model (SLIDE Model)

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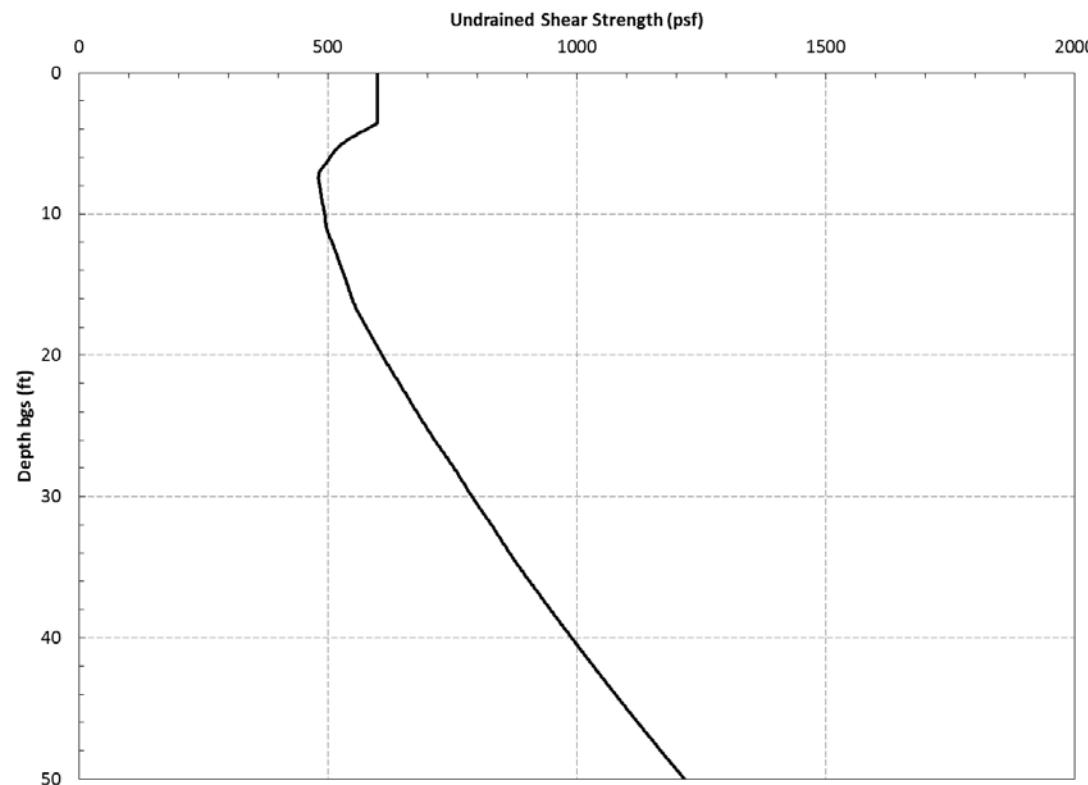


Figure 5. Recommended Design s_u Profile for SOLW Foundation (the strength gain due to consolidation under the weight of geotextile tubes is not considered in this profile)

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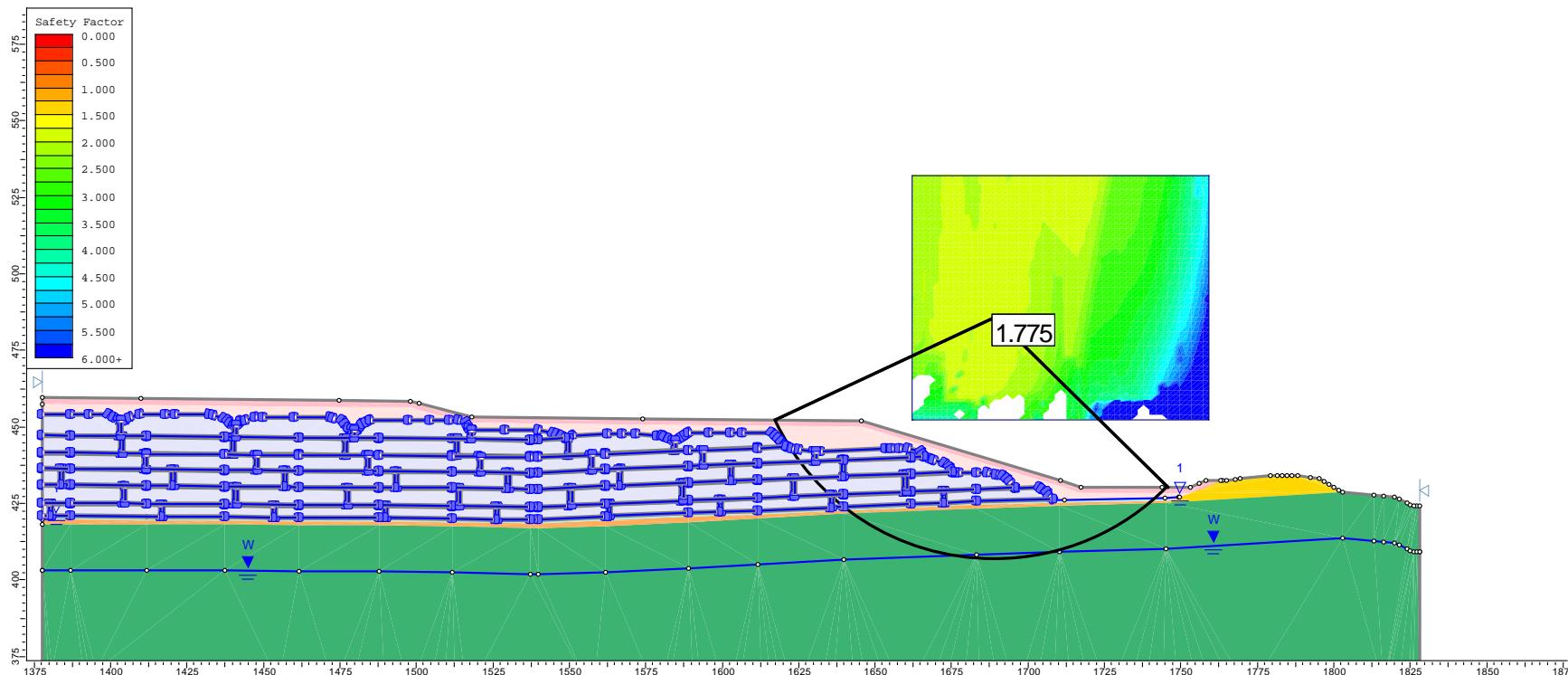


Figure 6. Calculated FS for Circular Slope Stability Analysis in Cross Section A-A – East Slope – Interim Condition

Note: This figure shows the FS calculated using Spencer's Method.

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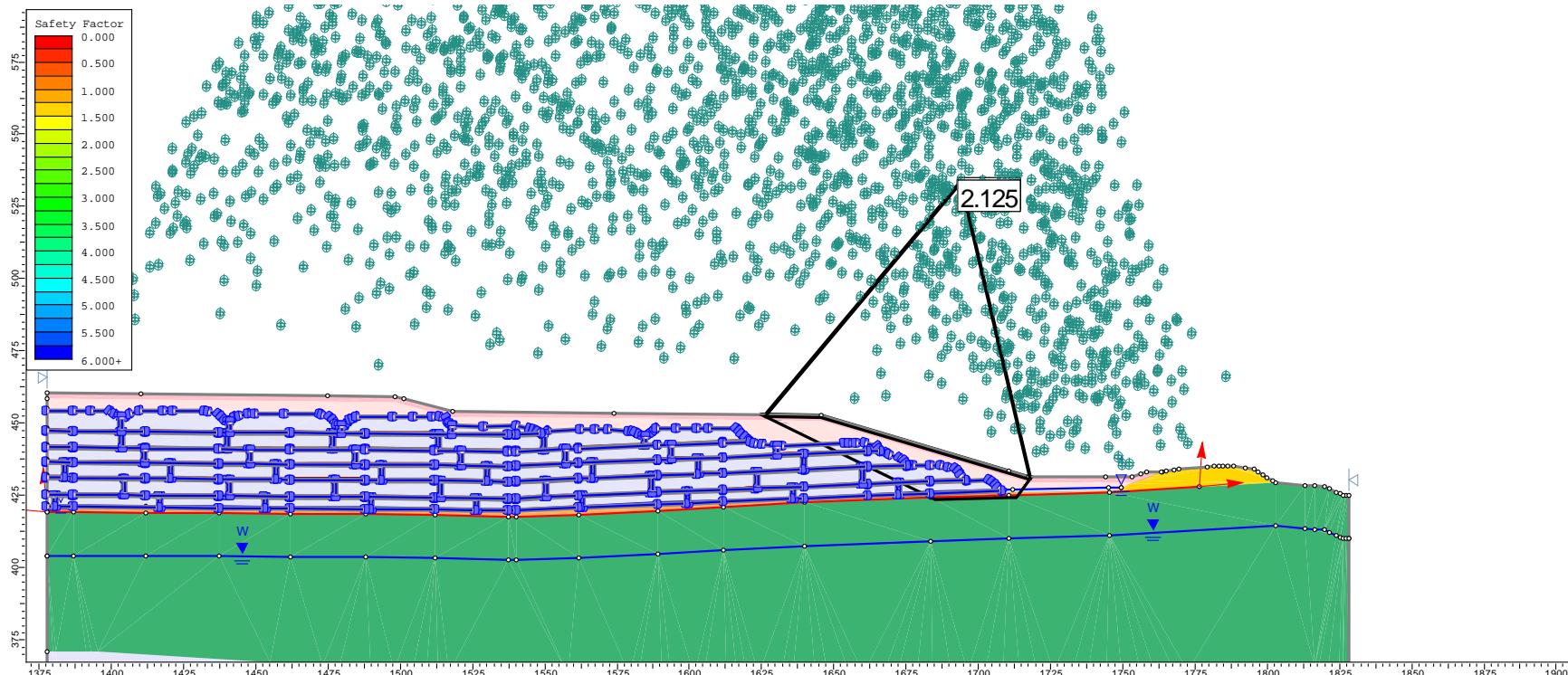


Figure 7. Calculated FS for Block Slope Stability Analysis in Cross Section A-A – East Slope – Interim Condition

Note: This figure shows the FS calculated using Janbu's Method.

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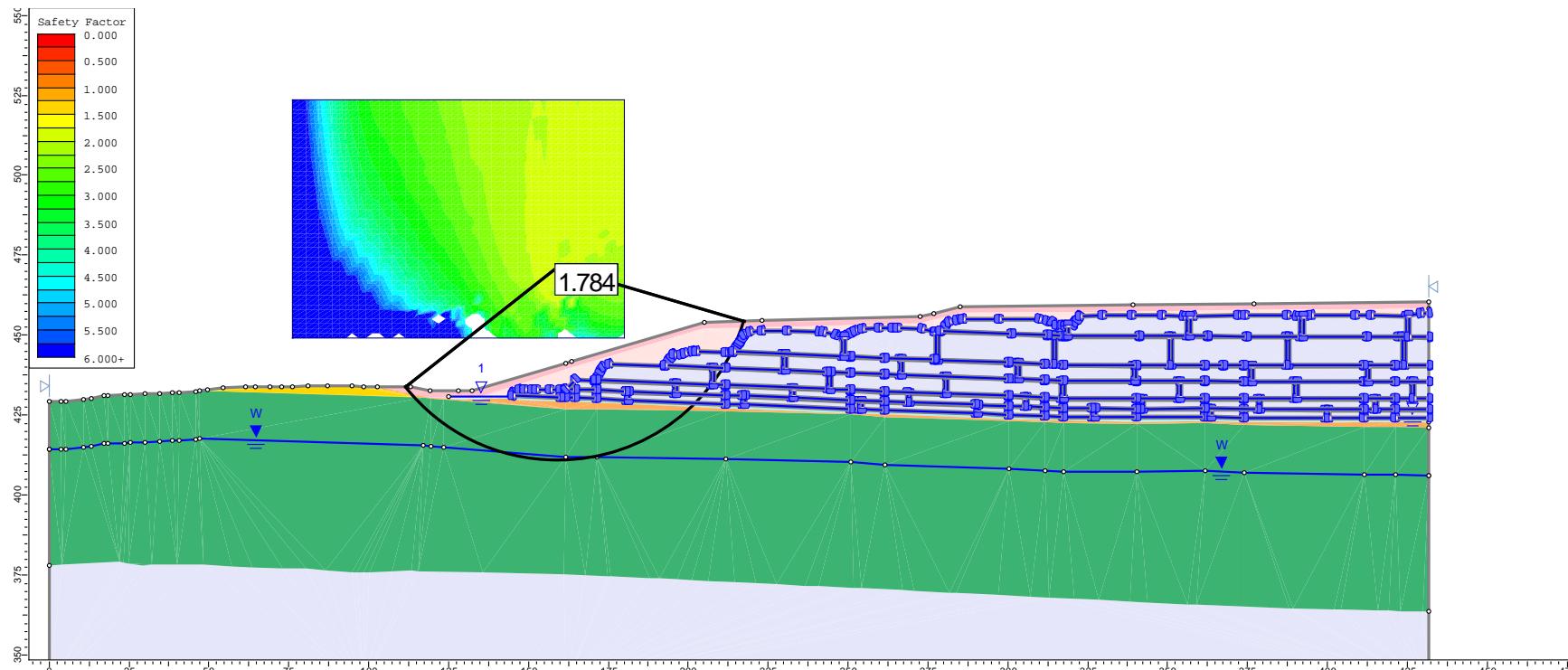


Figure 8. Calculated FS for Circular Slope Stability Analysis in Cross Section A-A – West Slope – Interim Condition
Note: This figure shows the FS calculated using Spencer's Method.

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Client: **Honeywell** Project: **Onondaga Lake SCA Final Cover Design** Project/ Proposal No.: **GD5497** Task No.: **03**

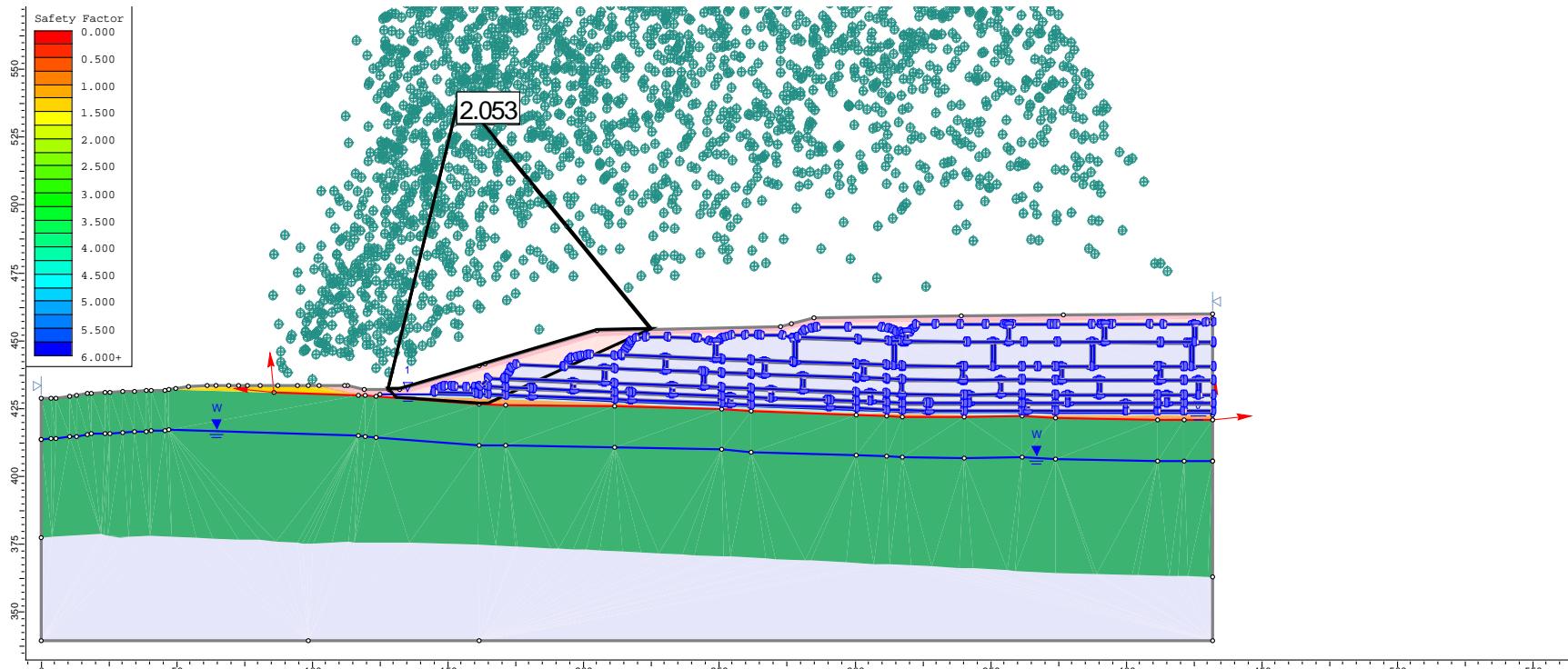


Figure 9. Calculated FS for Block Slope Stability Analysis in Cross Section A-A – West Slope – Interim Condition
Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

**Mustafa Erten /
Meena Viswanath**

Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

**Onondaga Lake SCA Final Cover
Design**

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Task No.: **03**

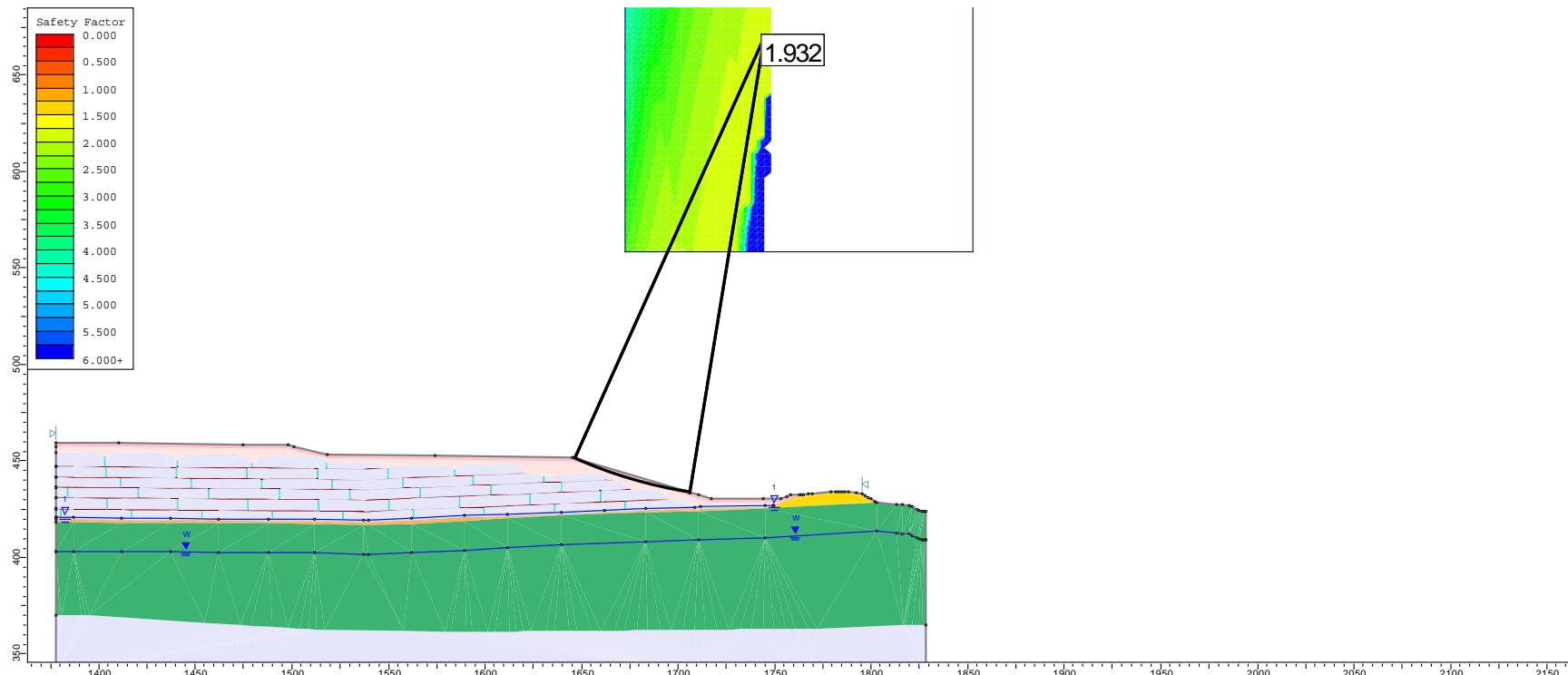


Figure 10. Calculated FS for Circular Slope Stability Analysis in Cross Section A-A – East Slope – Long Term Condition

Note: This figure shows the FS calculated using Spencer's Method.

Written by:

**Mustafa Erten /
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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

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GD5497

Task No.: **03**

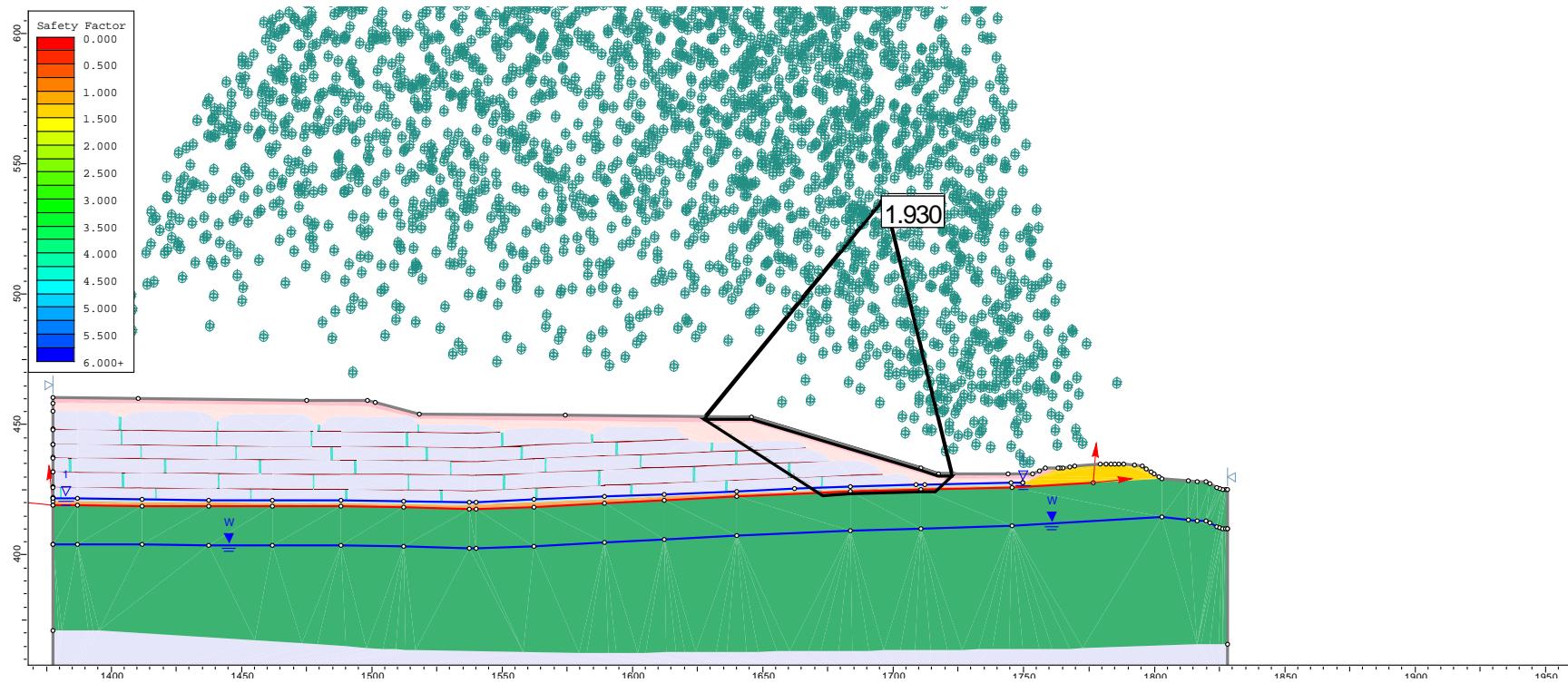


Figure 11. Calculated FS for Block Slope Stability Analysis in Cross Section A-A – East Slope – Long Term Condition

Note: This figure shows the FS calculated using Janbu's Method.

Written by:

**Mustafa Erten /
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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

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Design**

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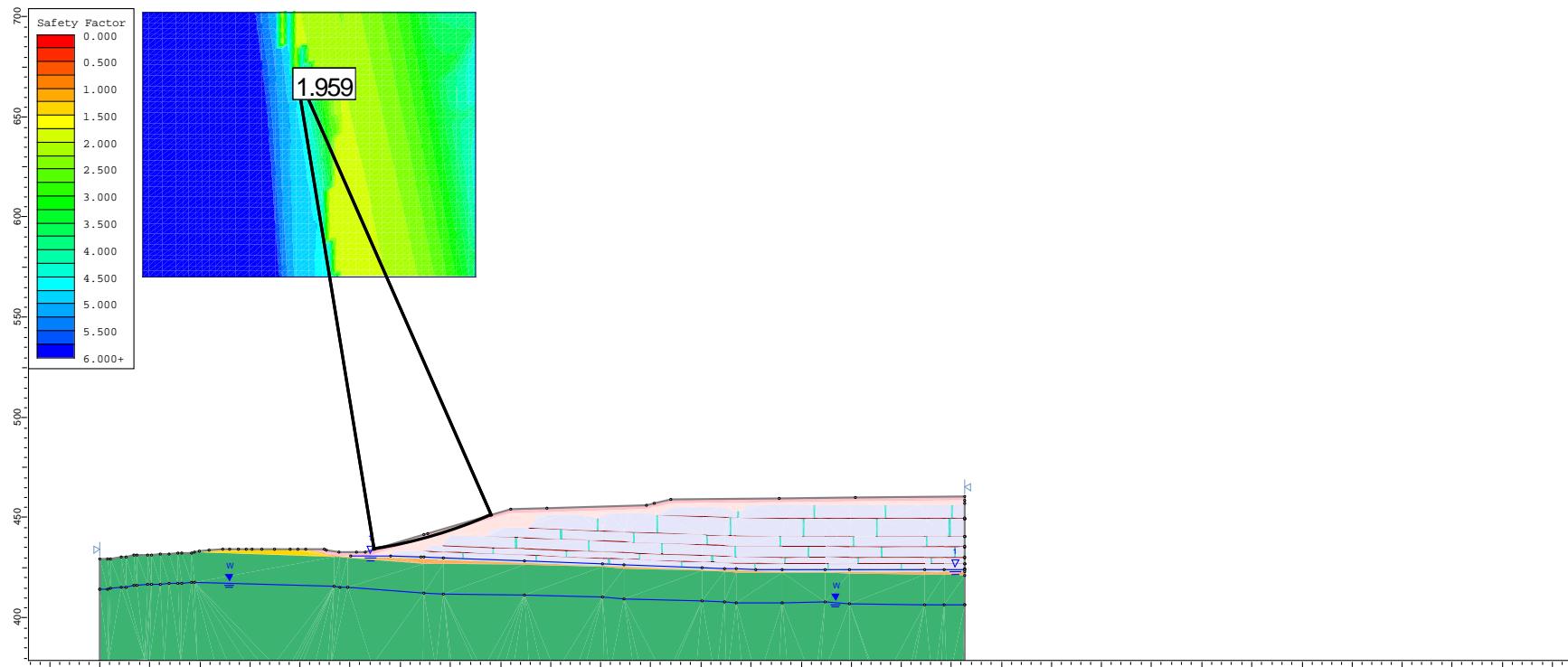


Figure 12. Calculated FS for Circular Slope Stability Analysis in Cross Section A-A – West Slope – Long Term Condition

Note: This figure shows the FS calculated using Spencer's Method.

Written by:

**Mustafa Erten /
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Date: **02/09/2015**

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Date: **02/09/2015**

Client: **Honeywell**

Project:

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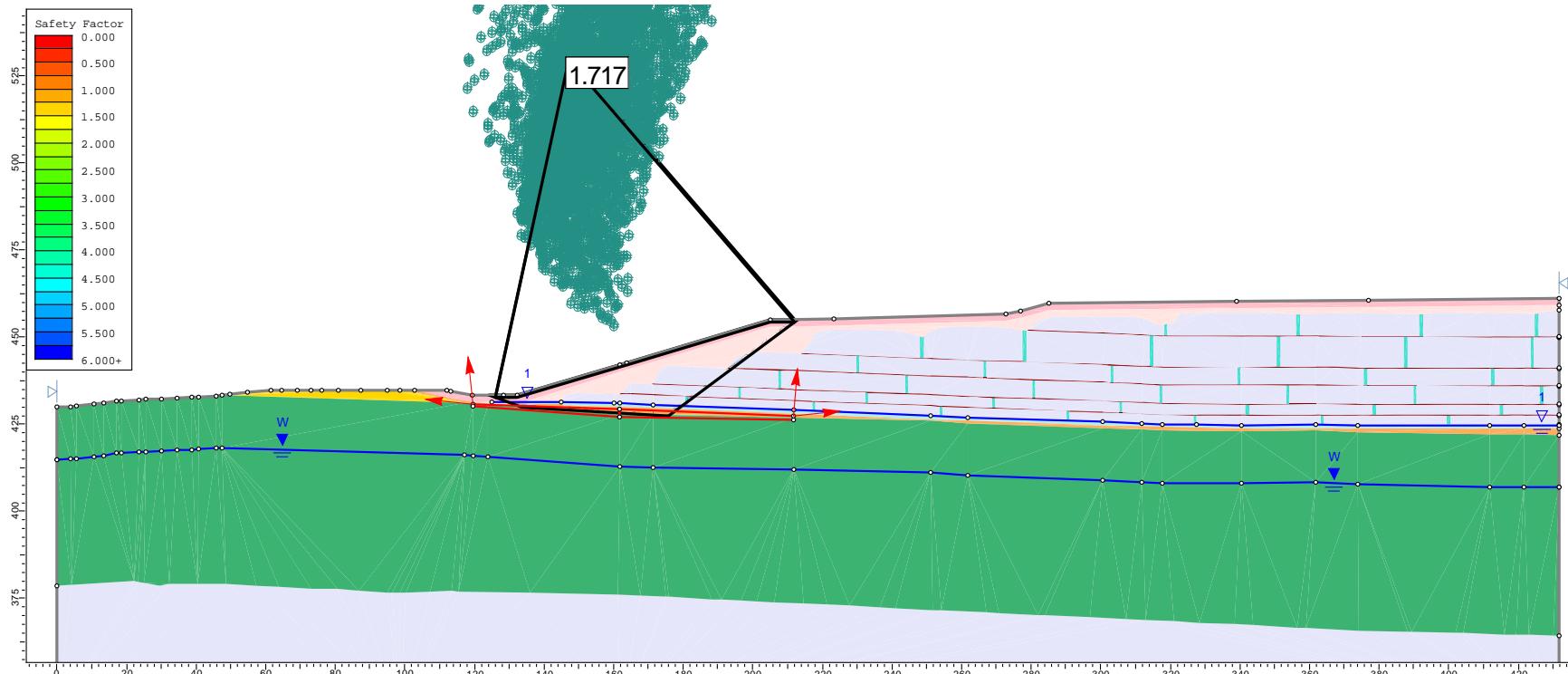


Figure 13. Calculated FS for Block Slope Stability Analysis in Cross Section A-A – West Slope – Long Term Condition

Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

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Project:

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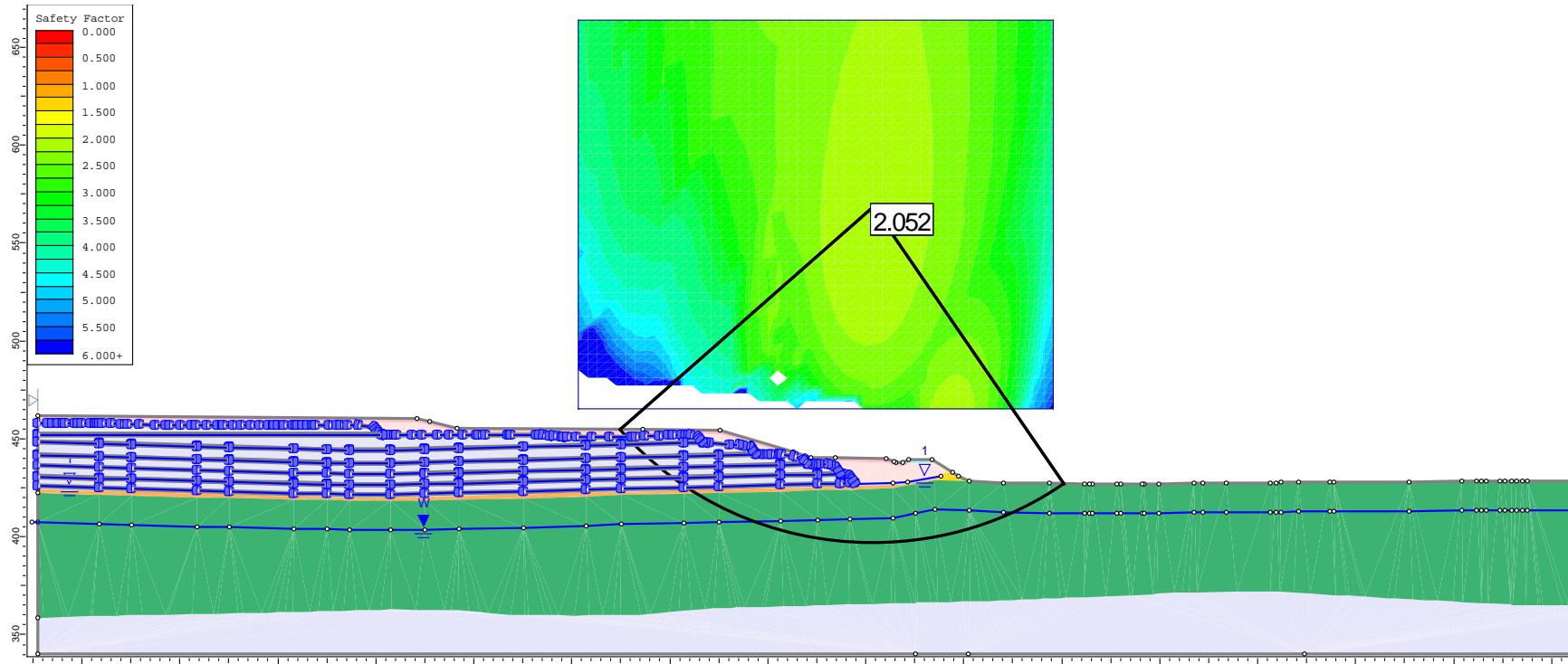


Figure 14. Calculated FS for Circular Slope Stability Analysis in Cross Section B-B – North Slope – Interim Condition
Note: This figure shows the FS calculated using Spencer's Method.

Written
by:

**Mustafa Erten /
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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

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Project:

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Task No.: **03**

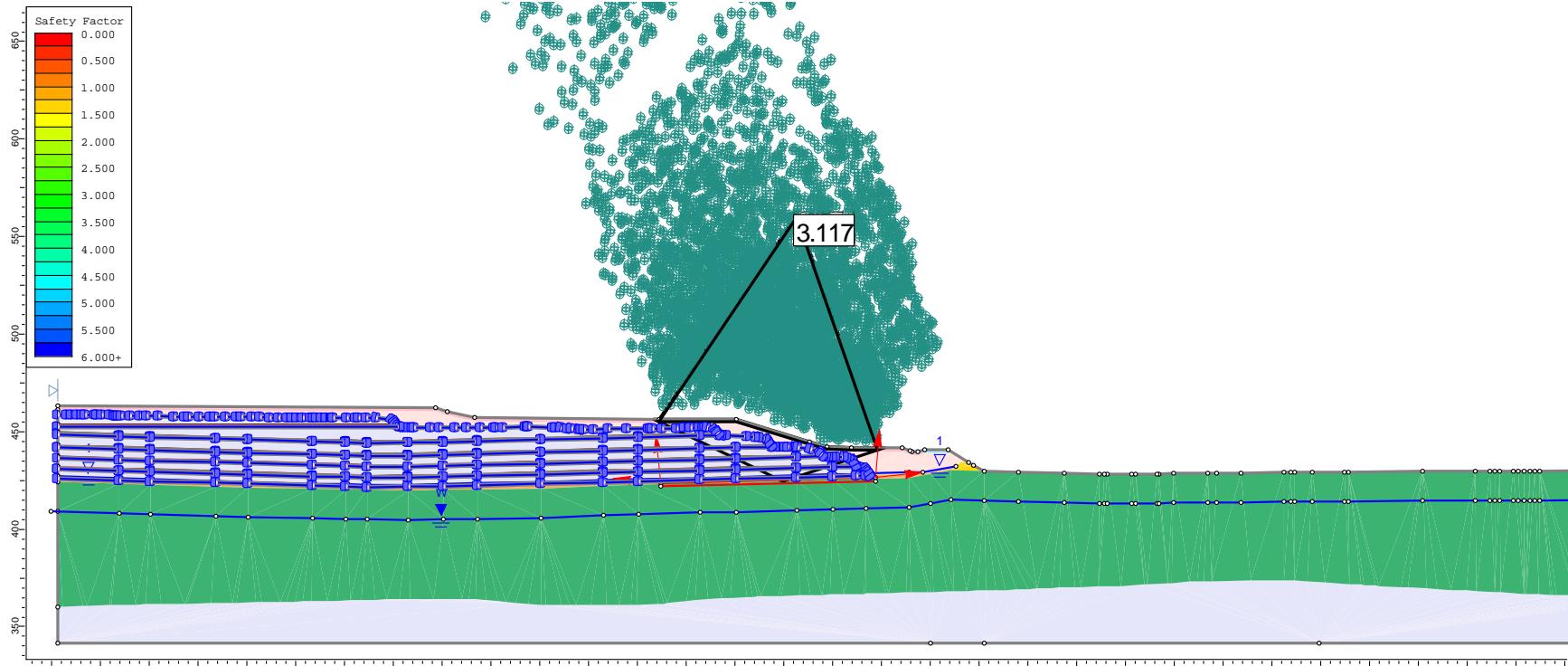


Figure 15. Calculated FS for Block Slope Stability Analysis in Cross Section B-B – North Slope – Interim Condition

Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

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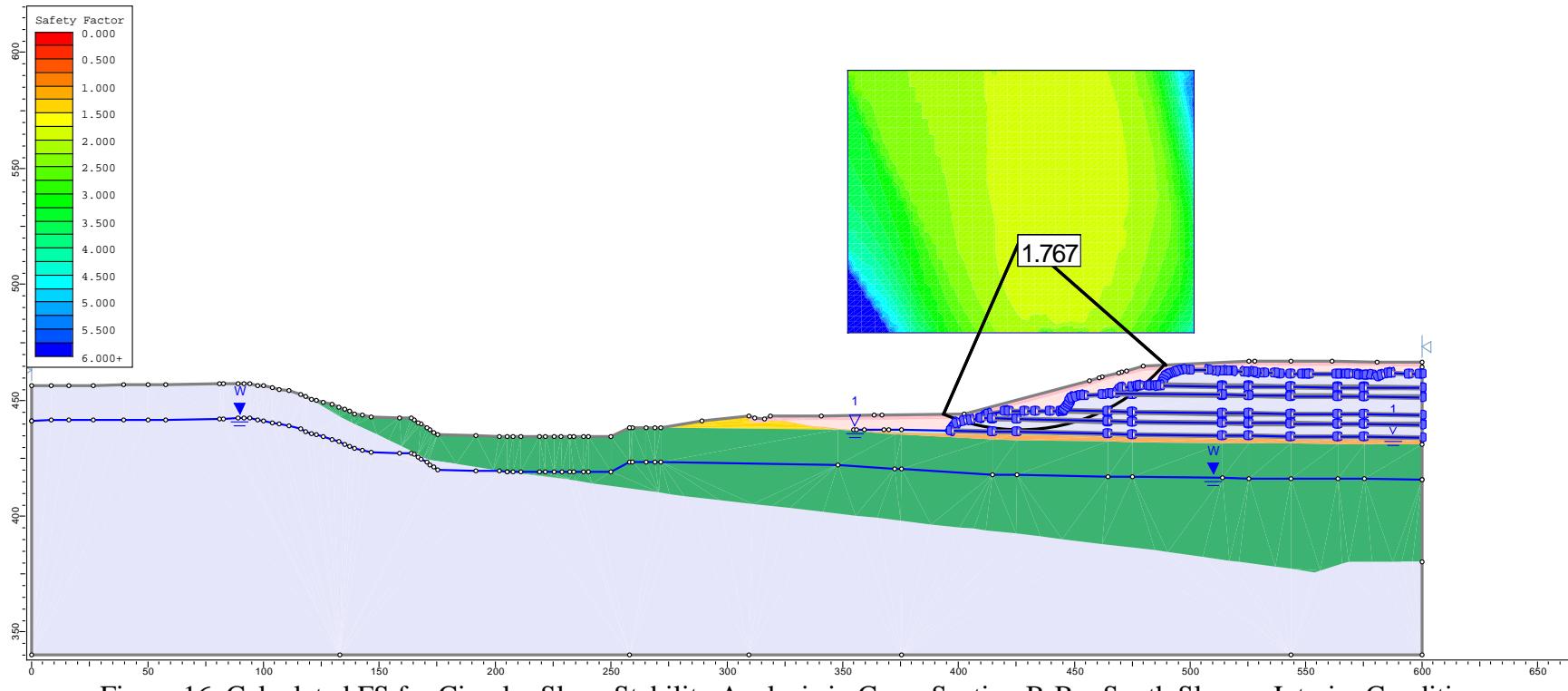


Figure 16. Calculated FS for Circular Slope Stability Analysis in Cross Section B-B – South Slope – Interim Condition

Note: This figure shows the FS calculated using Spencer's Method.

Written
by:

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Date: **02/09/2015**

Reviewed by:

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Date: **02/09/2015**

Client: **Honeywell**

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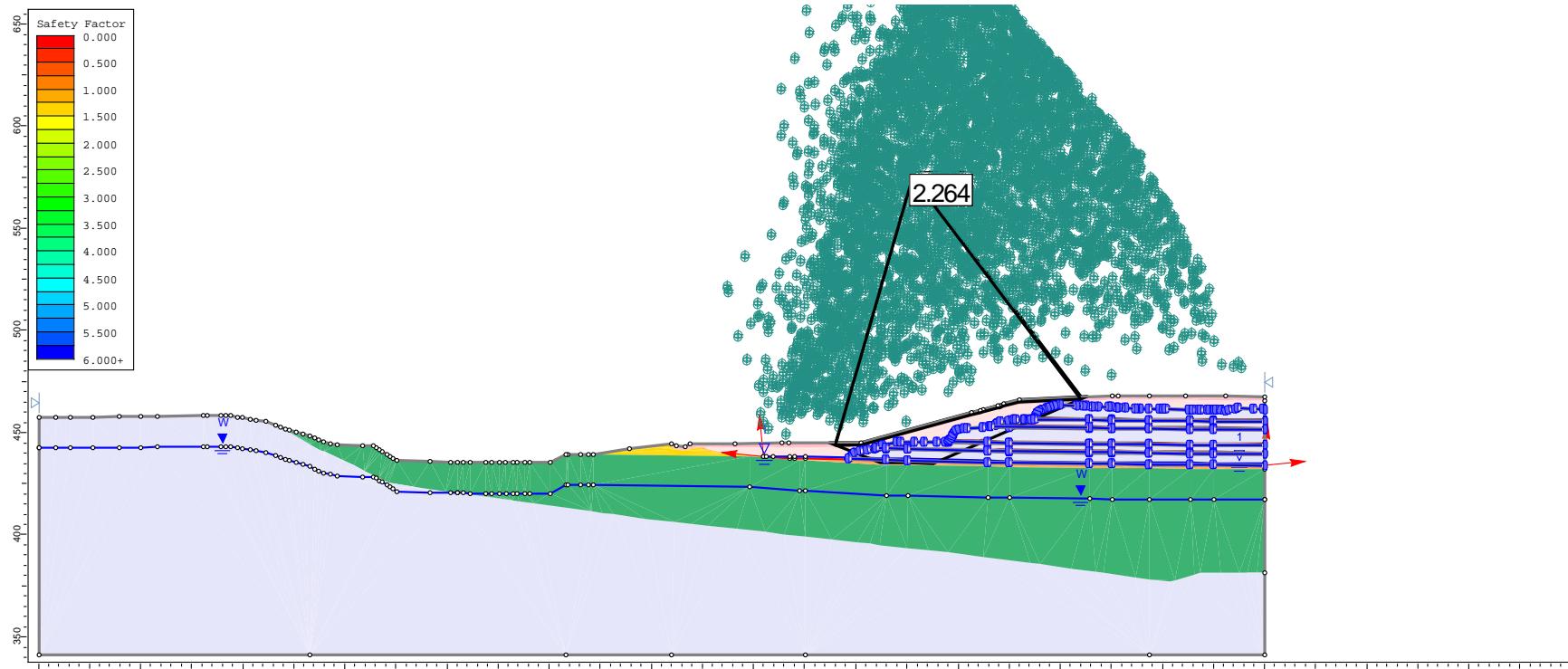


Figure 17. Calculated FS for Block Slope Stability Analysis in Cross Section B-B – South Slope – Interim Condition

Note: This figure shows the FS calculated using Janbu's Method.

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		Project/ Proposal No.:	GD5497	Task No.:	03

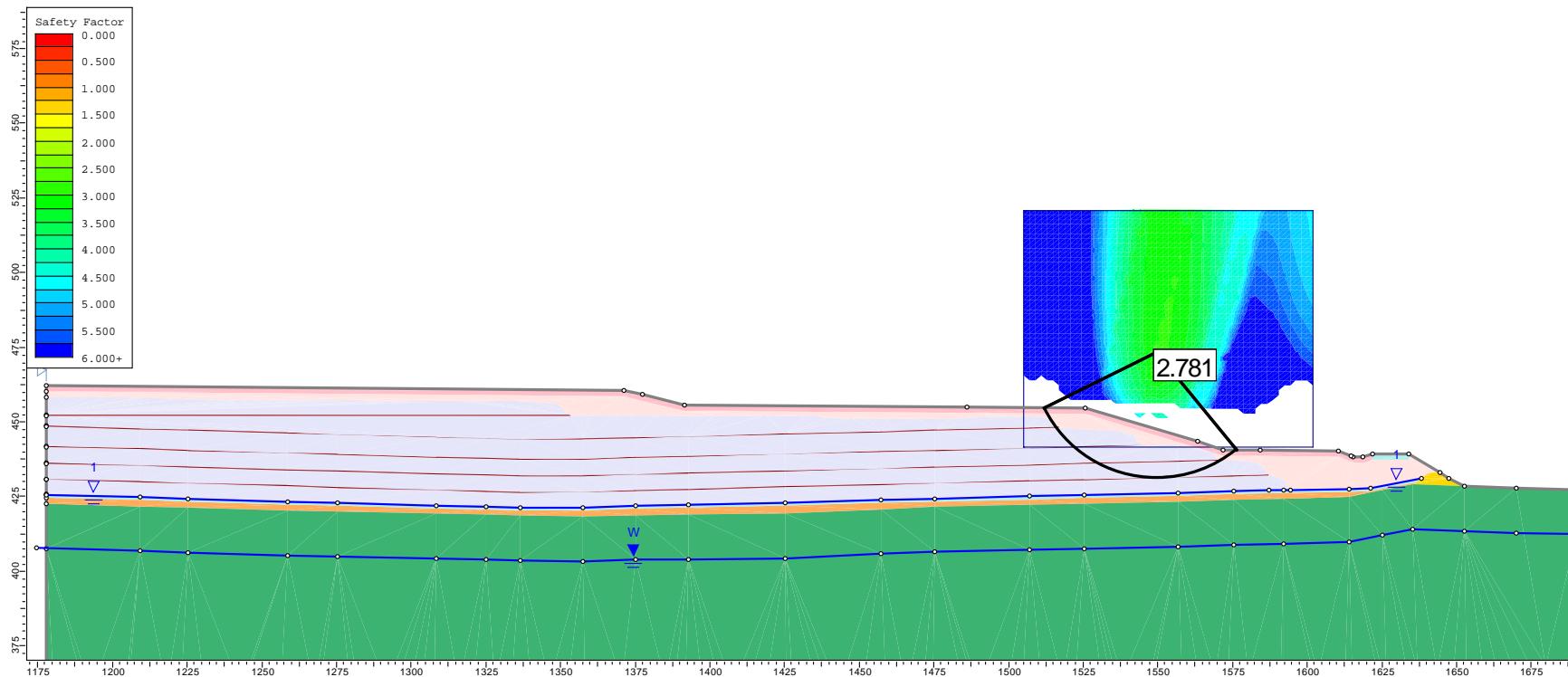


Figure 18. Calculated FS for Circular Slope Stability Analysis in Cross Section B-B – North Slope – Long Term Condition
Note: This figure shows the FS calculated using Spencer's Method.

Written by:

**Mustafa Erten /
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Date: **02/09/2015**

Reviewed by:

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Date: **02/09/2015**

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Project/ Proposal No.:

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Task No.: **03**

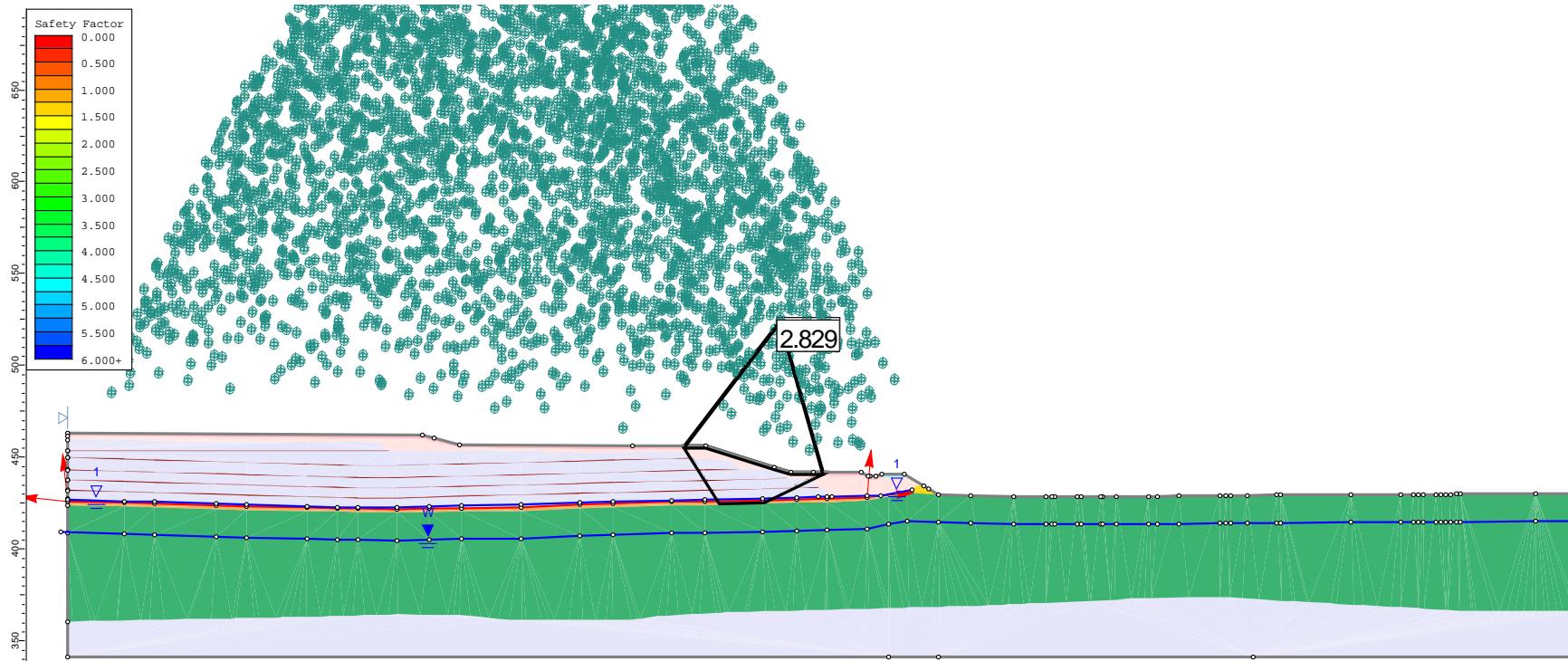


Figure 19. Calculated FS for Block Slope Stability Analysis in Cross Section B-B – North Slope – Long Term Condition

Note: This figure shows the FS calculated using Janbu's Method.

Written by:

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Date: **02/09/2015**

Reviewed by:

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Date: **02/09/2015**

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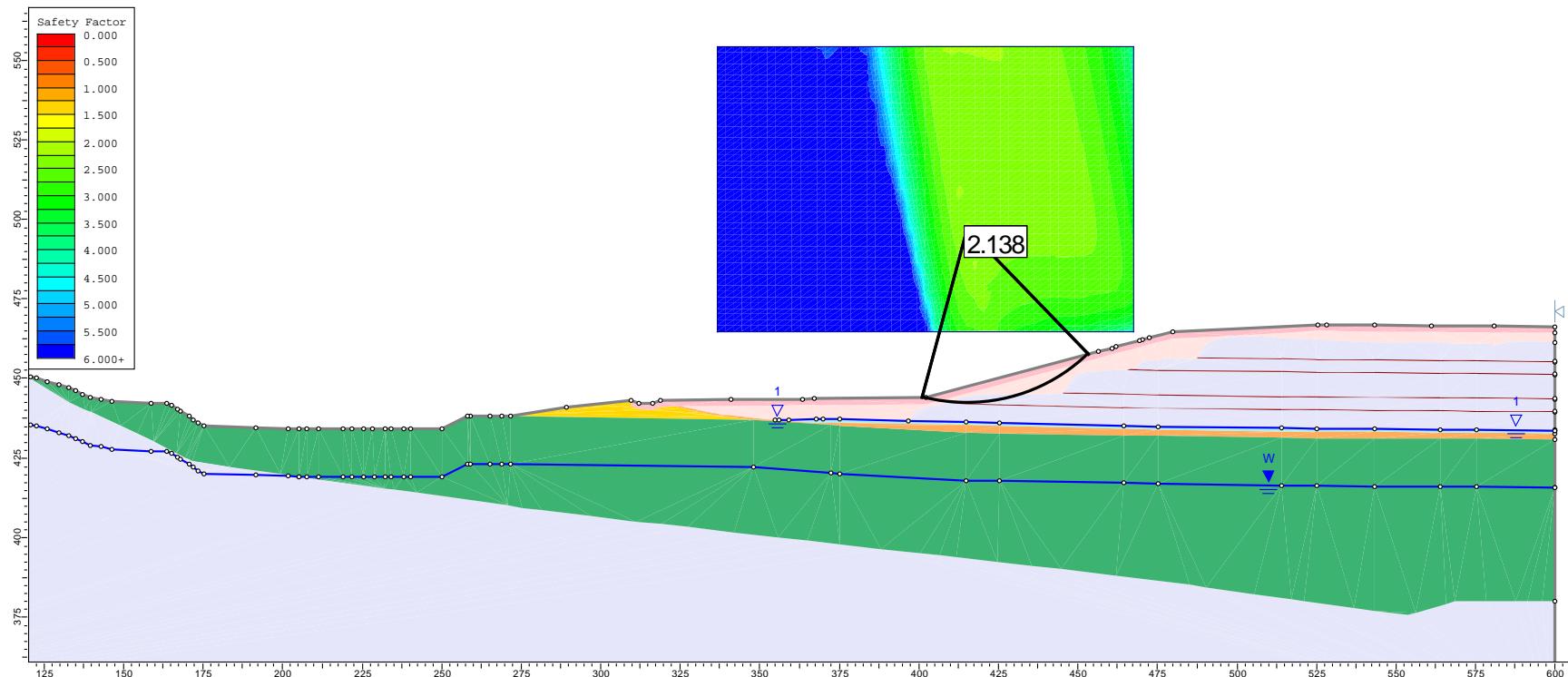


Figure 20. Calculated FS for Circular Slope Stability Analysis in Cross Section B-B – South Slope – Long Term Condition

Note: This figure shows the FS calculated using Spencer's Method.

Written
by:

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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

**Onondaga Lake SCA Final Cover
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Project/ Proposal No.: **GD5497**

Task No.: **03**

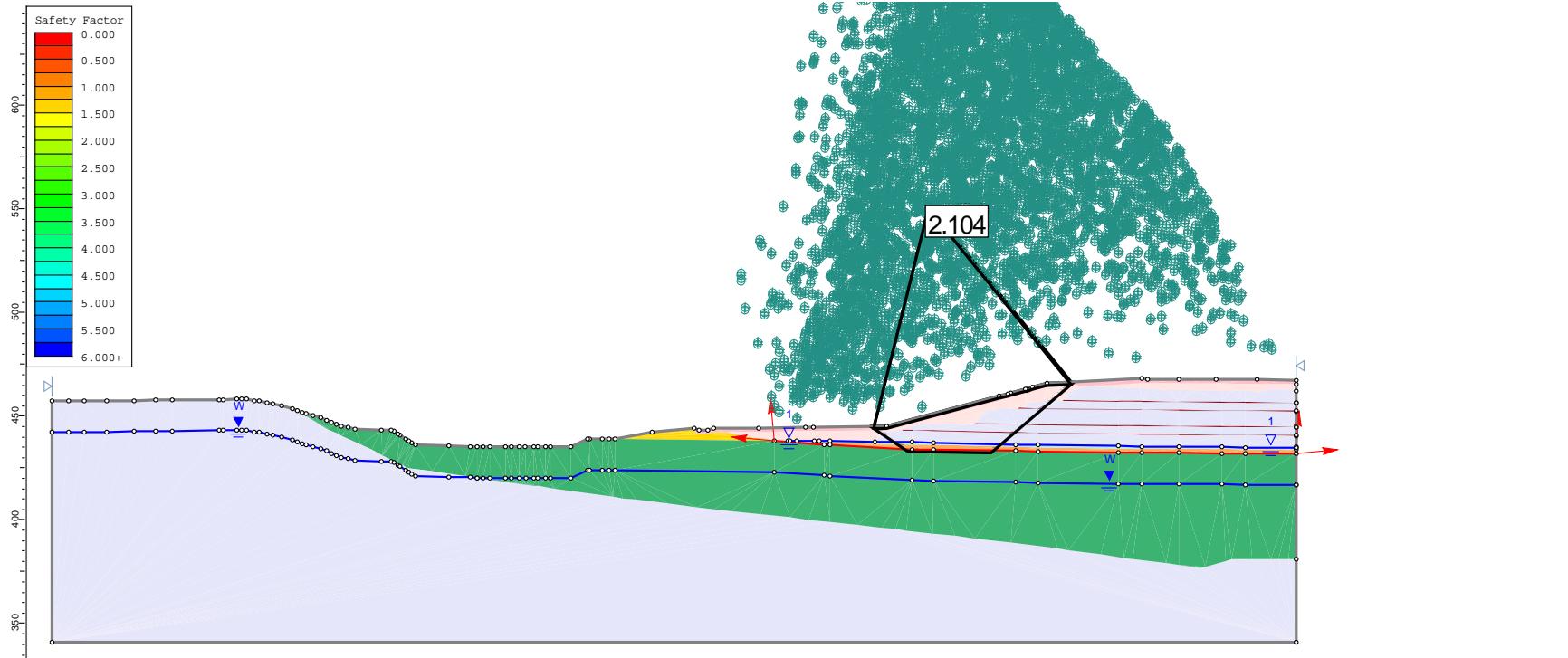


Figure 21. Calculated FS for Block Slope Stability Analysis in Cross Section B-B – South Slope – Long Term Condition

Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

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Date: **02/09/2015**

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Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

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Task No.: **03**

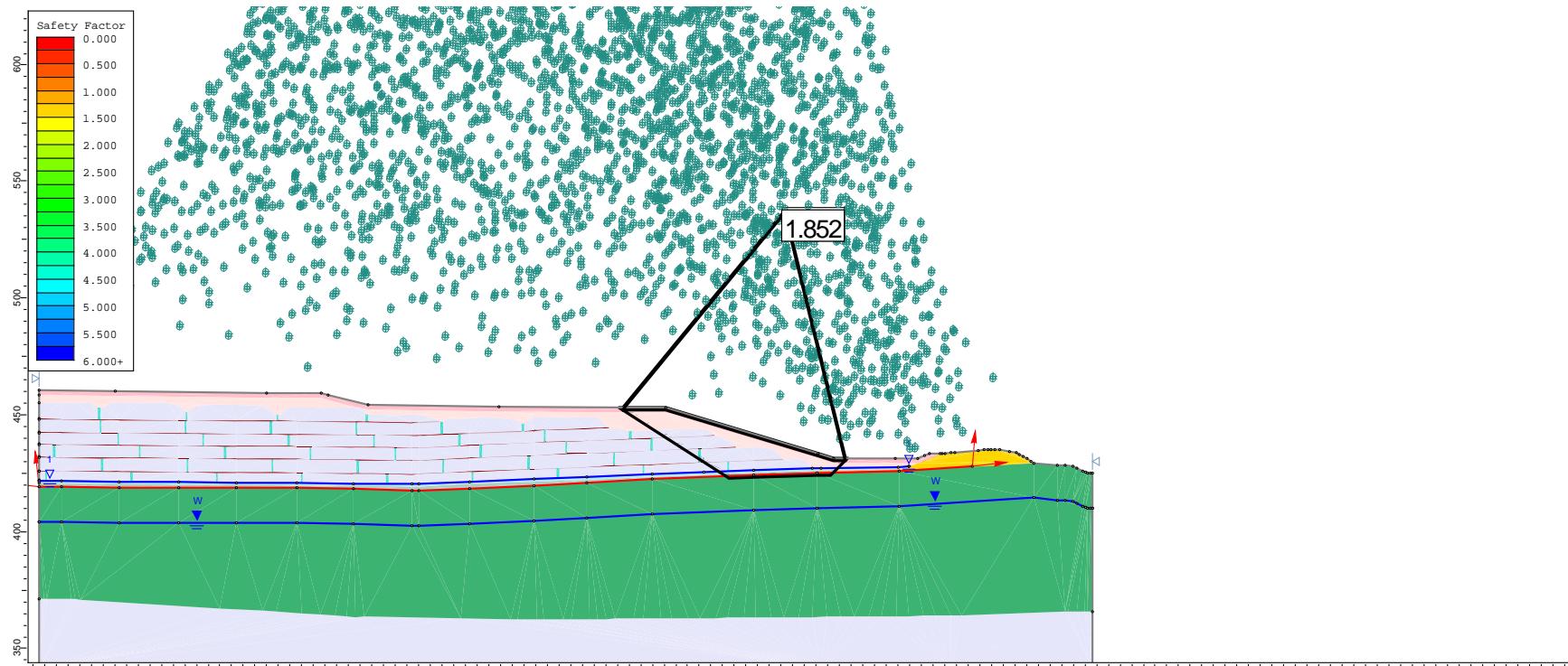


Figure 22. Calculated FS for Block Slope Stability Analysis in Cross Section A-A – East Slope – Long-Term Condition (Residual Liner Interface Shear Strength)

Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

**Mustafa Erten /
Meena Viswanath**

Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

**Onondaga Lake SCA Final Cover
Design**

Project/ Proposal No.: **GD5497**

Task No.: **03**

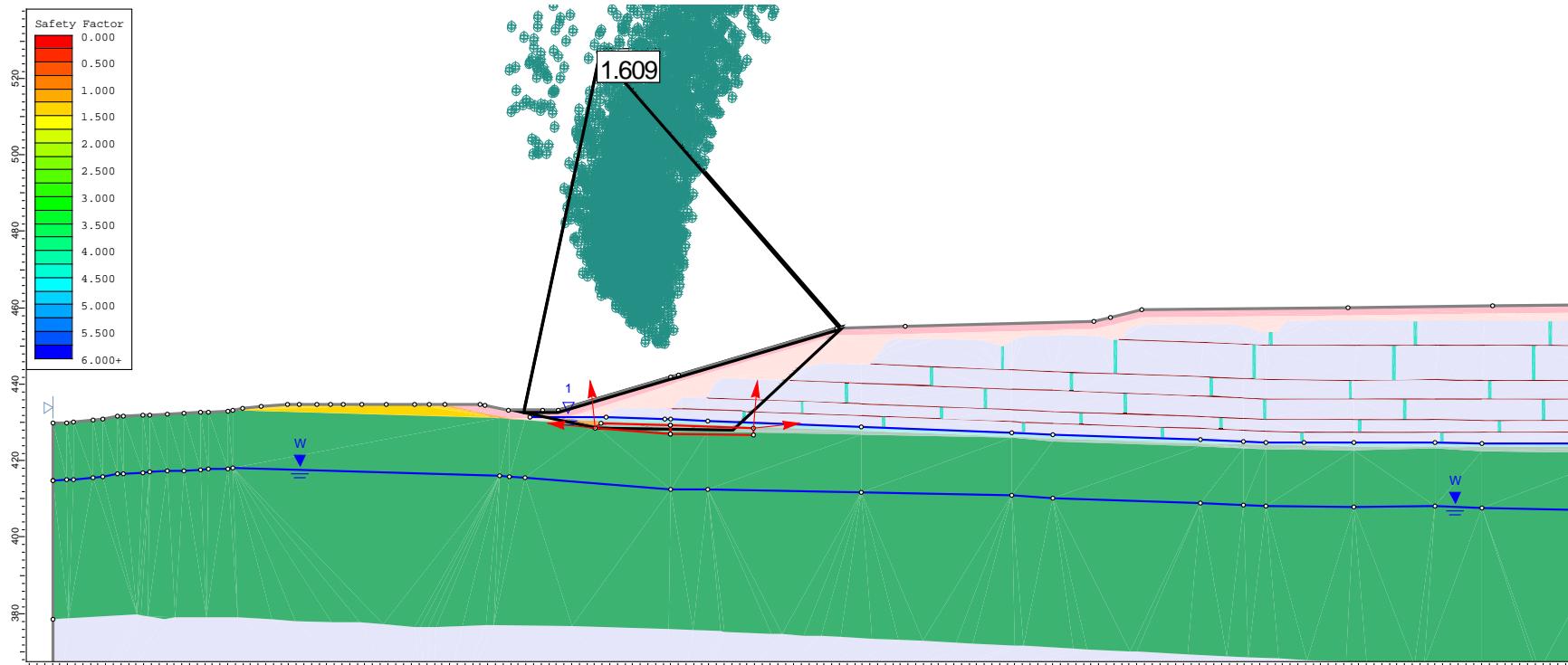


Figure 23. Calculated FS for Block Slope Stability Analysis in Cross Section A-A – West Slope – Long-Term Condition (Residual Liner Interface Shear Strength)

Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

**Mustafa Erten /
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Date: **02/09/2015**

Reviewed by:

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Date: **02/09/2015**

Client: **Honeywell**

Project:

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Task No.: **03**

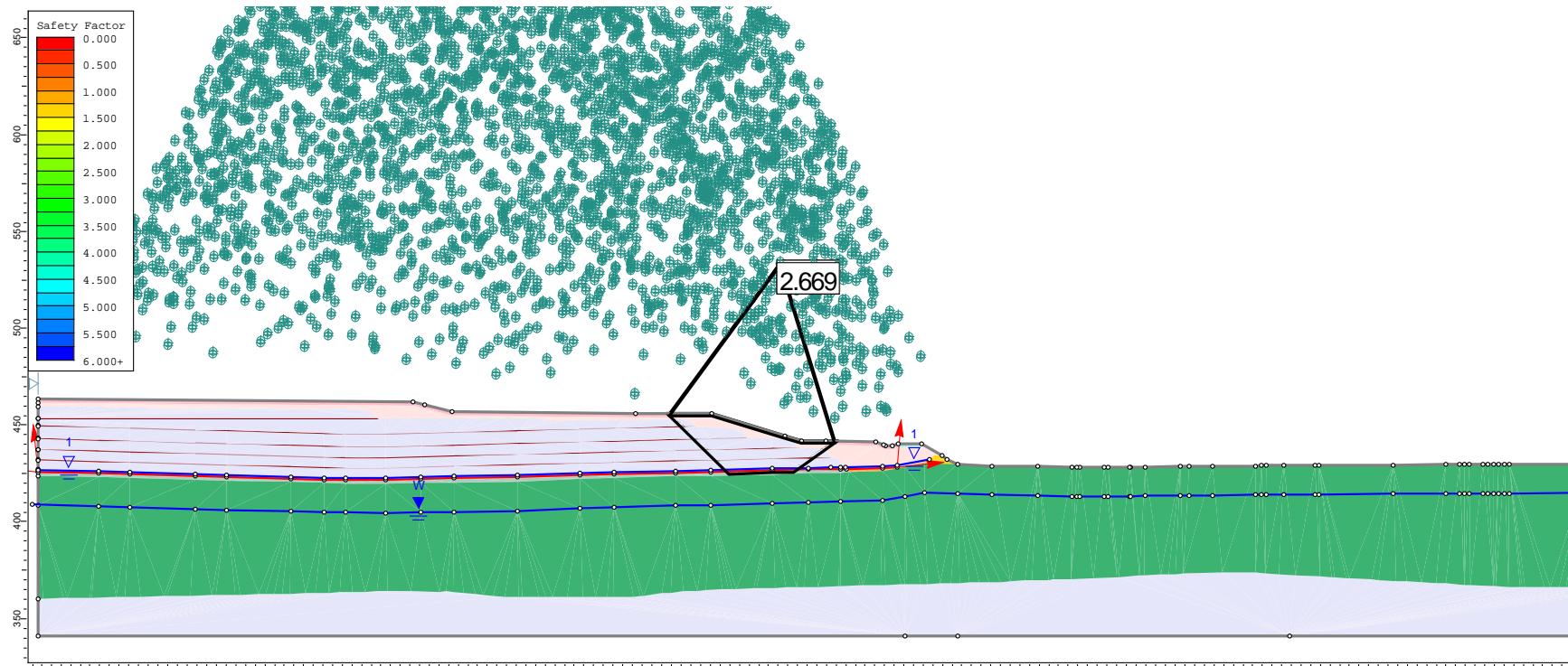


Figure 24. Calculated FS for Block Slope Stability Analysis in Cross Section B-B – North Slope – Long-Term Condition (Residual Liner Interface Shear Strength)

Note: This figure shows the FS calculated using Janbu's Method.

Written
by:

**Mustafa Erten /
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Date: **02/09/2015**

Reviewed by:

Ali Ebrahimi/Jay Beech

Date: **02/09/2015**

Client: **Honeywell**

Project:

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Task No.: **03**

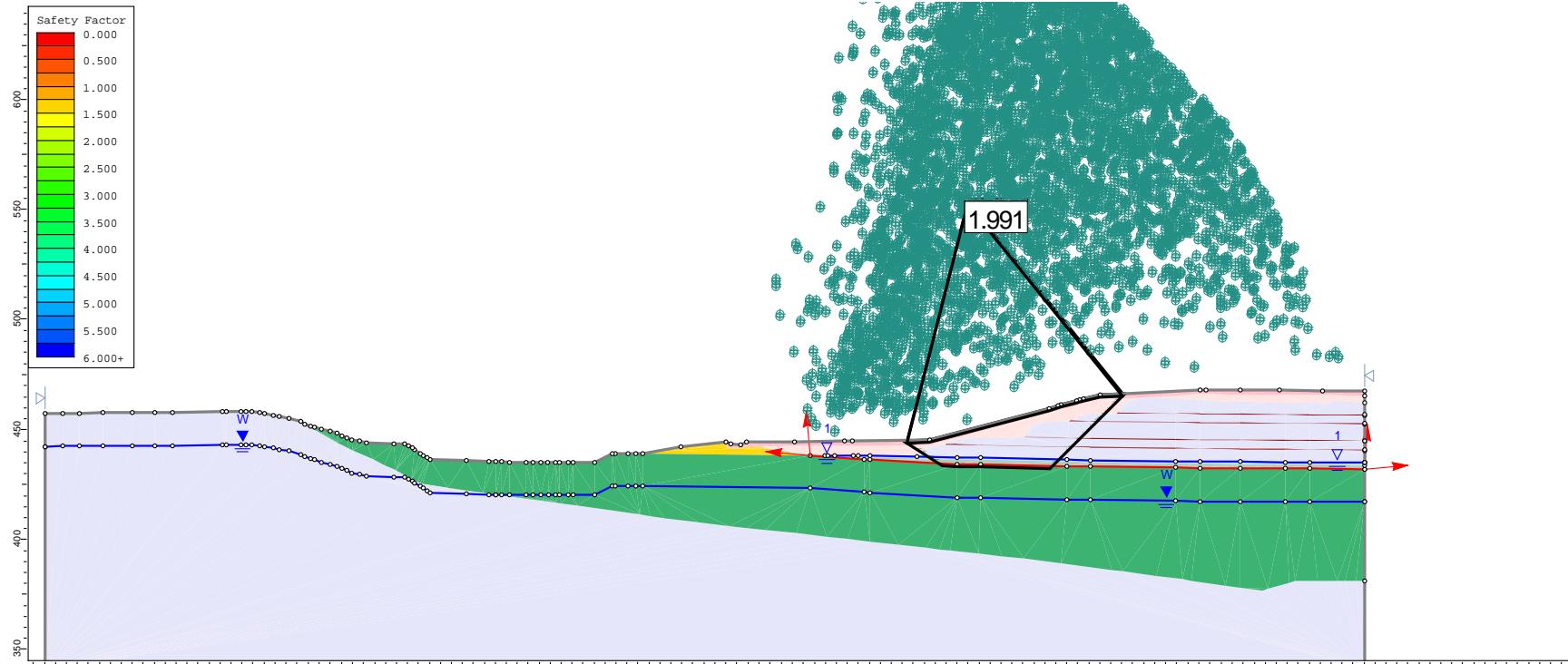


Figure 25. Calculated FS for Block Slope Stability Analysis in Cross Section B-B – South Slope – Long-Term Condition (Residual Liner Interface Shear Strength)

Note: This figure shows the FS calculated using Janbu's Method.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015		
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497	Task No.:	03

Attachment 1 SLIDE Output Files

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Notes

- 1.) The error messages in the output files are a result of invalid slip surfaces generated by the SLIDE program during the automatic search for the most critical slip surface. The invalid slip surfaces included surfaces that are beyond the defined model boundaries, surfaces that are kinematically not feasible, and surfaces that mathematically do not converge to a solution. The invalid slip surfaces do not affect the valid slip surfaces from which the critical slip surface is identified. A list of error codes identifying the meaning of each message is included immediately after this notes page.
- 2.) In the SLIDE output files, the model boundaries and definitions are only included once for each cross-section (A-A or B-B) and condition (interim, long-term, or residual) to avoid redundancy.

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List of Error Codes

- 101 = Only one (or zero) surface/slope interactions.
- 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.
- 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).
- 110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
- 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.
- 116 = Not enough slices to analyze the surface. Increase the number of slices in the job control in the modeler.
- 1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

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Cross-Section A-A: East, Interim Condition, Block Stability

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Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base_East_Block_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

- Units of Measurement: Imperial Units
- Time Units: seconds
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 30
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
- 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

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Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (undrained)	Dredge Material	Tube-Tube Interface (Horizontal)	Tub-Tube Interface (Vertical)	Tube-Gravel Interface
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Discrete function	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	43	86
Cohesion [psf]	0	0	0		0	0	0	0
Friction Angle [deg]	30	35	38		15	15	0.1	24
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Discrete Functions

- Name: SOLW (Undrained, U=0%)

X (ft)	Y (ft)	Cu (lbs/ft²)
1120	440	600
1120	427.5	600
1120	424.5	600
1120	424.4	600
1120	424.3	600
1120	424.2	600
1120	424.1	600
1120	424	600
1120	423.9	597.683
1120	423.8	592.646
1120	423.7	587.563
1120	423.6	582.359
1120	423.5	577.087
1120	423.4	571.796

1120	423.3	566.533
1120	423.2	561.342
1120	423.1	556.26
1120	423	551.323
1120	422.9	546.561
1120	422.8	542.001
1120	422.7	537.664
1120	422.6	533.568
1120	422.5	529.723
1120	422.4	526.138
1120	422.3	522.812
1120	422.2	519.744
1120	422.1	516.924
1120	422	514.337
1120	421.9	511.963
1120	421.8	509.777
1120	421.7	507.745
1120	421.6	505.83

1120	421.5	503.987
1120	421.4	502.166
1120	421.3	500.311
1120	421.2	498.358
1120	421.1	496.255
1120	421	494.037
1120	420.9	491.775
1120	420.8	489.544
1120	420.7	487.425
1120	420.6	485.503
1120	420.5	483.868
1120	420.4	482.606
1120	420.3	481.724
1120	420.2	481.188
1120	420.1	480.964
1120	420	481.009
1120	419.9	481.278
1120	419.8	481.721

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1120 419.7 482.284	1120 414.4 519.785	1120 409.1 583.981
1120 419.6 482.909	1120 414.3 520.787	1120 409 585.528
1120 419.5 483.532	1120 414.2 521.803	1120 408.9 587.063
1120 419.4 484.1	1120 414.1 522.831	1120 408.8 588.59
1120 419.3 484.61	1120 414 523.868	1120 408.7 590.115
1120 419.2 485.072	1120 413.9 524.913	1120 408.6 591.641
1120 419.1 485.498	1120 413.8 525.963	1120 408.5 593.175
1120 419 485.898	1120 413.7 527.015	1120 408.4 594.719
1120 418.9 486.285	1120 413.6 528.065	1120 408.3 596.275
1120 418.8 486.671	1120 413.5 529.112	1120 408.2 597.843
1120 418.7 487.068	1120 413.4 530.151	1120 408.1 599.422
1120 418.6 487.491	1120 413.3 531.18	1120 408 601.013
1120 418.5 487.953	1120 413.2 532.198	1120 407.9 602.616
1120 418.4 488.463	1120 413.1 533.204	1120 407.8 604.231
1120 418.3 489.017	1120 413 534.2	1120 407.7 605.857
1120 418.2 489.603	1120 412.9 535.186	1120 407.6 607.494
1120 418.1 490.211	1120 412.8 536.163	1120 407.5 609.144
1120 418 490.827	1120 412.7 537.13	1120 407.4 610.804
1120 417.9 491.439	1120 412.6 538.09	1120 407.3 612.475
1120 417.8 492.033	1120 412.5 539.042	1120 407.2 614.157
1120 417.7 492.595	1120 412.4 539.988	1120 407.1 615.848
1120 417.6 493.107	1120 412.3 540.929	1120 407 617.549
1120 417.5 493.555	1120 412.2 541.87	1120 406.9 619.258
1120 417.4 493.926	1120 412.1 542.814	1120 406.8 620.975
1120 417.3 494.234	1120 412 543.764	1120 406.7 622.698
1120 417.2 494.5	1120 411.9 544.722	1120 406.6 624.428
1120 417.1 494.745	1120 411.8 545.694	1120 406.5 626.164
1120 417 494.991	1120 411.7 546.682	1120 406.4 627.905
1120 416.9 495.263	1120 411.6 547.691	1120 406.3 629.65
1120 416.8 495.584	1120 411.5 548.723	1120 406.2 631.398
1120 416.7 495.979	1120 411.4 549.783	1120 406.1 633.149
1120 416.6 496.476	1120 411.3 550.873	1120 406 634.901
1120 416.5 497.101	1120 411.2 551.997	1120 405.9 636.654
1120 416.4 497.863	1120 411.1 553.158	1120 405.8 638.407
1120 416.3 498.75	1120 411 554.36	1120 405.7 640.16
1120 416.2 499.746	1120 410.9 555.605	1120 405.6 641.91
1120 416.1 500.836	1120 410.8 556.898	1120 405.5 643.658
1120 416 502	1120 410.7 558.242	1120 405.4 645.402
1120 415.9 503.222	1120 410.6 559.64	1120 405.3 647.143
1120 415.8 504.482	1120 410.5 561.097	1120 405.2 648.88
1120 415.7 505.76	1120 410.4 562.613	1120 405.1 650.615
1120 415.6 507.035	1120 410.3 564.183	1120 405 652.348
1120 415.5 508.285	1120 410.2 565.798	1120 404.9 654.078
1120 415.4 509.49	1120 410.1 567.449	1120 404.8 655.807
1120 415.3 510.644	1120 410 569.127	1120 404.7 657.534
1120 415.2 511.753	1120 409.9 570.823	1120 404.6 659.261
1120 415.1 512.824	1120 409.8 572.527	1120 404.5 660.986
1120 415 513.862	1120 409.7 574.229	1120 404.4 662.712
1120 414.9 514.874	1120 409.6 575.919	1120 404.3 664.437
1120 414.8 515.867	1120 409.5 577.588	1120 404.2 666.163
1120 414.7 516.847	1120 409.4 579.225	1120 404.1 667.89
1120 414.6 517.822	1120 409.3 580.834	1120 404 669.618
1120 414.5 518.799	1120 409.2 582.418	1120 403.9 671.347

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

1120 403.8 673.079	1120 398.5 771.785	1120 393.2 870.765
1120 403.7 674.813	1120 398.4 773.533	1120 393.1 872.703
1120 403.6 676.55	1120 398.3 775.279	1120 393 874.658
1120 403.5 678.29	1120 398.2 777.025	1120 392.9 876.626
1120 403.4 680.033	1120 398.1 778.775	1120 392.8 878.609
1120 403.3 681.781	1120 398 780.532	1120 392.7 880.605
1120 403.2 683.533	1120 397.9 782.298	1120 392.6 882.614
1120 403.1 685.29	1120 397.8 784.076	1120 392.5 884.633
1120 403 687.052	1120 397.7 785.87	1120 392.4 886.663
1120 402.9 688.82	1120 397.6 787.681	1120 392.3 888.703
1120 402.8 690.594	1120 397.5 789.513	1120 392.2 890.751
1120 402.7 692.375	1120 397.4 791.369	1120 392.1 892.807
1120 402.6 694.163	1120 397.3 793.247	1120 392 894.87
1120 402.5 695.958	1120 397.2 795.146	1120 391.9 896.939
1120 402.4 697.762	1120 397.1 797.063	1120 391.8 899.012
1120 402.3 699.573	1120 397 798.996	1120 391.7 901.09
1120 402.2 701.394	1120 396.9 800.944	1120 391.6 903.17
1120 402.1 703.224	1120 396.8 802.903	1120 391.5 905.253
1120 402 705.064	1120 396.7 804.873	1120 391.4 907.337
1120 401.9 706.914	1120 396.6 806.851	1120 391.3 909.422
1120 401.8 708.775	1120 396.5 808.835	1120 391.2 911.508
1120 401.7 710.647	1120 396.4 810.823	1120 391.1 913.596
1120 401.6 712.531	1120 396.3 812.812	1120 391 915.685
1120 401.5 714.427	1120 396.2 814.8	1120 390.9 917.776
1120 401.4 716.336	1120 396.1 816.785	1120 390.8 919.868
1120 401.3 718.259	1120 396 818.764	1120 390.7 921.961
1120 401.2 720.194	1120 395.9 820.736	1120 390.6 924.056
1120 401.1 722.142	1120 395.8 822.697	1120 390.5 926.152
1120 401 724.101	1120 395.7 824.646	1120 390.4 928.25
1120 400.9 726.069	1120 395.6 826.58	1120 390.3 930.349
1120 400.8 728.044	1120 395.5 828.497	1120 390.2 932.45
1120 400.7 730.026	1120 395.4 830.394	1120 390.1 934.552
1120 400.6 732.011	1120 395.3 832.273	1120 390 936.656
1120 400.5 734	1120 395.2 834.135	1120 389.9 938.761
1120 400.4 735.989	1120 395.1 835.982	1120 389.8 940.868
1120 400.3 737.977	1120 395 837.817	1120 389.7 942.976
1120 400.2 739.963	1120 394.9 839.64	1120 389.6 945.086
1120 400.1 741.945	1120 394.8 841.454	1120 389.5 947.198
1120 400 743.92	1120 394.7 843.26	1120 389.4 949.312
1120 399.9 745.888	1120 394.6 845.06	1120 389.3 951.427
1120 399.8 747.845	1120 394.5 846.857	1120 389.2 953.543
1120 399.7 749.791	1120 394.4 848.652	1120 389.1 955.662
1120 399.6 751.723	1120 394.3 850.446	1120 389 957.782
1120 399.5 753.639	1120 394.2 852.243	1120 388.9 959.904
1120 399.4 755.538	1120 394.1 854.044	1120 388.8 962.028
1120 399.3 757.416	1120 394 855.851	1120 388.7 964.153
1120 399.2 759.274	1120 393.9 857.667	1120 388.6 966.281
1120 399.1 761.108	1120 393.8 859.492	1120 388.5 968.41
1120 399 762.923	1120 393.7 861.33	1120 388.4 970.541
1120 398.9 764.721	1120 393.6 863.182	1120 388.3 972.673
1120 398.8 766.503	1120 393.5 865.051	1120 388.2 974.808
1120 398.7 768.273	1120 393.4 866.938	1120 388.1 976.944
1120 398.6 770.032	1120 393.3 868.842	1120 388 979.083

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1120 387.9 981.223	1120 384.2 1061.88	1120 380.5 1145.82
1120 387.8 983.365	1120 384.1 1064.11	1120 380.4 1148.14
1120 387.7 985.509	1120 384 1066.33	1120 380.3 1150.46
1120 387.6 987.655	1120 383.9 1068.56	1120 380.2 1152.78
1120 387.5 989.804	1120 383.8 1070.79	1120 380.1 1155.11
1120 387.4 991.954	1120 383.7 1073.02	1120 380 1157.44
1120 387.3 994.106	1120 383.6 1075.26	1120 379.9 1159.77
1120 387.2 996.26	1120 383.5 1077.5	1120 379.8 1162.1
1120 387.1 998.416	1120 383.4 1079.74	1120 379.7 1164.44
1120 387 1000.57	1120 383.3 1081.98	1120 379.6 1166.78
1120 386.9 1002.73	1120 383.2 1084.22	1120 379.5 1169.12
1120 386.8 1004.9	1120 383.1 1086.47	1120 379.4 1171.47
1120 386.7 1007.06	1120 383 1088.72	1120 379.3 1173.82
1120 386.6 1009.23	1120 382.9 1090.98	1120 379.2 1176.17
1120 386.5 1011.4	1120 382.8 1093.23	1120 379.1 1178.52
1120 386.4 1013.57	1120 382.7 1095.49	1120 379 1180.88
1120 386.3 1015.74	1120 382.6 1097.75	1120 378.9 1183.24
1120 386.2 1017.91	1120 382.5 1100.01	1120 378.8 1185.6
1120 386.1 1020.09	1120 382.4 1102.28	1120 378.7 1187.97
1120 386 1022.27	1120 382.3 1104.55	1120 378.6 1190.33
1120 385.9 1024.45	1120 382.2 1106.82	1120 378.5 1192.7
1120 385.8 1026.64	1120 382.1 1109.09	1120 378.4 1195.08
1120 385.7 1028.82	1120 382 1111.36	1120 378.3 1197.45
1120 385.6 1031.01	1120 381.9 1113.64	1120 378.2 1199.83
1120 385.5 1033.2	1120 381.8 1115.92	1120 378.1 1202.21
1120 385.4 1035.39	1120 381.7 1118.21	1120 378 1204.6
1120 385.3 1037.59	1120 381.6 1120.49	1120 377.9 1206.99
1120 385.2 1039.78	1120 381.5 1122.78	1120 377.8 1209.38
1120 385.1 1041.98	1120 381.4 1125.07	1120 377.7 1211.77
1120 385 1044.19	1120 381.3 1127.37	1120 377.6 1214.16
1120 384.9 1046.39	1120 381.2 1129.67	1120 377.5 1216.56
1120 384.8 1048.6	1120 381.1 1131.96	
1120 384.7 1050.81	1120 381 1134.27	
1120 384.6 1053.02	1120 380.9 1136.57	
1120 384.5 1055.23	1120 380.8 1138.88	
1120 384.4 1057.45	1120 380.7 1141.19	
1120 384.3 1059.66	1120 380.6 1143.5	

Property	Liner	Foundation	Leveling Soil
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	100	120	120
Cohesion [psf]	0	0	0
Friction Angle [deg]	19	37	30
Water Surface	Water Table	Water Table	Water Table
Hu Value	1	1	1

Support Properties

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Geotube

- Support Type: GeoTextile
- Force Application: Passive
- Force Orientation: Tangent to Slip Surface
- Anchorage: Both Ends
- Shear Strength Model: Linear
- Strip Coverage: 100 percent
- Tensile Strength: 1600 lb/ft

Global Minimum

Method: janbu simplified

- FS: 2.125340
- Axis Location: 1693.886, 532.761
- Left Slip Surface Endpoint: 1626.297, 452.045
- Right Slip Surface Endpoint: 1717.906, 430.260
- Resisting Horizontal Force=44277.8 lb
- Driving Horizontal Force=20833.3 lb
- Total Slice Area=955.945 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1626.3	452.045
1684.95	423.268
1710.35	424.006
1713.02	424.086
1717.91	430.26

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 1962

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- Number of Invalid Surfaces: 3038

Error Codes:

- Error Code -107 reported for 525 surfaces
- Error Code -108 reported for 2282 surfaces
- Error Code -112 reported for 231 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

List Of Coordinates

Water Table

1827.11	409.006
1828.16	409.012

1749.43	426.872
---------	---------

X	Y
1377.54	403.118
1386.89	403.089
1411.74	402.913
1437.21	402.889
1461.74	402.653
1487.85	402.622
1511.74	402.227
1537.11	401.646
1539.82	401.652
1561.75	402.378
1589.12	403.712
1611.75	404.993
1639.75	406.523
1683.22	408.213
1710.35	409.001
1745.21	410.042
1802.77	413.428
1812.97	412.429
1816.28	412.274
1819.76	412
1821.26	411.252
1823.88	410
1824.96	409.513
1826.06	409

Piezoline

X	Y
1377.54	420.711
1386.89	420.627
1411.74	420.405
1437.21	420.176
1461.74	419.957
1487.85	419.855
1511.74	419.666
1537.11	419.284
1539.82	419.317
1561.75	420.401
1589.12	421.488
1611.75	422.33
1639.75	423.482
1661.76	424.371
1683.22	425.238
1708.35	426.001
1711.76	426.067
	1744.9 426.703
	1749.35 426.869

Block Search Polyline

X	Y
1377.54	418.123
1386.89	418.094
1411.74	417.918
1437.21	417.894
1461.74	417.658
1487.85	417.627
1511.74	417.232
1537.11	416.651
1539.82	416.657
1561.75	417.383
1589.12	418.717
1611.75	419.998
1639.75	421.528
1683.22	423.218
1710.35	424.006
1745.21	425.047
1776.51	426.888

External Boundary

Written by: **Mustafa Erten / Meena Viswanath** Date: **02/09/2015** Reviewed by: **Ali Ebrahimi / Jay Beech** Date: **02/09/2015**

Client: **Honeywell** Project: **Onondaga Lake SCA Final Cover Design** Project/ Proposal No.: **GD5497** Task No.: **03**

X	Y
1827.11	424.006
1826.06	424
1824.96	424.513
1823.88	425
1821.26	426.252
1819.76	427
1816.28	427.274
1812.97	427.429
1802.77	428.428
1801.69	429.084
1799.88	430.18
1798.52	431
1796.81	432.032
1795.23	433
1792.45	433.449
1788.28	434
1786.11	434.012
1784.61	434.018
1783.15	434.011
1781.45	434
1779.1	433.812
1769.33	433
1767.61	432.702
1764.74	432.447
1763.59	432.229
1763.06	432.229
1758.22	432.229
1756.01	431.396
1753.07	430.261
1743.85	430.261
1717.26	430.26
1710.46	432.305
1645.36	451.855
1573.95	452.565
1518.09	453.12
1500.95	457.456
1498.08	458.169
1474.71	458.401
1409.97	459.044
1377.54	459.367
1377.54	457.367
1377.54	454.03
1377.54	447.253
1377.54	447.003
1377.54	441.601
1377.54	441.351
1377.54	436.41
1377.54	436.16
1377.54	431.007
1377.54	430.757
1377.54	425.101
1377.54	424.851

1377.54	420.961
1377.54	420.711
1377.54	419.711
1377.54	418.118
1377.54	403.118
1377.54	370.037
1377.54	340
1711.76	340
1767.61	340
1828.16	340
1828.16	364.881
1828.16	409.012
1828.16	424.012

Material Boundary

X	Y
1711.76	426.067
1744.9	426.703
1749.35	426.869

Material Boundary

X	Y
1762.13	431.629
1763.59	432.229

X	Y
1377.54	454.03
1386.78	454.118
1392.89	454.064
1399.32	454
1400.82	453.019
1402.59	452.202

Material Boundary

X	Y
1377.54	420.711
1386.89	420.627
1411.74	420.405
1437.21	420.176
1461.74	419.957
1487.85	419.855
1511.74	419.666
1537.11	419.284
1539.82	419.317
1561.75	420.401
1589.12	421.488
1611.75	422.33
1639.75	423.482
1661.76	424.371
1683.22	425.238
1708.35	426.001

Material Boundary

X	Y
1516.04	451.638
1518.09	451.12
1573.95	450.565
1645.36	449.855
1710.46	430.305
1717.26	428.26

Material Boundary

X	Y
1377.54	457.367
1409.97	457.044
1474.71	456.401
1498.09	456.169
1500.95	455.456

X	Y
1377.54	370.037
1379.54	370.036
1380.68	370.038
1391.04	370.009
1392.91	370.006
1395.06	370
1454.89	366.16
1472.96	365
1478.78	364.626
1489.73	363.924
1497.79	363.406
1503.97	363.01
1508.86	362.696
1512.83	362.441

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			Project/ Proposal No.:	GD5497	Task No.:	03

1516.51	362.527
1557.79	361.677
1579.2	361.31
1582.1	361.333
1590.42	361.397
1593.51	361.421
1601.62	361.483
1604.9	361.509
1612.8	361.57
1616.27	361.597
1619.96	361.63
1623.82	361.668
1631.63	361.728
1635.85	361.774
1643.41	361.833
1647.89	361.882
1655.2	361.94
1659.94	361.992
1667	362.048
1672.01	362.104
1678.8	362.158
1684.09	362.218
1690.62	362.27
1696.18	362.333
1702.44	362.384
1708.28	362.451
1714.26	362.499
1720.39	362.57
1726.1	362.617
1732.52	362.691
1737.95	362.736
1744.24	362.81
1749.39	362.853
1755.94	362.93
1760.8	362.971
1767.62	363.052
1772.19	363.091
1816.41	364.861
1817.65	364.862
1821.17	364.872
1824.72	364.874
1825.98	364.875
1828.16	364.881

1461.74	417.653
1487.85	417.622
1511.74	417.227
1537.11	416.646
1539.82	416.652
1561.75	417.378
1589.12	418.712
1611.75	419.993
1639.75	421.523

Material Boundary

X	Y
1683.22	424.238
1695.95	424.625
1708.35	425.001
1709.34	425.02
1744.9	425.703

Material Boundary

X	Y
1377.54	419.711
1386.89	419.627
1411.74	419.405
1437.21	419.176
1461.74	418.957
1487.85	418.855
1511.74	418.666
1537.11	418.284
1539.82	418.317
1561.75	419.401
1589.12	420.488
1611.75	421.33
1639.75	422.482

Material Boundary

X	Y
1639.75	421.523
1683.22	423.213
1710.35	424.001

Material Boundary

X	Y
1639.75	422.482
1661.76	423.371
1683.22	424.238

Material Boundary

X	Y
1706.86	427.34
1708.08	426.243
1708.35	426.001
1711.76	426.067

Material Boundary

X	Y
1745.21	425.042
1802.77	428.428

Material Boundary

X	Y
1753.07	428.261
1763.06	432.229

Material Boundary

X	Y
1377.54	418.118
1386.89	418.089
1411.74	417.913
1437.21	417.889

Material Boundary

X	Y
1710.35	424.001
1745.21	425.042

Material Boundary

X	Y
1749.35	426.869
1749.43	426.872

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			Project/ Proposal No.:	GD5497	Task No.:	03

Material Boundary

X	Y
1744.9	425.703
1745.83	425.703

1525.85	423.594
1526.85	423.579
1537.11	423.425
1539.82	423.458
1561.75	424.541
1562.35	424.565
1563.35	424.605
1589.12	425.629
1598.85	425.991
1599.85	426.028
1611.75	426.447
1635.35	427.442
1636.35	427.483
1639.75	427.623
1661.76	428.512
1671.85	428.919
1672.85	428.96
1683.22	429.378
1695.86	429.762
1703.68	430

1659.36	434.32
1660.36	434.361
1661.76	434.417
1675.43	434.97
1676.12	434.997

Material Boundary

X	Y
1745.21	425.042
1753.36	428.045
1756.29	429.217

1611.75	426.447
1635.35	427.442
1636.35	427.483
1639.75	427.623
1661.76	428.512
1671.85	428.919
1672.85	428.96
1683.22	429.378
1695.86	429.762
1703.68	430

Material Boundary

X	Y
1561.75	441.041
1589.12	442.128
1593.21	442.281
1594.21	442.318
1611.75	442.97
1621.31	443.363

Material Boundary

X	Y
1756.29	429.217
1762.13	431.629

Material Boundary

1377.54	430.757
1386.89	430.673
1403.86	430.521
1404.86	430.512
1411.74	430.451
1437.21	430.222
1440.36	430.194
1441.36	430.185
1461.74	430.003
1476.86	429.944
1477.86	429.94
1487.85	429.901
1511.74	429.713
1513.36	429.688
1514.36	429.673
1537.11	429.33
1539.82	429.363
1549.86	429.859
1550.86	429.909
1561.75	430.447
1586.36	431.425
1587.36	431.465
1589.12	431.535
1611.75	432.376
1622.86	432.833
1623.86	432.874
1639.75	433.528

X	Y
1377.54	441.351
1386.89	441.267
1410.71	441.054
1411.71	441.045
1411.74	441.045
1437.21	440.816
1447.21	440.727
1448.21	440.718
1461.74	440.597
1483.71	440.511
1484.71	440.507
1487.85	440.495
1511.74	440.306

Material Boundary

X	Y
1717.26	428.26
1743.85	428.261

1377.54	424.851
1379.85	424.831
1380.85	424.822
1386.89	424.768
1411.74	424.545
1416.35	424.504
1417.35	424.495
1437.21	424.317
1452.85	424.177
1453.85	424.168
1461.74	424.097
1487.85	423.995
1489.35	423.983
1490.35	423.975
1511.74	423.807

Material Boundary

X	Y
1511.74	440.306
1520.21	440.179
1521.21	440.164
1537.11	439.924

Material Boundary

X	Y
1377.54	436.16
1383.43	436.107

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1384.43	436.098
1386.89	436.076
1411.74	435.853
1419.93	435.78
1420.93	435.771
1437.21	435.625
1456.43	435.453
1457.43	435.444
1461.74	435.406
1487.85	435.303
1492.93	435.263
1493.93	435.256
1511.74	435.115
1529.43	434.849
1530.43	434.834
1537.11	434.733
1539.82	434.766
1561.75	435.85
1565.93	436.016
1566.93	436.056
1589.12	436.937
1602.43	437.432
1603.43	437.47
1611.75	437.779
1638.93	438.898
1639.75	438.931
1639.93	438.939
1661.76	439.82
1666.21	440

1676.12	434.997
1677.35	434.998
1683.29	435
1686.79	435
1689.52	434.366
1691.7	434
1693.04	432.997
1693.99	431.927

1511.74	445.959
---------	---------

Material Boundary

X	Y
1584.38	445.174
1584.88	445.436
1584.88	442.21

Material Boundary

X	Y
1674.85	435.921
1675.28	435.214
1675.43	434.97

Material Boundary

X	Y
1583.88	442.171
1583.88	445.392

Material Boundary

X	Y
1537.11	445.577
1539.82	445.609
1549.03	446.065

Material Boundary

Material Boundary

X	Y
1511.74	445.959
1512.67	445.945
1513.67	445.93
1537.11	445.577

Material Boundary

Material Boundary

X	Y
1703.68	430
1704.64	429.512
1706.03	428.467
1706.86	427.34

Material Boundary

X	Y
1377.54	447.003
1386.89	446.92
1403.17	446.774
1404.17	446.765
1411.74	446.697
1437.21	446.469
1439.67	446.447
1440.67	446.438
1461.74	446.249
1476.17	446.193
1477.17	446.189
1487.85	446.147

X	Y
1584.88	445.436
1585.96	446
1587.09	446.778
1587.86	447.349
1588.81	448
1595.55	448.034
1602.59	448.054
1606.59	448.036
1616.09	448
1617.27	446.979
1618.26	446
1619.42	444.981
1620.42	444
1620.98	443.6
1621.31	443.363
1622.66	443
1625.15	442.657
1629.71	442.026
1629.98	441.99
1630.71	441.994
1631.99	442
1653.52	442.916
1655.32	442.975
1657.79	443.004
1660.79	443.001
1665.02	441.795
1665.61	440.971
1666.06	440.244
1666.21	440
1668.3	439.395

Material Boundary

X	Y
1693.99	431.927
1695.65	430.006
1695.86	429.762

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1669.17	439
1672.68	438.006
1674.2	436.93
1674.85	435.921

Material Boundary

X	Y
1636.35	423.593
1636.35	427.483

Material Boundary

X	Y
1489.35	420.093
1489.35	423.983

Material Boundary

X	Y
1550.17	440.718
1550.17	445.994

Material Boundary

X	Y
1598.85	422.1
1598.85	425.991

Material Boundary

X	Y
1490.35	420.085
1490.35	423.975

Material Boundary

X	Y
1549.17	440.669
1549.17	446.056

Material Boundary

X	Y
1599.85	422.138
1599.85	426.028

Material Boundary

X	Y
1416.35	420.613
1416.35	424.504

Material Boundary

X	Y
1556.71	440.792
1557.71	440.841
1561.75	441.041

Material Boundary

X	Y
1562.35	420.675
1562.35	424.565

Material Boundary

X	Y
1417.35	420.604
1417.35	424.495

Material Boundary

X	Y
1671.85	425.029
1671.85	428.919

Material Boundary

X	Y
1563.35	420.715
1563.35	424.605

Material Boundary

X	Y
1452.85	420.286
1452.85	424.177

Material Boundary

X	Y
1672.85	425.069
1672.85	428.96

Material Boundary

X	Y
1525.85	419.704
1525.85	423.594

Material Boundary

X	Y
1453.85	420.277
1453.85	424.168

Material Boundary

X	Y
1635.35	423.551
1635.35	427.442

Material Boundary

X	Y
1526.85	419.689
1526.85	423.579

Material Boundary

X	Y
1379.85	420.94
1379.85	424.831

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Material Boundary

X	Y
1380.85	420.931
1380.85	424.822

Material Boundary

X	Y
1549.86	424.204
1549.86	429.859

Material Boundary

X	Y
1441.36	424.53
1441.36	430.185

Material Boundary

X	Y
1659.36	428.665
1659.36	434.32

Material Boundary

X	Y
1550.86	424.253
1550.86	429.909

Material Boundary

X	Y
1403.86	424.866
1403.86	430.521

Material Boundary

X	Y
1660.36	428.705
1660.36	434.361

Material Boundary

X	Y
1513.36	424.033
1513.36	429.688

Material Boundary

X	Y
1404.86	424.857
1404.86	430.512

Material Boundary

X	Y
1622.86	427.177
1622.86	432.833

Material Boundary

X	Y
1514.36	424.018
1514.36	429.673

Material Boundary

X	Y
1638.93	433.745
1638.93	438.898

Material Boundary

X	Y
1623.86	427.219
1623.86	432.874

Material Boundary

X	Y
1476.86	424.288
1476.86	429.944

Material Boundary

X	Y
1639.93	433.786
1639.93	438.939

Material Boundary

X	Y
1586.36	425.769
1586.36	431.425

Material Boundary

X	Y
1477.86	424.284
1477.86	429.944

Material Boundary

X	Y
1602.43	432.28
1602.43	437.432

Material Boundary

X	Y
1587.36	425.809
1587.36	431.465

Material Boundary

X	Y
1440.36	424.539
1440.36	430.194

Material Boundary

X	Y
1603.43	432.317
1603.43	437.447

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Material Boundary

X	Y
1565.93	430.863
1565.93	436.016

Material Boundary

X	Y
1457.43	430.291
1457.43	435.444

Material Boundary

X	Y
1593.21	437.34
1593.21	442.281

Material Boundary

X	Y
1566.93	430.903
1566.93	436.056

Material Boundary

X	Y
1419.93	430.627
1419.93	435.78

Material Boundary

X	Y
1594.21	437.377
1594.21	442.318

Material Boundary

X	Y
1529.43	429.696
1529.43	434.849

Material Boundary

X	Y
1420.93	430.618
1420.93	435.771

Material Boundary

X	Y
1556.71	435.851
1556.71	440.792

Material Boundary

X	Y
1530.43	429.681
1530.43	434.834

Material Boundary

X	Y
1383.43	430.954
1383.43	436.107

Material Boundary

X	Y
1557.71	435.9
1557.71	440.841

Material Boundary

X	Y
1492.93	430.111
1492.93	435.263

Material Boundary

X	Y
1384.43	430.945
1384.43	436.098

Material Boundary

X	Y
1520.21	435.238
1520.21	440.179

Material Boundary

X	Y
1493.93	430.103
1493.93	435.256

Material Boundary

X	Y
1629.71	438.768
1629.71	442.026

Material Boundary

X	Y
1521.21	435.223
1521.21	440.164

Material Boundary

X	Y
1456.43	430.3
1456.43	435.453

Material Boundary

X	Y
1630.71	438.809
1630.71	441.994

Material Boundary

X	Y
1483.71	435.57
1483.71	440.511

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Material Boundary

X	Y
1484.71	435.566
1484.71	440.507

Material Boundary

X	Y
1476.17	440.79
1476.17	446.193

1518.04 446.114

Material Boundary

X	Y
1518.04	449.025
1518.46	448.984
1528.82	448.843
1539.92	448.982
1544.67	448
1545.97	447.54
1547.54	447
1548.66	446.296
1549.03	446.065
1549.17	446.056
1550.17	445.994
1551.14	446.942
1562.42	447.653
1567.37	447.704
1571.79	447.69
1578.82	447.146
1580.2	447.054
1581.14	446.733
1582.49	446
1583.88	445.392
1584.38	445.174

Material Boundary

X	Y
1447.21	435.786
1447.21	440.727

Material Boundary

X	Y
1477.17	440.786
1477.17	446.189

Material Boundary

X	Y
1448.21	435.777
1448.21	440.718

Material Boundary

X	Y
1439.67	441.044
1439.67	446.447

Material Boundary

X	Y
1411.71	436.104
1411.71	441.045

Material Boundary

X	Y
1440.67	441.035
1440.67	446.438

Material Boundary

X	Y
1517.04	446.129
1517.04	449.745
1517.54	449.074

Material Boundary

X	Y
1410.71	436.113
1410.71	441.054

Material Boundary

X	Y
1403.17	441.371
1403.17	446.774

Material Boundary

X	Y
1512.67	440.543
1512.67	445.945

Material Boundary

X	Y
1404.17	441.362
1404.17	446.765

X	Y
1479.39	448.973
1479.89	449.018
1479.89	446.428

Material Boundary

X	Y
1513.67	440.527
1513.67	445.93

Material Boundary

X	Y
1518.04	449.025
1518.04	446.114

X	Y
1479.89	449.018
1480.88	449.107

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1481.72	450.127
1482.4	451
1483.55	451.471
1484.76	452
1497.24	452.011
1504.47	452.007
1510.87	452
1513.7	452.229
1516.04	451.638
1516.74	450.144
1517.04	449.745

1476.75	450.994
1477.8	449.442
1478.89	449.12

1453.85	420.277
1461.74	420.207
1487.85	420.105
1489.35	420.093
1490.35	420.085
1511.74	419.916
1525.85	419.704
1526.85	419.689
1537.11	419.534
1539.82	419.567
1561.75	420.651
1562.35	420.675
1563.35	420.715
1589.12	421.738
1598.85	422.1
1599.85	422.138
1611.75	422.58
1635.35	423.551
1636.35	423.593
1639.75	423.732
1661.76	424.621
1671.85	425.029
1672.85	425.069
1683.22	425.488
1708.08	426.243

Material Boundary

X	Y
1478.89	446.432
1478.89	449.12
1479.39	448.973

Material Boundary

X	Y
1403.09	451.972
1403.59	451.995
1403.59	447.02

Material Boundary

X	Y
1440.58	450.056
1441.08	450.461
1441.08	446.693

Material Boundary

X	Y
1403.59	451.995
1404.88	452.054
1406.51	453.108
1409.62	454
1417.85	454.084
1421.2	454.112
1432.23	454.006
1433.49	453.827
1436.92	452.929
1438.16	452
1439.04	451.038
1440.08	450.375

Material Boundary

X	Y
1377.54	425.101
1386.89	425.018
1403.86	424.866
1404.86	424.857
1411.74	424.795
1437.21	424.567
1440.36	424.539
1441.36	424.53
1461.74	424.347
1476.86	424.288
1477.86	424.284
1487.85	424.245
1511.74	424.057
1513.36	424.033
1514.36	424.018
1537.11	423.675
1539.82	423.708
1549.86	424.204
1550.86	424.253
1561.75	424.791
1586.36	425.769
1587.36	425.809

Material Boundary

X	Y
1440.08	446.693
1440.08	450.375
1440.58	450.056

Material Boundary

X	Y
1377.54	420.961
1379.85	420.94
1380.85	420.931
1386.89	420.877
1411.74	420.655
1416.35	420.613
1417.35	420.604
1437.21	420.426
1452.85	420.286

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1589.12	425.879
1611.75	426.72
1622.86	427.177
1623.86	427.219
1639.75	427.873
1659.36	428.665
1660.36	428.705
1661.76	428.762
1683.22	429.628
1695.65	430.006

1386.89	436.326
1410.71	436.113
1411.71	436.104
1411.74	436.103
1437.21	435.875
1447.21	435.786
1448.21	435.777
1461.74	435.656
1483.71	435.57
1484.71	435.566
1487.85	435.553
1511.74	435.365
1520.21	435.238
1521.21	435.223
1537.11	434.983
1539.82	435.016
1556.71	435.851
1557.71	435.9
1561.75	436.1
1589.12	437.187
1593.21	437.34
1594.21	437.377
1611.75	438.029
1629.71	438.768
1630.71	438.809
1639.75	439.181
1661.76	440.07
1666.06	440.244

1537.11	439.924
1539.82	439.957

Material Boundary

X	Y
1377.54	431.007
1383.43	430.954
1384.43	430.945
1386.89	430.923
1411.74	430.701
1419.93	430.627
1420.93	430.618
1437.21	430.472
1456.43	430.3
1457.43	430.291
1461.74	430.253
1487.85	430.151
1492.93	430.111
1493.93	430.103
1511.74	429.963
1529.43	429.696
1530.43	429.681
1537.11	429.58
1539.82	429.613
1561.75	430.697
1565.93	430.863
1566.93	430.903
1589.12	431.785
1602.43	432.28
1603.43	432.317
1611.75	432.626
1638.93	433.745
1639.75	433.778
1639.93	433.786
1661.76	434.667
1675.28	435.214

Material Boundary

X	Y
1561.75	441.291
1583.88	442.171
1584.88	442.21
1589.12	442.378
1611.75	443.22
1620.98	443.6

Material Boundary

X	Y
1537.11	440.174
1539.82	440.207
1549.17	440.669
1550.17	440.718

Material Boundary

X	Y
1511.74	440.556
1512.67	440.543
1513.67	440.527
1537.11	440.174

Material Boundary

X	Y
1377.54	441.601
1386.89	441.517
1403.17	441.371
1404.17	441.362
1411.74	441.295
1437.21	441.066
1439.67	441.044
1440.67	441.035
1461.74	440.847
1476.17	440.79
1477.17	440.786
1487.85	440.745
1511.74	440.556

Material Boundary

X	Y
1537.11	445.827
1539.82	445.859
1548.66	446.296

Material Boundary

Material Boundary

X	Y
1377.54	436.41

Material Boundary

X	Y
1561.75	441.291

Material Boundary

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X	Y
1511.74	446.209
1517.04	446.129
1518.04	446.114
1537.11	445.827

Material Boundary

X	Y
1710.35	409.001
1745.21	410.042

Material Boundary

X	Y
1377.54	403.118
1386.89	403.089
1411.74	402.913
1437.21	402.889
1461.74	402.653
1487.85	402.622
1511.74	402.227
1537.11	401.646
1539.82	401.652
1561.75	402.378
1589.12	403.712
1611.75	404.993
1639.75	406.523

Material Boundary

X	Y
1745.21	410.042
1802.77	413.428

Material Boundary

X	Y
1639.75	406.523
1683.22	408.213
1710.35	409.001

X	Y
1802.77	413.428
1812.97	412.429
1816.28	412.274
1819.76	412
1821.26	411.252
1823.88	410
1824.96	409.513
1826.06	409
1827.11	409.006
1828.16	409.012

Material Boundary

X	Y
1377.54	447.253
1386.89	447.17
1402.59	447.029
1403.59	447.02
1411.74	446.947
1437.21	446.719
1440.08	446.693
1441.08	446.684
1461.74	446.499
1478.89	446.432
1479.89	446.428
1487.85	446.397
1511.74	446.209

Material Boundary

Material Boundary

X	Y
1539.82	439.957
1556.71	440.792

Material Boundary

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Cross-Section A-A: East, Interim Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
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				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base__East_Circular_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

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- 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: 2

Global Minimums

Method: spencer

- FS: 1.774560
- Center: 1689.179, 485.780
- Radius: 79.332
- Left Slip Surface Endpoint: 1617.336, 452.134
- Right Slip Surface Endpoint: 1745.846, 430.261
- Resisting Moment=6.99277e+006 lb·ft
- Driving Moment=3.94057e+006 lb·ft
- Resisting Horizontal Force=74855.7 lb
- Driving Horizontal Force=42182.7 lb
- Total Slice Area=3098.14 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 17818
- Number of Invalid Surfaces: 10793

Error Codes:

- Error Code -103 reported for 1238 surfaces
- Error Code -106 reported for 1 surface
- Error Code -107 reported for 2436 surfaces
- Error Code -108 reported for 1307 surfaces
- Error Code -111 reported for 3748 surfaces
- Error Code -112 reported for 1850 surfaces

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- Error Code -115 reported for 213 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.
- 115 = Surface too shallow, below the minimum depth.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: East, Long-Term Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base__East_Block_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

- Units of Measurement: Imperial Units
- Time Units: seconds
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 30
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tub-Tube Interface (Vertical)	Tube-Gravel Interface
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	43	86
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	0.1	24
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Liner	Foundation	Leveling Soil
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	100	120	120
Cohesion [psf]	0	0	0
Friction Angle [deg]	19	37	30
Water Surface	Water Table	Water Table	Water Table
Hu Value	1	1	1

Global Minimums

Method: janbu simplified

- FS: 1.930480
- Axis Location: 1696.636, 536.451
- Left Slip Surface Endpoint: 1627.209, 452.036
- Right Slip Surface Endpoint: 1722.512, 430.260

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Resisting Horizontal Force=48715 lb
- Driving Horizontal Force=25234.7 lb
- Total Slice Area=1155.84 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1627.21	452.036
1672.69	422.808
1683.22	423.218
1710.35	424.006
1716.05	424.177
1722.51	430.26

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3159
- Number of Invalid Surfaces: 1841

Error Codes:

- Error Code -107 reported for 525 surfaces
- Error Code -108 reported for 525 surfaces
- Error Code -112 reported for 791 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: East, Long-Term Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base__East_Circular_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		Project/ Proposal No.: GD5497 Task No.: 03

- 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: 2

Global Minimums

Method: spencer

- FS: 1.932140
- Center: 1744.487, 669.228
- Radius: 238.716
- Left Slip Surface Endpoint: 1646.747, 451.439
- Right Slip Surface Endpoint: 1706.056, 433.627
- Resisting Moment=1.31929e+006 lb·ft
- Driving Moment=682814 lb·ft
- Resisting Horizontal Force=5296.81 lb
- Driving Horizontal Force=2741.43 lb
- Total Slice Area=83.289 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 10614
- Number of Invalid Surfaces: 17997

Error Codes:

- Error Code -102 reported for 47 surfaces
- Error Code -106 reported for 901 surfaces
- Error Code -107 reported for 1096 surfaces
- Error Code -108 reported for 6 surfaces
- Error Code -115 reported for 11855 surfaces
- Error Code -1000 reported for 4092 surfaces

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Error Codes

The following errors were encountered during the computation:

- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 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).
- 115 = Surface too shallow, below the minimum depth.
- 1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: East, Residual Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base__East_Block_Long Term_Residual
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

- Units of Measurement: Imperial Units
- Time Units: seconds
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 30
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
- 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: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled

Written by:	Mustafa Erten / Meena Viswanath	Date:	02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date:	02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497	Task No.:	03

- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tub-Tube Interface (Vertical)	Tube-Gravel Interface
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	43	86
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	0.1	24
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Liner	Foundation	Leveling Soil	Liner (Residual)
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	100	120	120	100
Cohesion [psf]	0	0	0	0
Friction Angle [deg]	19	37	30	17
Water Surface	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1

Global Minimums

Method: janbu simplified

- FS: 1.851640
- Axis Location: 1696.636, 536.451
- Left Slip Surface Endpoint: 1627.209, 452.036
- Right Slip Surface Endpoint: 1722.512, 430.260
- Resisting Horizontal Force=46302.3 lb
- Driving Horizontal Force=25006.1 lb

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

- Total Slice Area=1155.84 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1627.21	452.036
1672.69	422.808
1683.22	423.218
1710.35	424.006
1716.05	424.177
1722.51	430.26

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3105
- Number of Invalid Surfaces: 1895

Error Codes:

- Error Code -107 reported for 525 surfaces
- Error Code -108 reported for 567 surfaces
- Error Code -112 reported for 803 surfaces

Error Codes

The following errors were encountered during the computation:

- -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).
- -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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: West, Interim Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base_West_Block_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
 - 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (undrained)	Dredge Material	Tube-Tube Interface (Horizontal)	Tub-Tube Interface (Vertical)	Tube-Gravel Interface
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Discrete function	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	43	86
Cohesion [psf]	0	0	0		0	0	0	0
Friction Angle [deg]	30	35	38		15	15	0.1	24
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Discrete Functions

- Name: SOLW (Undrained, U=0%)

X (ft)	Y (ft)	Cu (lbs/ft²)
1120	440	600
1120	427.5	600
1120	424.5	600
1120	424.4	600
1120	424.3	600
1120	424.2	600
1120	424.1	600
1120	424	600
1120	423.9	597.683
1120	423.8	592.646
1120	423.7	587.563
1120	423.6	582.359

1120	423.5	577.087
1120	423.4	571.796
1120	423.3	566.533
1120	423.2	561.342
1120	423.1	556.26
1120	423	551.323
1120	422.9	546.561
1120	422.8	542.001
1120	422.7	537.664
1120	422.6	533.568
1120	422.5	529.723
1120	422.4	526.138
1120	422.3	522.812
1120	422.2	519.744
1120	422.1	516.924
1120	422	514.337

1120	421.9	511.963
1120	421.8	509.777
1120	421.7	507.745
1120	421.6	505.83
1120	421.5	503.987
1120	421.4	502.166
1120	421.3	500.311
1120	421.2	498.358
1120	421.1	496.255
1120	421	494.037
1120	420.9	491.775
1120	420.8	489.544
1120	420.7	487.425
1120	420.6	485.503
1120	420.5	483.868
1120	420.4	482.606

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
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1120 420.3 481.724	1120 415 513.862	1120 409.7 574.229
1120 420.2 481.188	1120 414.9 514.874	1120 409.6 575.919
1120 420.1 480.964	1120 414.8 515.867	1120 409.5 577.588
1120 420 481.009	1120 414.7 516.847	1120 409.4 579.225
1120 419.9 481.278	1120 414.6 517.822	1120 409.3 580.834
1120 419.8 481.721	1120 414.5 518.799	1120 409.2 582.418
1120 419.7 482.284	1120 414.4 519.785	1120 409.1 583.981
1120 419.6 482.909	1120 414.3 520.787	1120 409 585.528
1120 419.5 483.532	1120 414.2 521.803	1120 408.9 587.063
1120 419.4 484.1	1120 414.1 522.831	1120 408.8 588.59
1120 419.3 484.61	1120 414 523.868	1120 408.7 590.115
1120 419.2 485.072	1120 413.9 524.913	1120 408.6 591.641
1120 419.1 485.498	1120 413.8 525.963	1120 408.5 593.175
1120 419 485.898	1120 413.7 527.015	1120 408.4 594.719
1120 418.9 486.285	1120 413.6 528.065	1120 408.3 596.275
1120 418.8 486.671	1120 413.5 529.112	1120 408.2 597.843
1120 418.7 487.068	1120 413.4 530.151	1120 408.1 599.422
1120 418.6 487.491	1120 413.3 531.18	1120 408 601.013
1120 418.5 487.953	1120 413.2 532.198	1120 407.9 602.616
1120 418.4 488.463	1120 413.1 533.204	1120 407.8 604.231
1120 418.3 489.017	1120 413 534.2	1120 407.7 605.857
1120 418.2 489.603	1120 412.9 535.186	1120 407.6 607.494
1120 418.1 490.211	1120 412.8 536.163	1120 407.5 609.144
1120 418 490.827	1120 412.7 537.13	1120 407.4 610.804
1120 417.9 491.439	1120 412.6 538.09	1120 407.3 612.475
1120 417.8 492.033	1120 412.5 539.042	1120 407.2 614.157
1120 417.7 492.595	1120 412.4 539.988	1120 407.1 615.848
1120 417.6 493.107	1120 412.3 540.929	1120 407 617.549
1120 417.5 493.555	1120 412.2 541.87	1120 406.9 619.258
1120 417.4 493.926	1120 412.1 542.814	1120 406.8 620.975
1120 417.3 494.234	1120 412 543.764	1120 406.7 622.698
1120 417.2 494.5	1120 411.9 544.722	1120 406.6 624.428
1120 417.1 494.745	1120 411.8 545.694	1120 406.5 626.164
1120 417 494.991	1120 411.7 546.682	1120 406.4 627.905
1120 416.9 495.263	1120 411.6 547.691	1120 406.3 629.65
1120 416.8 495.584	1120 411.5 548.723	1120 406.2 631.398
1120 416.7 495.979	1120 411.4 549.783	1120 406.1 633.149
1120 416.6 496.476	1120 411.3 550.873	1120 406 634.901
1120 416.5 497.101	1120 411.2 551.997	1120 405.9 636.654
1120 416.4 497.863	1120 411.1 553.158	1120 405.8 638.407
1120 416.3 498.75	1120 411 554.36	1120 405.7 640.16
1120 416.2 499.746	1120 410.9 555.605	1120 405.6 641.91
1120 416.1 500.836	1120 410.8 556.898	1120 405.5 643.658
1120 416 502	1120 410.7 558.242	1120 405.4 645.402
1120 415.9 503.222	1120 410.6 559.64	1120 405.3 647.143
1120 415.8 504.482	1120 410.5 561.097	1120 405.2 648.88
1120 415.7 505.76	1120 410.4 562.613	1120 405.1 650.615
1120 415.6 507.035	1120 410.3 564.183	1120 405 652.348
1120 415.5 508.285	1120 410.2 565.798	1120 404.9 654.078
1120 415.4 509.49	1120 410.1 567.449	1120 404.8 655.807
1120 415.3 510.644	1120 410 569.127	1120 404.7 657.534
1120 415.2 511.753	1120 409.9 570.823	1120 404.6 659.261
1120 415.1 512.824	1120 409.8 572.527	1120 404.5 660.986

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

1120 404.4 662.712	1120 399.1 761.108	1120 393.8 859.492
1120 404.3 664.437	1120 399 762.923	1120 393.7 861.33
1120 404.2 666.163	1120 398.9 764.721	1120 393.6 863.182
1120 404.1 667.89	1120 398.8 766.503	1120 393.5 865.051
1120 404 669.618	1120 398.7 768.273	1120 393.4 866.938
1120 403.9 671.347	1120 398.6 770.032	1120 393.3 868.842
1120 403.8 673.079	1120 398.5 771.785	1120 393.2 870.765
1120 403.7 674.813	1120 398.4 773.533	1120 393.1 872.703
1120 403.6 676.55	1120 398.3 775.279	1120 393 874.658
1120 403.5 678.29	1120 398.2 777.025	1120 392.9 876.626
1120 403.4 680.033	1120 398.1 778.775	1120 392.8 878.609
1120 403.3 681.781	1120 398 780.532	1120 392.7 880.605
1120 403.2 683.533	1120 397.9 782.298	1120 392.6 882.614
1120 403.1 685.29	1120 397.8 784.076	1120 392.5 884.633
1120 403 687.052	1120 397.7 785.87	1120 392.4 886.663
1120 402.9 688.82	1120 397.6 787.681	1120 392.3 888.703
1120 402.8 690.594	1120 397.5 789.513	1120 392.2 890.751
1120 402.7 692.375	1120 397.4 791.369	1120 392.1 892.807
1120 402.6 694.163	1120 397.3 793.247	1120 392 894.87
1120 402.5 695.958	1120 397.2 795.146	1120 391.9 896.939
1120 402.4 697.762	1120 397.1 797.063	1120 391.8 899.012
1120 402.3 699.573	1120 397 798.996	1120 391.7 901.09
1120 402.2 701.394	1120 396.9 800.944	1120 391.6 903.17
1120 402.1 703.224	1120 396.8 802.903	1120 391.5 905.253
1120 402 705.064	1120 396.7 804.873	1120 391.4 907.337
1120 401.9 706.914	1120 396.6 806.851	1120 391.3 909.422
1120 401.8 708.775	1120 396.5 808.835	1120 391.2 911.508
1120 401.7 710.647	1120 396.4 810.823	1120 391.1 913.596
1120 401.6 712.531	1120 396.3 812.812	1120 391 915.685
1120 401.5 714.427	1120 396.2 814.8	1120 390.9 917.776
1120 401.4 716.336	1120 396.1 816.785	1120 390.8 919.868
1120 401.3 718.259	1120 396 818.764	1120 390.7 921.961
1120 401.2 720.194	1120 395.9 820.736	1120 390.6 924.056
1120 401.1 722.142	1120 395.8 822.697	1120 390.5 926.152
1120 401 724.101	1120 395.7 824.646	1120 390.4 928.25
1120 400.9 726.069	1120 395.6 826.58	1120 390.3 930.349
1120 400.8 728.044	1120 395.5 828.497	1120 390.2 932.45
1120 400.7 730.026	1120 395.4 830.394	1120 390.1 934.552
1120 400.6 732.011	1120 395.3 832.273	1120 390 936.656
1120 400.5 734	1120 395.2 834.135	1120 389.9 938.761
1120 400.4 735.989	1120 395.1 835.982	1120 389.8 940.868
1120 400.3 737.977	1120 395 837.817	1120 389.7 942.976
1120 400.2 739.963	1120 394.9 839.64	1120 389.6 945.086
1120 400.1 741.945	1120 394.8 841.454	1120 389.5 947.198
1120 400 743.92	1120 394.7 843.26	1120 389.4 949.312
1120 399.9 745.888	1120 394.6 845.06	1120 389.3 951.427
1120 399.8 747.845	1120 394.5 846.857	1120 389.2 953.543
1120 399.7 749.791	1120 394.4 848.652	1120 389.1 955.662
1120 399.6 751.723	1120 394.3 850.446	1120 389 957.782
1120 399.5 753.639	1120 394.2 852.243	1120 388.9 959.904
1120 399.4 755.538	1120 394.1 854.044	1120 388.8 962.028
1120 399.3 757.416	1120 394 855.851	1120 388.7 964.153
1120 399.2 759.274	1120 393.9 857.667	1120 388.6 966.281

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1120 388.5 968.41	1120 384.6 1053.02	1120 380.7 1141.19
1120 388.4 970.541	1120 384.5 1055.23	1120 380.6 1143.5
1120 388.3 972.673	1120 384.4 1057.45	1120 380.5 1145.82
1120 388.2 974.808	1120 384.3 1059.66	1120 380.4 1148.14
1120 388.1 976.944	1120 384.2 1061.88	1120 380.3 1150.46
1120 388 979.083	1120 384.1 1064.11	1120 380.2 1152.78
1120 387.9 981.223	1120 384 1066.33	1120 380.1 1155.11
1120 387.8 983.365	1120 383.9 1068.56	1120 380 1157.44
1120 387.7 985.509	1120 383.8 1070.79	1120 379.9 1159.77
1120 387.6 987.655	1120 383.7 1073.02	1120 379.8 1162.1
1120 387.5 989.804	1120 383.6 1075.26	1120 379.7 1164.44
1120 387.4 991.954	1120 383.5 1077.5	1120 379.6 1166.78
1120 387.3 994.106	1120 383.4 1079.74	1120 379.5 1169.12
1120 387.2 996.26	1120 383.3 1081.98	1120 379.4 1171.47
1120 387.1 998.416	1120 383.2 1084.22	1120 379.3 1173.82
1120 387 1000.57	1120 383.1 1086.47	1120 379.2 1176.17
1120 386.9 1002.73	1120 383 1088.72	1120 379.1 1178.52
1120 386.8 1004.9	1120 382.9 1090.98	1120 379 1180.88
1120 386.7 1007.06	1120 382.8 1093.23	1120 378.9 1183.24
1120 386.6 1009.23	1120 382.7 1095.49	1120 378.8 1185.6
1120 386.5 1011.4	1120 382.6 1097.75	1120 378.7 1187.97
1120 386.4 1013.57	1120 382.5 1100.01	1120 378.6 1190.33
1120 386.3 1015.74	1120 382.4 1102.28	1120 378.5 1192.7
1120 386.2 1017.91	1120 382.3 1104.55	1120 378.4 1195.08
1120 386.1 1020.09	1120 382.2 1106.82	1120 378.3 1197.45
1120 386 1022.27	1120 382.1 1109.09	1120 378.2 1199.83
1120 385.9 1024.45	1120 382 1111.36	1120 378.1 1202.21
1120 385.8 1026.64	1120 381.9 1113.64	1120 378 1204.6
1120 385.7 1028.82	1120 381.8 1115.92	1120 377.9 1206.99
1120 385.6 1031.01	1120 381.7 1118.21	1120 377.8 1209.38
1120 385.5 1033.2	1120 381.6 1120.49	1120 377.7 1211.77
1120 385.4 1035.39	1120 381.5 1122.78	1120 377.6 1214.16
1120 385.3 1037.59	1120 381.4 1125.07	1120 377.5 1216.56
1120 385.2 1039.78	1120 381.3 1127.37	
1120 385.1 1041.98	1120 381.2 1129.67	
1120 385 1044.19	1120 381.1 1131.96	
1120 384.9 1046.39	1120 381 1134.27	
1120 384.8 1048.6	1120 380.9 1136.57	
1120 384.7 1050.81	1120 380.8 1138.88	

Property	Liner	Foundation	Leveling Soil
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	100	120	120
Cohesion [psf]	0	0	0
Friction Angle [deg]	19	37	30
Water Surface	Water Table	Water Table	Water Table
Hu Value	1	1	1

Support Properties

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Geotube

- Support Type: GeoTextile
- Force Application: Passive
- Force Orientation: Tangent to Slip Surface
- Anchorage: Both Ends
- Shear Strength Model: Linear
- Strip Coverage: 100 percent
- Tensile Strength: 1600 lb/ft

Global Minimum

Method: janbu simplified

- FS: 2.052870
- Axis Location: 154.257, 540.601
- Left Slip Surface Endpoint: 127.814, 432.584
- Right Slip Surface Endpoint: 224.805, 454.637
- Resisting Horizontal Force=42913.4 lb
- Driving Horizontal Force=20904.1 lb
- Total Slice Area=879.15 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
127.814	432.584
130.915	429.326
161.64	426.971
164.669	426.932
224.805	454.637

Valid / Invalid Surfaces

Method: janbu simplified

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- Number of Valid Surfaces: 1856
- Number of Invalid Surfaces: 3144

Error Codes:

- Error Code -107 reported for 491 surfaces
- Error Code -108 reported for 2400 surfaces
- Error Code -112 reported for 253 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

List Of Coordinates

Water Table

X	Y
-3.55271e-015	414.167
3.75161	414.326
5.40252	414.408
10.6498	415
13.2622	415.279
17.0667	416
18.4544	416.037
23.6038	416.291
25.5028	416.349
30.0263	416.596
34.4589	416.828
38.6887	417
40.6533	417.14
45.7865	417.294
47.2495	417.552
117.054	415.388
119.538	415.192
123.634	414.879
161.64	411.966
171.361	411.84
211.644	411.174
250.936	410.308

261.648	409.443
300.326	408.15
311.652	407.708
317.539	407.408
340.48	407.197
361.656	407.588
373.897	406.941
411.659	406.252
421.434	406.222
431.784	406.138

311.652	424.426
317.539	424.125
327.47	424.067
340.48	423.991
361.656	424.036
373.897	423.97
411.659	423.947
421.434	423.941
431.784	423.934

Piezoline

X	Y
124.986	430.751
144.97	430.751
160.111	430.287
161.64	430.24
171.361	429.843
211.644	428.244
250.936	426.685
261.648	426.247
300.326	424.891

Block Search Polyline

X	Y
85.9786	431.356
117.054	430.393
119.538	430.197
123.634	429.884
161.64	426.971
171.361	426.845
211.644	426.179
250.936	425.313
261.648	424.448
300.326	423.155

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311.652	422.713
317.539	422.413
340.48	422.202
361.656	422.593
373.897	421.946
411.659	421.257
421.434	421.227
431.784	421.143

431.784	460.421
376.913	459.869
339.055	459.488
285.031	458.945
276.752	456.876
272.52	455.819
223.164	454.596
205.088	454.14
163.653	441.854
161.64	441.259
132.304	432.584
128.199	432.584
119.297	432.585
113.118	433.795
111.949	434.003
102.582	434.003
98.5552	434.003
94.7672	434.011
87.2606	434.022
80.9092	434.013
76.0202	434.007
72.8356	434.008
69.0775	434.004
64.4862	434.001
61.3983	434
54.5453	433.453
49.6415	432.975
47.2495	432.552

300.326	424.891
311.652	424.426
317.539	424.125
327.47	424.067
340.48	423.991
361.656	424.036

External Boundary

X	Y
45.7865	432.294
40.6533	432.14
38.6887	432
34.4589	431.828
30.0263	431.596
25.5028	431.349
23.6038	431.291
18.4544	431.037
17.0667	431
13.2622	430.279
10.6498	430
5.40252	429.408
3.75161	429.326
0	429.167
-3.55271e-015	414.167
0	377.894
0	340
98.5552	340
161.64	340
431.784	340

Material Boundary

X	Y
98.5552	434.003
99.9218	434
101.467	433.705
104.922	432.954
109.598	431.939
113.015	431.197
114.411	430.813
117.054	430.388

Material Boundary

X	Y
144.97	430.751
146.133	430.716
160.111	430.287
161.64	430.24

Material Boundary

X	Y
161.64	430.24
164.87	430.108
171.361	429.843
211.644	428.244
250.936	426.685
261.648	426.247

Material Boundary

X	Y
161.64	426.966

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171.361	426.84
211.644	426.174
250.936	425.308

221.297	372.4
227.641	372.092
236.469	371.663
240.867	371.45
251.645	370.927
254.096	370.808
267.075	370.178
270.743	370
281.801	369.463
283.81	369.366
296.945	368.728
307.138	368.234
312.8	367.959
320.904	367.566
328.334	367.205
338.346	366.719
343.728	366.458
356.351	365.845
358.985	365.718
373.987	364.994
388.049	364.621
389.182	364.593
402.009	364.254
404.236	364.2
415.962	363.892
419.269	363.812
422.997	363.714
429.909	363.534
431.784	363.489

Material Boundary

X	Y
161.64	429.24
171.361	428.843
211.644	427.244

Material Boundary

X	Y
250.936	425.308
261.648	424.443
300.326	423.15
311.652	422.708
317.539	422.408
340.48	422.197
361.656	422.588

Material Boundary

X	Y
361.656	423.036
373.897	422.97
411.659	422.947

Material Boundary

X	Y
0	377.894
4.14537	378.158
22.1464	379.149
23.1892	378.959
24.8284	378.662
29.3418	377.843
32.1813	378.298
40.2475	378.404
48.3824	378.283
57.3202	377.787
63.6229	377.435
72.9722	377.092
80.486	376.957
86.5799	376.511
94.7665	375.912
96.245	375.804
98.3509	375.746
100.285	375.738
107.27	376.058
113.278	376.334
115.416	376.173
135.821	375.971
161.103	375.321
167.716	375

Material Boundary

X	Y
361.656	422.588
373.897	421.941
411.659	421.252
421.434	421.222
431.784	421.138

Material Boundary

X	Y
160.111	433
161.64	432.953

Material Boundary

X	Y
211.644	427.244
250.936	425.685
261.648	425.247
300.326	423.891
340.48	422.991
361.656	423.036

Material Boundary

X	Y
161.64	432.953
162.137	432.933

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250.936	432.577
261.648	432.139
268.611	431.895
269.611	431.86
300.326	430.783
305.111	430.586
306.111	430.545
311.652	430.318
317.539	430.017
340.48	429.883
341.611	429.886
342.611	429.888
361.656	429.928
373.897	429.862
378.111	429.86
379.111	429.859
411.659	429.839
414.611	429.837
415.611	429.836
421.434	429.833
431.784	429.826

427.171	435.249
431.784	435.246

386.989	449.322
387.989	449.321
412.549	449.306
422.324	449.3
423.489	449.299
424.489	449.299
431.784	449.294

Material Boundary

X	Y
202.61	444.948
211.644	444.59
213.881	444.501
229.598	443.878
230.598	443.838
250.936	443.031
261.648	442.593
266.098	442.437
267.098	442.402
277.238	442.046
300.326	441.236
302.598	441.143
303.598	441.102
311.652	440.771
317.539	440.47
339.098	440.345
340.098	440.339
340.48	440.337
361.656	440.382
367.491	440.351
373.897	440.316
375.598	440.315
376.598	440.314
411.659	440.292
412.098	440.292
413.098	440.292
421.434	440.286
431.784	440.28

Material Boundary

X	Y
180.47	429.731
180.47	432.194

Material Boundary

X	Y
181.47	429.692
181.47	432.155

Material Boundary

X	Y
175.283	440.999
192.808	440.304
207.171	439.734
208.171	439.694
211.644	439.556
243.671	438.286
244.671	438.246
250.936	437.997
261.648	437.559
280.171	436.909
281.171	436.874
300.326	436.203
311.652	435.738
316.671	435.481
317.539	435.437
317.671	435.436
340.48	435.303
353.171	435.33
354.171	435.332
361.656	435.348
373.897	435.282
389.671	435.272
390.671	435.272
411.659	435.259
421.434	435.253
426.171	435.25

Material Boundary

X	Y
278.829	451.035
301.216	450.25
312.542	449.785
313.989	449.711
314.989	449.66
317.216	449.546
318.429	449.484
341.369	449.351
350.489	449.37
351.489	449.372
362.545	449.396
374.787	449.33

Material Boundary

X	Y
253.47	426.832
253.47	429.295

Material Boundary

X	Y
254.47	426.791

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254.47	429.254
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431.784	426.647
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X	Y
232.111	430.395
232.111	433.324

Material Boundary

X	Y
289.97	425.504
289.97	427.967

Material Boundary

X	Y
363.97	426.737
373.897	426.683

Material Boundary

X	Y
233.111	430.356
233.111	433.285

Material Boundary

X	Y
290.97	425.469
290.97	427.932

Material Boundary

X	Y
361.656	424.036
373.897	423.97

Material Boundary

X	Y
268.611	428.966
268.611	431.895

Material Boundary

X	Y
326.47	424.323
326.47	426.786

X	Y
399.47	424.204
399.47	426.667

Material Boundary

X	Y
269.611	428.931
269.611	431.86

Material Boundary

X	Y
327.47	424.317
327.47	426.78

Material Boundary

X	Y
400.47	424.204
400.47	426.667

Material Boundary

X	Y
305.111	427.657
305.111	430.586

Material Boundary

X	Y
373.897	423.97
411.659	423.947
421.434	423.941
431.784	423.934

X	Y
195.611	431.844
195.611	434.772

Material Boundary

X	Y
306.111	427.616
306.111	430.545

Material Boundary

X	Y
196.611	431.804
196.611	434.733

Material Boundary

X	Y
341.611	426.957
341.611	429.886

Material Boundary

X	Y
373.897	426.683
399.47	426.667
400.47	426.667
411.659	426.66
421.434	426.654

Material Boundary

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X	Y
342.611	426.959
342.611	429.888

X	Y
243.671	433.116
243.671	438.286

X	Y
354.171	430.162
354.171	435.332

Material Boundary

X	Y
378.111	426.931
378.111	429.86

Material Boundary

X	Y
244.671	433.076
244.671	438.246

Material Boundary

X	Y
389.671	430.102
389.671	435.272

Material Boundary

X	Y
379.111	426.93
379.111	429.859

Material Boundary

X	Y
280.171	431.739
280.171	436.909

Material Boundary

X	Y
390.671	430.102
390.671	435.272

Material Boundary

X	Y
414.611	426.908
414.611	429.837

Material Boundary

X	Y
281.171	431.704
281.171	436.874

X	Y
426.171	430.08
426.171	435.25

Material Boundary

X	Y
415.611	426.907
415.611	429.836

Material Boundary

X	Y
316.671	430.311
316.671	435.481

X	Y
427.171	430.079
427.171	435.249

Material Boundary

X	Y
207.171	434.564
207.171	439.734

Material Boundary

X	Y
317.671	430.266
317.671	435.436

X	Y
47.2495	432.552
117.054	430.388

Material Boundary

X	Y
208.171	434.524
208.171	439.694

Material Boundary

X	Y
353.171	430.16
353.171	435.33

Material Boundary

X	Y
123.634	429.879
161.64	426.966

Material Boundary

Material Boundary

Material Boundary

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

X	Y
135.157	429.887
144.97	429.751
150.061	429.595
161.64	429.24

Material Boundary

302.598	436.359
302.598	441.143

Material Boundary

X	Y
119.297	430.585
124.986	430.084
132.304	430.084
144.97	430.751

Material Boundary

X	Y
102.582	434.003
111.949	432.003
113.118	431.795
119.297	430.585
124.986	430.584
128.199	430.584
132.304	430.584
134.118	430.584
161.64	439.222

Material Boundary

303.598	436.318
303.598	441.102

Material Boundary

X	Y
132.317	429.802
135.157	429.887

Material Boundary

339.098	435.561
339.098	440.345

Material Boundary

X	Y
229.598	439.094
229.598	443.878

Material Boundary

340.098	435.556
340.098	440.339

Material Boundary

X	Y
161.64	439.222
163.653	439.854

X	Y
230.598	439.054
230.598	443.838

Material Boundary

375.598	435.531
375.598	440.315

Material Boundary

X	Y
128.191	429.802
132.317	429.802

Material Boundary

X	Y
266.098	437.653
266.098	442.437

Material Boundary

376.598	435.531
376.598	440.314

Material Boundary

X	Y
124.986	430.084
128.191	429.802

Material Boundary

X	Y
267.098	437.618
267.098	442.402

Material Boundary

412.098	435.508
412.098	440.292

Material Boundary

X	Y
117.054	430.388
119.538	430.192
123.634	429.879

Material Boundary

X	Y
---	---

Material Boundary

Written by:	Mustafa Erten / Meena Viswanath	Date:	02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date:	02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			Project/ Proposal No.:	GD5497
						Task No.:	03

X	Y
413.098	435.508
413.098	440.292

Material Boundary

X	Y
314.989	440.851
314.989	449.66

Material Boundary

X	Y
318.14	449.749
318.14	452.932

Material Boundary

X	Y
362.97	426.742
363.97	426.737

Material Boundary

X	Y
350.489	440.608
350.489	449.37

Material Boundary

X	Y
319.14	449.73
319.14	452.961

Material Boundary

X	Y
249.04	443.356
249.04	449.53

Material Boundary

X	Y
351.489	440.61
351.489	449.372

Material Boundary

X	Y
357.077	449.634
357.077	455.827

Material Boundary

X	Y
248.04	443.396
248.04	449.362

Material Boundary

X	Y
386.989	440.558
386.989	449.322

Material Boundary

X	Y
356.077	449.632
356.077	455.838

Material Boundary

X	Y
277.489	442.287
277.489	451.039

Material Boundary

X	Y
387.989	440.557
387.989	449.321

Material Boundary

X	Y
392.477	449.569
392.477	455.904

Material Boundary

X	Y
278.489	442.252
278.489	451.022

Material Boundary

X	Y
423.489	440.535
423.489	449.299

Material Boundary

X	Y
391.477	449.569
391.477	455.894

Material Boundary

X	Y
313.989	440.902
313.989	449.711

Material Boundary

X	Y
424.489	440.534
424.489	449.299

Material Boundary

X	Y
425.625	449.548
425.625	456.078

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

Material Boundary

X	Y
424.625	449.548
424.625	456.002

X	Y
362.97	424.279
362.97	426.742

Material Boundary

X	Y
145.09	430.998
160.111	430.537
161.64	430.49

X	Y
363.97	424.274
363.97	426.737

Material Boundary

X	Y
362.97	424.279
363.97	424.274

Material Boundary

X	Y
161.64	430.49
164.87	430.358
171.361	430.093
180.47	429.731
181.47	429.692
211.644	428.494
216.97	428.283
217.97	428.243
250.936	426.935
253.47	426.832
254.47	426.791
261.648	426.497
289.97	425.504
290.97	425.469
300.326	425.141
311.652	424.676
317.539	424.375
326.47	424.323
327.47	424.317
340.48	424.241
361.656	424.286

Material Boundary

X	Y
363.97	424.274
373.897	424.22
399.47	424.204
400.47	424.204
411.659	424.197
421.434	424.191
431.784	424.184

Material Boundary

X	Y
171.024	435.998
171.361	435.985
207.171	434.564
208.171	434.524
211.644	434.386
243.671	433.116
244.671	433.076
250.936	432.827
261.648	432.389
280.171	431.739
281.171	431.704
300.326	431.033
311.652	430.568
316.671	430.311
317.539	430.267
317.671	430.266
340.48	430.133
353.171	430.16
354.171	430.162
361.656	430.178
373.897	430.112
389.671	430.102
390.671	430.102
411.659	430.089
421.434	430.083
426.171	430.08
427.171	430.079
431.784	430.076

Material Boundary

X	Y
362.97	426.992
373.897	426.933

Material Boundary

X	Y
192.99	440.546
211.644	439.806
229.598	439.094
230.598	439.054
243.671	438.536
244.671	438.496
250.936	438.247
261.648	437.809
266.098	437.653
267.098	437.618
300.326	436.453
302.598	436.359
303.598	436.318
311.652	435.988

Material Boundary

X	Y
373.897	426.933
378.111	426.931
379.111	426.93
411.659	426.91
414.611	426.908
415.611	426.907
421.434	426.904
431.784	426.897

Material Boundary

X	Y
361.656	424.286
362.97	424.279

Material Boundary

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		Project/ Proposal No.: GD5497 Task No.: 03

317.539	435.687
339.098	435.561
340.098	435.556
340.48	435.553
361.656	435.598
373.897	435.532
375.598	435.531
376.598	435.531
411.659	435.509
412.098	435.508
413.098	435.508
421.434	435.503
431.784	435.496

Material Boundary

317.216	449.796
318.14	449.749
318.429	449.734
319.14	449.73
341.369	449.601
356.077	449.632
357.077	449.634
362.545	449.646
374.787	449.58
391.477	449.569
392.477	449.569
412.549	449.556
422.324	449.55
424.625	449.548
425.625	449.548
431.784	449.544

Material Boundary

X	Y
163.843	434.94
164.87	436

Material Boundary

X	Y
161.64	432.953
161.908	433.195
163.843	434.94

X	Y
214.072	444.744
248.04	443.396
249.04	443.356
250.936	443.281
261.648	442.843
277.238	442.296
277.489	442.287
278.489	442.252
300.326	441.486
311.652	441.021
313.989	440.902
314.989	440.851
317.539	440.72
340.48	440.587
350.489	440.608
351.489	440.61
361.656	440.632
367.491	440.601
373.897	440.566
386.989	440.558
387.989	440.557
411.659	440.542
421.434	440.536
423.489	440.535
424.489	440.534
431.784	440.53

Material Boundary

X	Y
160.111	433
162.137	432.933
162.275	432.927

Material Boundary

X	Y
170.86	435.755
171.024	435.998
171.671	437.013

Material Boundary

X	Y
162.275	432.927
164.87	432.821
171.361	432.556
180.47	432.194
181.47	432.155
211.644	430.957
216.97	430.746
217.97	430.706
250.936	429.398
253.47	429.295
254.47	429.254
261.648	428.96
289.97	427.967
290.97	427.932
300.326	427.604
311.652	427.139
317.539	426.838
326.47	426.786
327.47	426.78
340.48	426.704
361.656	426.749
362.97	426.742

Material Boundary

X	Y
164.87	436
170.86	435.755

Material Boundary

X	Y
279.132	451.274
301.216	450.5
312.542	450.035

X	Y
192.808	440.304
192.99	440.546
194.098	442.012

Material Boundary

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

X	Y
194.098	442.012
194.843	443
195.703	443.856
197.63	444
199.039	444.333
201.281	444.754
202.61	444.948

317.997	452.927
318.14	452.932
318.216	452.934
319.14	452.961
320.435	453
321.223	454.031
322.1	455
322.741	455.946
329.676	456.063
338.845	456.148
348.418	456.064
354.975	456
356.077	455.838
356.577	455.765
357.077	455.827
358.137	455.959
372.285	456.058
374.378	456.066
387.415	456.014
390.487	455.984
391.477	455.894
391.977	455.849
392.477	455.904
393.339	456
395.106	456.164
408.854	456.159
413.727	456.086
424.625	456.002
425.125	455.998
425.625	456.078
429.331	456.667
431.784	456.897

211.644	431.207
216.97	430.996
217.97	430.956
232.111	430.395
233.111	430.356
250.936	429.648
253.47	429.545
254.47	429.504
261.648	429.21
268.611	428.966
269.611	428.931
289.97	428.217
290.97	428.182
300.326	427.854
305.111	427.657
306.111	427.616
311.652	427.389
317.539	427.088
326.47	427.036
327.47	427.03
340.48	426.954
341.611	426.957
342.611	426.959
361.656	426.999
362.97	426.992

Material Boundary

X	Y
215.134	446.124
215.966	447.147
216.496	448
217.135	449.011
217.692	450
219.285	450.849
222.968	451.292
230.916	451.309
240.998	451.044
242.175	450.873
246.295	450
248.04	449.362
248.466	449.206
249.04	449.53
249.871	450
251.045	450.805
252.301	451.328
254.409	452
259.623	452.119
264.149	452.202
265.486	452.172
273.237	452
277.238	451.04
277.489	451.039
278.063	451.037
278.489	451.036
278.829	451.035
279.132	451.274
280.049	452
280.839	452.967
281.837	454
284.248	454.56
286.139	455
297.445	455
309.911	455
312.328	454.42
314.075	454
315.435	453.002
317.216	452.95

Material Boundary

X	Y
213.881	444.501
214.072	444.744
215.134	446.124

Material Boundary

X	Y
161.908	433.195
164.87	433.071
171.361	432.806
180.47	432.444
181.47	432.405
195.611	431.844
196.611	431.804

Material Boundary

-3.55271e-015	414.167
3.75161	414.326
5.40252	414.408
10.6498	415
13.2622	415.279
17.0667	416
18.4544	416.037
23.6038	416.291
25.5028	416.349
30.0263	416.596
34.4589	416.828
38.6887	417
40.6533	417.14
45.7865	417.294
47.2495	417.552

Material Boundary

X	Y
47.2495	417.552

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		
			Project/ Proposal No.:	GD5497	Task No.: 03

117.054	415.388
---------	---------

Material Boundary

340.48	407.197
361.656	407.588

Material Boundary

X	Y
117.054	415.388
119.538	415.192
123.634	414.879

X	Y
161.64	411.966
171.361	411.84
211.644	411.174
250.936	410.308

Material Boundary

X	Y
361.656	407.588
373.897	406.941
411.659	406.252
421.434	406.222
431.784	406.138

Material Boundary

X	Y
123.634	414.879
161.64	411.966

Material Boundary

X	Y
250.936	410.308
261.648	409.443
300.326	408.15
311.652	407.708
317.539	407.408

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: West, Interim Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base_West_Circular_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- 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: 2

Global Minimums

Method: spencer

- FS: 1.783540
- Center: 159.287, 471.528
- Radius: 60.771
- Left Slip Surface Endpoint: 111.486, 434.003
- Right Slip Surface Endpoint: 217.611, 454.456
- Resisting Moment=4.48859e+006 lb·ft
- Driving Moment=2.51667e+006 lb·ft
- Resisting Horizontal Force=59367.4 lb
- Driving Horizontal Force=33286.2 lb
- Total Slice Area=2367.52 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 20018
- Number of Invalid Surfaces: 8593

Error Codes:

- Error Code -103 reported for 2251 surfaces
- Error Code -107 reported for 1733 surfaces
- Error Code -108 reported for 688 surfaces
- Error Code -111 reported for 1050 surfaces
- Error Code -112 reported for 2796 surfaces
- Error Code -115 reported for 75 surfaces

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
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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.
- 115 = Surface too shallow, below the minimum depth.

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: West, Long-Term Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base__East_Block_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

- Units of Measurement: Imperial Units
- Time Units: seconds
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 30
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tub-Tube Interface (Vertical)	Tube-Gravel Interface
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	43	86
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	0.1	24
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Liner	Foundation	Leveling Soil
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	100	120	120
Cohesion [psf]	0	0	0
Friction Angle [deg]	19	37	30
Water Surface	Water Table	Water Table	Water Table
Hu Value	1	1	1

Global Minimums

Method: janbu simplified

- FS: 1.930480
- Axis Location: 1696.636, 536.451
- Left Slip Surface Endpoint: 1627.209, 452.036
- Right Slip Surface Endpoint: 1722.512, 430.260

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

- Resisting Horizontal Force=48715 lb
- Driving Horizontal Force=25234.7 lb
- Total Slice Area=1155.84 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1627.21	452.036
1672.69	422.808
1683.22	423.218
1710.35	424.006
1716.05	424.177
1722.51	430.26

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3159
- Number of Invalid Surfaces: 1841

Error Codes:

- Error Code -107 reported for 525 surfaces
- Error Code -108 reported for 525 surfaces
- Error Code -112 reported for 791 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section A-A: West, Long-Term Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base_West_Circular_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
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				Task No.:	03

- 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: 2

Global Minimums

Method: spencer

- FS: 1.958960
- Center: 97.630, 672.899
- Radius: 242.207
- Left Slip Surface Endpoint: 136.550, 433.840
- Right Slip Surface Endpoint: 195.162, 451.197
- Resisting Moment=1.26455e+006 lb·ft
- Driving Moment=645524 lb·ft
- Resisting Horizontal Force=5009.09 lb
- Driving Horizontal Force=2557.02 lb
- Total Slice Area=78.5889 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 25198
- Number of Invalid Surfaces: 3413

Error Codes:

- Error Code -106 reported for 11 surfaces
- Error Code -107 reported for 190 surfaces
- Error Code -108 reported for 10 surfaces
- Error Code -115 reported for 3202 surfaces

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				Task No.:	03

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.
- 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).
- 115 = Surface too shallow, below the minimum depth.

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Cross-Section A-A: West, Residual Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-A_EastWest_Base_West_Block_Long Term_Residual
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
-
- Number of slices: 100
 - Tolerance: 0.005
 - Maximum number of iterations: 200
 - 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

Written by:	Mustafa Erten / Meena Viswanath	Date:	02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date:	02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		Project/ Proposal No.:	GD5497	Task No.:	03

- Random Number Generation Method: Park and Miller v.3

Surface Options

-
- Surface Type: Non-Circular Block Search
 - Number of Surfaces: 5000
 - Pseudo-Random Surfaces: Enabled
 - Convex Surfaces Only: Disabled
 - Left Projection Angle (Start Angle): 95
 - Left Projection Angle (End Angle): 175
 - Right Projection Angle (Start Angle): 5
 - Right Projection Angle (End Angle): 85
 - Minimum Elevation: Not Defined
 - Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tub-Tube Interface (Vertical)	Tube-Gravel Interface
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	43	86
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	0.1	24
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Liner	Foundation	Leveling Soil	Liner (Residual)
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	100	120	120	100
Cohesion [psf]	0	0	0	0
Friction Angle [deg]	19	37	30	17
Water Surface	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1

Global Minimums

Method: janbu simplified

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- FS: 1.609450
- Axis Location: 143.264, 526.351
- Left Slip Surface Endpoint: 123.365, 432.584
- Right Slip Surface Endpoint: 206.338, 454.172
- Resisting Horizontal Force=29012.7 lb
- Driving Horizontal Force=18026.5 lb
- Total Slice Area=762.465 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
123.365	432.584
142.587	428.448
178.002	428.053
206.338	454.172

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 2961
- Number of Invalid Surfaces: 2039

Error Codes:

- Error Code -107 reported for 101 surfaces
- Error Code -108 reported for 786 surfaces
- Error Code -112 reported for 1152 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: North, Interim Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_North_Block_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
 - 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (undrained)	Dredge Material	Tube-Tube Interface (Horizontal)	Tube-Gravel Interface	Liner
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Discrete function	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	86	100
Cohesion [psf]	0	0	0		0	0	0	0
Friction Angle [deg]	30	35	38		15	15	24	19
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Discrete Functions

- Name: SOLW (Undrained, U=0%)

X (ft)	Y (ft)	Cu (lbs/ft²)
1120	440	600
1120	427.5	600
1120	424.5	600
1120	424.4	600
1120	424.3	600
1120	424.2	600
1120	424.1	600
1120	424	600
1120	423.9	597.683
1120	423.8	592.646
1120	423.7	587.563
1120	423.6	582.359

1120	423.5	577.087
1120	423.4	571.796
1120	423.3	566.533
1120	423.2	561.342
1120	423.1	556.26
1120	423	551.323
1120	422.9	546.561
1120	422.8	542.001
1120	422.7	537.664
1120	422.6	533.568
1120	422.5	529.723
1120	422.4	526.138
1120	422.3	522.812
1120	422.2	519.744
1120	422.1	516.924
1120	422	514.337

1120	421.9	511.963
1120	421.8	509.777
1120	421.7	507.745
1120	421.6	505.83
1120	421.5	503.987
1120	421.4	502.166
1120	421.3	500.311
1120	421.2	498.358
1120	421.1	496.255
1120	421	494.037
1120	420.9	491.775
1120	420.8	489.544
1120	420.7	487.425
1120	420.6	485.503
1120	420.5	483.868
1120	420.4	482.606

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1120 420.3 481.724	1120 415 513.862	1120 409.7 574.229
1120 420.2 481.188	1120 414.9 514.874	1120 409.6 575.919
1120 420.1 480.964	1120 414.8 515.867	1120 409.5 577.588
1120 420 481.009	1120 414.7 516.847	1120 409.4 579.225
1120 419.9 481.278	1120 414.6 517.822	1120 409.3 580.834
1120 419.8 481.721	1120 414.5 518.799	1120 409.2 582.418
1120 419.7 482.284	1120 414.4 519.785	1120 409.1 583.981
1120 419.6 482.909	1120 414.3 520.787	1120 409 585.528
1120 419.5 483.532	1120 414.2 521.803	1120 408.9 587.063
1120 419.4 484.1	1120 414.1 522.831	1120 408.8 588.59
1120 419.3 484.61	1120 414 523.868	1120 408.7 590.115
1120 419.2 485.072	1120 413.9 524.913	1120 408.6 591.641
1120 419.1 485.498	1120 413.8 525.963	1120 408.5 593.175
1120 419 485.898	1120 413.7 527.015	1120 408.4 594.719
1120 418.9 486.285	1120 413.6 528.065	1120 408.3 596.275
1120 418.8 486.671	1120 413.5 529.112	1120 408.2 597.843
1120 418.7 487.068	1120 413.4 530.151	1120 408.1 599.422
1120 418.6 487.491	1120 413.3 531.18	1120 408 601.013
1120 418.5 487.953	1120 413.2 532.198	1120 407.9 602.616
1120 418.4 488.463	1120 413.1 533.204	1120 407.8 604.231
1120 418.3 489.017	1120 413 534.2	1120 407.7 605.857
1120 418.2 489.603	1120 412.9 535.186	1120 407.6 607.494
1120 418.1 490.211	1120 412.8 536.163	1120 407.5 609.144
1120 418 490.827	1120 412.7 537.13	1120 407.4 610.804
1120 417.9 491.439	1120 412.6 538.09	1120 407.3 612.475
1120 417.8 492.033	1120 412.5 539.042	1120 407.2 614.157
1120 417.7 492.595	1120 412.4 539.988	1120 407.1 615.848
1120 417.6 493.107	1120 412.3 540.929	1120 407 617.549
1120 417.5 493.555	1120 412.2 541.87	1120 406.9 619.258
1120 417.4 493.926	1120 412.1 542.814	1120 406.8 620.975
1120 417.3 494.234	1120 412 543.764	1120 406.7 622.698
1120 417.2 494.5	1120 411.9 544.722	1120 406.6 624.428
1120 417.1 494.745	1120 411.8 545.694	1120 406.5 626.164
1120 417 494.991	1120 411.7 546.682	1120 406.4 627.905
1120 416.9 495.263	1120 411.6 547.691	1120 406.3 629.65
1120 416.8 495.584	1120 411.5 548.723	1120 406.2 631.398
1120 416.7 495.979	1120 411.4 549.783	1120 406.1 633.149
1120 416.6 496.476	1120 411.3 550.873	1120 406 634.901
1120 416.5 497.101	1120 411.2 551.997	1120 405.9 636.654
1120 416.4 497.863	1120 411.1 553.158	1120 405.8 638.407
1120 416.3 498.75	1120 411 554.36	1120 405.7 640.16
1120 416.2 499.746	1120 410.9 555.605	1120 405.6 641.91
1120 416.1 500.836	1120 410.8 556.898	1120 405.5 643.658
1120 416 502	1120 410.7 558.242	1120 405.4 645.402
1120 415.9 503.222	1120 410.6 559.64	1120 405.3 647.143
1120 415.8 504.482	1120 410.5 561.097	1120 405.2 648.88
1120 415.7 505.76	1120 410.4 562.613	1120 405.1 650.615
1120 415.6 507.035	1120 410.3 564.183	1120 405 652.348
1120 415.5 508.285	1120 410.2 565.798	1120 404.9 654.078
1120 415.4 509.49	1120 410.1 567.449	1120 404.8 655.807
1120 415.3 510.644	1120 410 569.127	1120 404.7 657.534
1120 415.2 511.753	1120 409.9 570.823	1120 404.6 659.261
1120 415.1 512.824	1120 409.8 572.527	1120 404.5 660.986

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1120 404.4 662.712	1120 399.1 761.108	1120 393.8 859.492
1120 404.3 664.437	1120 399 762.923	1120 393.7 861.33
1120 404.2 666.163	1120 398.9 764.721	1120 393.6 863.182
1120 404.1 667.89	1120 398.8 766.503	1120 393.5 865.051
1120 404 669.618	1120 398.7 768.273	1120 393.4 866.938
1120 403.9 671.347	1120 398.6 770.032	1120 393.3 868.842
1120 403.8 673.079	1120 398.5 771.785	1120 393.2 870.765
1120 403.7 674.813	1120 398.4 773.533	1120 393.1 872.703
1120 403.6 676.55	1120 398.3 775.279	1120 393 874.658
1120 403.5 678.29	1120 398.2 777.025	1120 392.9 876.626
1120 403.4 680.033	1120 398.1 778.775	1120 392.8 878.609
1120 403.3 681.781	1120 398 780.532	1120 392.7 880.605
1120 403.2 683.533	1120 397.9 782.298	1120 392.6 882.614
1120 403.1 685.29	1120 397.8 784.076	1120 392.5 884.633
1120 403 687.052	1120 397.7 785.87	1120 392.4 886.663
1120 402.9 688.82	1120 397.6 787.681	1120 392.3 888.703
1120 402.8 690.594	1120 397.5 789.513	1120 392.2 890.751
1120 402.7 692.375	1120 397.4 791.369	1120 392.1 892.807
1120 402.6 694.163	1120 397.3 793.247	1120 392 894.87
1120 402.5 695.958	1120 397.2 795.146	1120 391.9 896.939
1120 402.4 697.762	1120 397.1 797.063	1120 391.8 899.012
1120 402.3 699.573	1120 397 798.996	1120 391.7 901.09
1120 402.2 701.394	1120 396.9 800.944	1120 391.6 903.17
1120 402.1 703.224	1120 396.8 802.903	1120 391.5 905.253
1120 402 705.064	1120 396.7 804.873	1120 391.4 907.337
1120 401.9 706.914	1120 396.6 806.851	1120 391.3 909.422
1120 401.8 708.775	1120 396.5 808.835	1120 391.2 911.508
1120 401.7 710.647	1120 396.4 810.823	1120 391.1 913.596
1120 401.6 712.531	1120 396.3 812.812	1120 391 915.685
1120 401.5 714.427	1120 396.2 814.8	1120 390.9 917.776
1120 401.4 716.336	1120 396.1 816.785	1120 390.8 919.868
1120 401.3 718.259	1120 396 818.764	1120 390.7 921.961
1120 401.2 720.194	1120 395.9 820.736	1120 390.6 924.056
1120 401.1 722.142	1120 395.8 822.697	1120 390.5 926.152
1120 401 724.101	1120 395.7 824.646	1120 390.4 928.25
1120 400.9 726.069	1120 395.6 826.58	1120 390.3 930.349
1120 400.8 728.044	1120 395.5 828.497	1120 390.2 932.45
1120 400.7 730.026	1120 395.4 830.394	1120 390.1 934.552
1120 400.6 732.011	1120 395.3 832.273	1120 390 936.656
1120 400.5 734	1120 395.2 834.135	1120 389.9 938.761
1120 400.4 735.989	1120 395.1 835.982	1120 389.8 940.868
1120 400.3 737.977	1120 395 837.817	1120 389.7 942.976
1120 400.2 739.963	1120 394.9 839.64	1120 389.6 945.086
1120 400.1 741.945	1120 394.8 841.454	1120 389.5 947.198
1120 400 743.92	1120 394.7 843.26	1120 389.4 949.312
1120 399.9 745.888	1120 394.6 845.06	1120 389.3 951.427
1120 399.8 747.845	1120 394.5 846.857	1120 389.2 953.543
1120 399.7 749.791	1120 394.4 848.652	1120 389.1 955.662
1120 399.6 751.723	1120 394.3 850.446	1120 389 957.782
1120 399.5 753.639	1120 394.2 852.243	1120 388.9 959.904
1120 399.4 755.538	1120 394.1 854.044	1120 388.8 962.028
1120 399.3 757.416	1120 394 855.851	1120 388.7 964.153
1120 399.2 759.274	1120 393.9 857.667	1120 388.6 966.281

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

1120 388.5 968.41	1120 384.6 1053.02	1120 380.7 1141.19
1120 388.4 970.541	1120 384.5 1055.23	1120 380.6 1143.5
1120 388.3 972.673	1120 384.4 1057.45	1120 380.5 1145.82
1120 388.2 974.808	1120 384.3 1059.66	1120 380.4 1148.14
1120 388.1 976.944	1120 384.2 1061.88	1120 380.3 1150.46
1120 388 979.083	1120 384.1 1064.11	1120 380.2 1152.78
1120 387.9 981.223	1120 384 1066.33	1120 380.1 1155.11
1120 387.8 983.365	1120 383.9 1068.56	1120 380 1157.44
1120 387.7 985.509	1120 383.8 1070.79	1120 379.9 1159.77
1120 387.6 987.655	1120 383.7 1073.02	1120 379.8 1162.1
1120 387.5 989.804	1120 383.6 1075.26	1120 379.7 1164.44
1120 387.4 991.954	1120 383.5 1077.5	1120 379.6 1166.78
1120 387.3 994.106	1120 383.4 1079.74	1120 379.5 1169.12
1120 387.2 996.26	1120 383.3 1081.98	1120 379.4 1171.47
1120 387.1 998.416	1120 383.2 1084.22	1120 379.3 1173.82
1120 387 1000.57	1120 383.1 1086.47	1120 379.2 1176.17
1120 386.9 1002.73	1120 383 1088.72	1120 379.1 1178.52
1120 386.8 1004.9	1120 382.9 1090.98	1120 379 1180.88
1120 386.7 1007.06	1120 382.8 1093.23	1120 378.9 1183.24
1120 386.6 1009.23	1120 382.7 1095.49	1120 378.8 1185.6
1120 386.5 1011.4	1120 382.6 1097.75	1120 378.7 1187.97
1120 386.4 1013.57	1120 382.5 1100.01	1120 378.6 1190.33
1120 386.3 1015.74	1120 382.4 1102.28	1120 378.5 1192.7
1120 386.2 1017.91	1120 382.3 1104.55	1120 378.4 1195.08
1120 386.1 1020.09	1120 382.2 1106.82	1120 378.3 1197.45
1120 386 1022.27	1120 382.1 1109.09	1120 378.2 1199.83
1120 385.9 1024.45	1120 382 1111.36	1120 378.1 1202.21
1120 385.8 1026.64	1120 381.9 1113.64	1120 378 1204.6
1120 385.7 1028.82	1120 381.8 1115.92	1120 377.9 1206.99
1120 385.6 1031.01	1120 381.7 1118.21	1120 377.8 1209.38
1120 385.5 1033.2	1120 381.6 1120.49	1120 377.7 1211.77
1120 385.4 1035.39	1120 381.5 1122.78	1120 377.6 1214.16
1120 385.3 1037.59	1120 381.4 1125.07	1120 377.5 1216.56
1120 385.2 1039.78	1120 381.3 1127.37	
1120 385.1 1041.98	1120 381.2 1129.67	
1120 385 1044.19	1120 381.1 1131.96	
1120 384.9 1046.39	1120 381 1134.27	
1120 384.8 1048.6	1120 380.9 1136.57	
1120 384.7 1050.81	1120 380.8 1138.88	

Property	Foundation	Leveling Soil
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120
Cohesion [psf]	0	0
Friction Angle [deg]	37	30
Water Surface	Water Table	Water Table
Hu Value	1	1

Support Properties

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Geotube

- Support Type: GeoTextile
- Force Application: Passive
- Force Orientation: Tangent to Slip Surface
- Anchorage: Both Ends
- Shear Strength Model: Linear
- Strip Coverage: 100 percent
- Tensile Strength: 1600 lb/ft

Global Minimum

Method: janbu simplified

- FS: 3.117430
- Axis Location: 1556.527, 559.485
- Left Slip Surface Endpoint: 1486.046, 454.899
- Right Slip Surface Endpoint: 1597.908, 440.349
- Resisting Horizontal Force=60098.7 lb
- Driving Horizontal Force=19278.3 lb
- Total Slice Area=1340.02 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1486.05	454.899
1549.3	424.472
1597.91	440.349

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 1290

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- Number of Invalid Surfaces: 3710

Error Codes:

- Error Code -106 reported for 31 surfaces
- Error Code -107 reported for 1208 surfaces
- Error Code -108 reported for 2443 surfaces
- Error Code -112 reported for 28 surfaces

Error Codes

The following errors were encountered during the computation:

- 106 = Average slice width is less than $0.0001 * (\text{maximum horizontal extent of soil region})$. 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).
- 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.

List Of Coordinates

Water Table

X	Y
1174.54	407.711
1209.11	406.699
1225.24	406.222
1258.76	405.198
1275.24	404.856
1308.4	404.237
1325.24	403.928
1336.44	403.527
1357.35	403.38
1375.24	403.737
1392.69	403.99
1425.24	404.344
1457.33	405.678
1475.24	406.461
1506.97	407.199
1525.25	407.461
1556.61	408.155
1575.25	408.748
1591.92	409.078
1613.98	409.749

1625.26	411.996	1911.72	413.374
1635.32	414	1914.08	413.387
1652.77	413.444	1916.58	413.398
1670.05	412.693	1923.56	413.425
1693.67	412.26	1926.18	413.435
1711.39	412.007	1929.32	413.45
1714.19	412.008	1931.93	413.458
1715.79	412.008	1934.79	413.474
1728.01	412	1937.31	413.48
1730.24	412	1978.25	413.689
1741.07	412	2024.59	413.978
1742.01	412	2029.85	413.982
1749.5	412.09	2031.92	413.983
1767.27	412.292	2035.49	413.986
1771.82	412.34	2037.88	413.995
1783.87	412.475	2039.39	414
1806.18	412.692	2045.55	414.094
1809.37	412.727	2050.82	414.182
1811.78	412.756	2055.83	414.227
1820.7	412.833	2076.35	414.46
1836.96	412.995	2121.65	414.991
1839.02	413	2124.47	415
1877.17	413.213	2145.98	415.257
1904.33	413.351	2212.68	416

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2221.72	416.01
2225.33	416.012
2229.67	416.009
2231.98	416.009
2235.72	416.007
2237.66	416.007
2243.79	416.004
2253.87	416.001
2256.76	416
2260.42	416
2265.24	416
2268.12	416.01
2273.6	416.121
2279.23	416.281
2283.87	416.442
2284.34	416.458
2288.07	416.578
2300.7	417
2313.12	417.27
2340.82	417.949
2343.12	418.568
2345.28	419
2347.6	420
2349.99	421
2351.64	420.464
2357.72	420
2360.75	420.039
2363.22	419.255
2365.22	418.379
2367.89	417.263
2376.02	417.242
2378.85	417.094
2380.4	417
2386.4	416
2388.14	415
2389.88	414
2391.79	413
2394.95	411.469
2397.98	410
2400.04	409
2402.11	408
2405.18	406.508
2408.3	405
2410.36	404
2412.42	403
2414.49	402
2416.55	401
2419.7	399.477
2422.75	398
2425.75	396.485
2428.37	395.056
2430.32	394
2433.21	392.435

2435.86	391
2437.7	390
2439.54	389
2441.39	388
2444.17	386.539
2447.51	385
2449.76	384
2452	383
2453.2	382.455
2456.42	381.42
2458	381
2459.51	380.642
2462.15	380
2463.38	379.618
2465.38	379
2468.61	378
2472.12	377.984
2475.64	378
2478.23	378.623
2479.84	379
2481.32	379.352
2484.02	380
2488.54	380.401
2495.31	381
2497.11	381.151
2507.41	381.151

1613.98	427.574
1621.22	427.855
1638.06	431.018

Block Search Window

X	Y
1487.18	423.511
1487.18	421.739
1596.83	424.227
1596.83	426.175

External Boundary

X	Y
2497.11	396.151
2495.31	396
2488.54	395.401
2484.02	395
2481.32	394.352
2479.84	394
2478.23	393.623
2475.64	393
2472.12	392.984
2468.61	393
2465.38	394
2463.38	394.618
2462.15	395
2459.51	395.642
2458	396
2456.42	396.42
2453.2	397.455
2452	398
2449.76	399
2447.51	400
2444.17	401.539
2441.39	403
2439.54	404
2437.7	405
2435.86	406
2433.21	407.435
2430.32	409
2428.37	410.056
2425.75	411.485
2422.75	413
2419.7	414.477
2416.55	416
2414.49	417
2412.42	418
2410.36	419

Piezoline

X	Y
1177.75	425.559
1209.11	424.699
1225.24	424.257
1258.76	423.338
1275.24	422.886
1308.4	421.977
1325.24	421.536
1336.44	421.233
1357.35	421.281
1375.24	421.744
1392.69	422.195
1425.24	422.986
1457.33	423.76
1475.24	424.223
1506.97	424.989
1525.25	425.462
1556.61	426.219
1575.25	426.701
1587.02	426.978
1591.92	427.094
1594.38	427.147

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2408.3	420
2405.18	421.508
2402.11	423
2400.04	424
2397.98	425
2394.95	426.469
2391.79	428
2389.88	429
2388.14	430
2386.4	431
2380.4	432
2378.85	432.094
2376.02	432.242
2367.89	432.263
2365.22	433.379
2363.22	434.255
2360.75	435.039
2357.72	435
2351.64	435.464
2349.99	436
2347.6	435
2345.28	434
2343.12	433.568
2340.82	432.949
2313.12	432.27
2300.7	432
2288.07	431.578
2284.34	431.458
2279.23	431.281
2273.6	431.121
2268.12	431.01
2265.24	431
2260.42	431
2256.76	431
2253.87	431.001
2243.79	431.004
2237.66	431.007
2235.72	431.007
2231.98	431.009
2229.67	431.009
2225.33	431.012
2221.72	431.01
2212.68	431
2145.98	430.257
2124.47	430
2121.65	429.991
2076.35	429.46
2055.83	429.227
2050.82	429.182
2045.55	429.094
2039.39	429
2037.88	428.995
2035.49	428.986

2031.92	428.983
2029.85	428.982
2024.59	428.978
1978.25	428.689
1937.31	428.48
1934.79	428.474
1931.93	428.458
1929.32	428.45
1926.18	428.435
1923.56	428.425
1916.58	428.398
1914.08	428.387
1911.72	428.374
1904.33	428.351
1877.17	428.213
1839.02	428
1836.96	427.995
1820.7	427.833
1811.78	427.756
1809.37	427.727
1806.18	427.692
1783.87	427.475
1771.82	427.34
1767.27	427.292
1749.5	427.09
1742.01	427
1741.07	427
1730.24	427
1728.01	427
1715.79	427.008
1714.19	427.008
1711.39	427.007
1693.67	427.26
1670.05	427.693
1652.77	428.444
1647.23	431.149
1644.41	433
1633.96	439.288
1621.96	439.288
1618.69	438.192
1615.46	438.193
1614.5	438.579
1610.46	440.194
1584.32	440.518
1571.95	440.66
1563.15	443.303
1525.73	454.607
1486.06	454.899
1391.46	455.595
1377.58	459.018
1371.18	460.595
1177.75	462.016
1177.75	460.016

X	Y
1177.75	458.108
1177.75	452.325
1177.75	452.075
1177.75	448.572
1177.75	448.322
1177.75	441.892
1177.75	441.642
1177.75	436.265
1177.75	436.015
1177.75	430.831
1177.75	430.581
1177.75	425.809
1177.75	425.559
1177.75	424.559
1177.75	422.532
1177.75	407.532
1177.75	358.845
1177.75	340
1625.25	340
1652.43	340
1824.03	340
2343.12	340
2505.89	340
2505.56	396.207

Material Boundary

X	Y
1567.48	440.005
1568.55	439.683
1571.95	438.66
1584.32	438.518
1610.46	438.194
1614.5	436.579
1615.46	436.193
1619.08	436.192

Material Boundary

X	Y
1563.31	441.256
1567.48	440.005

Material Boundary

X	Y
1177.75	424.559
1209.11	423.699

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1225.24	423.257
1258.76	422.338
1275.24	421.886
1308.4	420.977
1325.24	420.536
1336.44	420.233
1357.35	420.281
1375.24	420.744
1392.69	421.195
1425.24	421.986
1457.33	422.76
1475.24	423.223
1506.97	423.989
1525.25	424.462
1556.61	425.219
1575.25	425.701
1591.92	426.094
1613.98	426.574

1370.47	362.876
1385.13	362.573
1388.38	362.835
1391.76	362.52
1396.29	362.096
1397.46	362.168
1403.41	361.561
1407.45	361.148
1412.6	360.623
1418.72	360
1425.65	359.975
1427.78	359.968
1436.11	359.939
1439.83	359.929
1443.26	359.919
1451.14	359.898
1458.99	359.923
1465.65	359.943
1471.39	359.961
1474.57	359.971
1485.22	360
1488.69	360.455
1490.09	360.638
1499.75	361.907
1504.63	362.112
1511.09	362.816
1518.19	363.065
1522.55	363.47
1531.21	363.731
1534.06	363.921
1536.26	364.022
1538.2	364.073
1547.17	364.31
1548.55	364.346
1558.15	364.6
1563.65	364.745
1569.29	364.894
1573.32	365
1580.35	365.186
1591.04	365.468
1592.11	365.496
1601.93	365.755
1603.6	365.799
1612.73	366.04
1615.03	366.101
1623.48	366.324
1625.25	366.37
1626.4	366.401
1633.36	366.584
1636.86	366.677
1643.31	366.847
1649.13	367.001
1653.35	367.112

1658.7	367.253
1663.47	367.379
1668.81	367.52
1674.81	367.678
1679.75	368.097
1687.1	368.265
1690.82	368.542
1699.19	368.712
1701.97	368.897
1711.16	369.063
1722.37	369.475
1734.78	369.998
1735.91	370.072
1746.52	370.878
1748.72	370.922
1757.58	371.519
1761.37	371.587
1764.85	371.696
1768.89	371.845
1789.19	372.284
1806.16	372.363
1811.45	372.045
1818.19	371.64
1827.06	371.106
1839.65	370.35
1845.47	370
1846.95	369.917
1853.3	369.56
1854.61	369.488
1866.19	368.84
1869.63	368.653
1879.04	368.128
1884.59	367.828
1891.86	367.424
1899.48	367.013
1904.65	366.727
1914.31	366.208
1917.41	366.037
1929.08	365.412
1930.13	365.354
1936.78	365
1942.79	364.987
1943.89	364.984
1945.51	364.98
1955.36	364.958
1958.49	364.95
1962.86	364.938
1966.79	364.929
1971.91	364.915
1976.05	364.904
1978.23	364.908
1982.9	364.92
1985.41	364.926

Material Boundary

X	Y
1177.75	358.845
1180.46	358.904
1191.05	359.281
1192.87	359.322
1204.47	359.584
1205.4	359.617
1217.99	359.895
1222.86	360
1230.76	360.134
1242.86	360.344
1244.08	360.376
1256.32	360.599
1267.34	360.799
1269.4	360.855
1279.55	361.042
1282.23	361.116
1291.73	361.295
1295.06	361.39
1299.58	361.477
1303.53	361.592
1307.9	361.678
1316.01	361.838
1320.75	361.98
1328.11	362.129
1333.6	362.298
1340.18	362.434
1346.45	362.633
1352.73	362.849
1358.21	362.969

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1989.68	364.936
1992.82	364.944
1998.99	364.962
2001.14	364.967
2002.72	364.971
2012.57	365.007
2024.54	365.685
2026.53	365.798
2036.61	366.37
2040.62	366.597
2048.84	367.062
2054.93	367.407
2065.69	368.394
2080.73	369.955
2082.31	370
2096.58	372.99
2106.17	375
2110.46	375.899
2130.03	380
2140.66	382.228
2153.89	385
2167.62	387.877
2177.75	390
2200.11	394.686
2201.61	395
2221.84	399.239
2225.57	400.022
2249.53	405.043
2267.02	408.707
2272.7	410
2276.42	412.147
2281.37	415
2283.87	416.442
2290.03	419.994
2291.76	420.884
2308.94	425
2311.17	425.536
2329.81	430
2334.09	431.139
2340.82	432.949

Material Boundary

X	Y
1635.32	429
1652.77	428.444

Material Boundary

X	Y
---	---

1177.75	422.532
1209.11	421.699
1225.24	421.222
1258.76	420.198
1275.24	419.856
1308.4	419.237
1325.24	418.928
1336.44	418.527
1357.35	418.38
1375.24	418.737
1392.69	418.99
1425.24	419.344
1457.33	420.678
1475.24	421.461
1506.97	422.199
1525.25	422.461
1556.61	423.155
1575.25	423.748
1591.92	424.078
1613.98	424.749

Material Boundary

X	Y
1177.75	460.016
1371.18	458.595
1377.58	457.018
1391.46	453.595
1486.06	452.899
1525.73	452.607
1563.31	441.256

Material Boundary

X	Y
1177.75	425.559
1209.11	424.699
1225.24	424.257
1258.76	423.338
1275.24	422.886
1308.4	421.977
1325.24	421.536
1336.44	421.233
1357.35	421.281
1375.24	421.744
1392.69	422.195
1425.24	422.986
1457.33	423.76
1475.24	424.223
1506.97	424.989
1525.25	425.462
1556.61	426.219
1575.25	426.701

Material Boundary

X	Y
1563.3	440.868
1568.5	439.41
1569.04	438.236

Material Boundary

X	Y
1569.04	438.236
1570.17	437.276
1570.46	437.033
1572.07	436.84
1573.05	436.778
1574.99	436.885
1576.48	436.838
1580.85	436.726
1582.48	436.369
1583.72	436
1584.86	435.104
1585.66	434.078
1586.6	432.749
1586.88	432.247
1587.02	432
1590.23	431.274
1591.54	431
1592.3	429.978

Material Boundary

X	Y
1621.96	437.245
1633.96	437.245

Material Boundary

X	Y
1619.08	436.192
1621.96	437.245

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1621.96	439.288
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Material Boundary

X	Y
1633.96	437.245
1633.96	438.189
1633.96	439.288

1575.25	426.701
1587.02	426.978
1591.92	427.094
1594.38	427.147
1613.98	427.574
1621.22	427.855
1638.06	431.018

Material Boundary

X	Y
1357.35	444.044
1375.24	444.506
1392.69	444.957
1425.24	445.749
1457.33	446.522
1475.24	446.986
1506.97	447.751
1516.95	448.01

Material Boundary

X	Y
1613.98	424.749
1625.26	426.996

X	Y
1593.07	428.93
1593.81	428
1594.22	427.394
1594.38	427.147

Material Boundary

X	Y
1177.75	458.108
1182.28	458.094
1184.96	458.095
1187.8	458.086
1190.27	458.083
1191.7	458.08
1196.61	458.062
1197.96	458.06
1200.12	458.051
1204.31	458.04
1206.95	458.022
1207.02	458.022
1208.07	458.013
1209.06	458

Material Boundary

X	Y
1575.25	431.723
1587.02	432

Material Boundary

X	Y
1177.75	430.581
1209.11	429.721
1225.24	429.279
1258.76	428.36
1275.24	427.908
1308.4	426.999
1325.24	426.558
1336.44	426.255
1357.35	426.303
1375.24	426.765
1392.69	427.216
1425.24	428.008
1457.33	428.782
1475.24	429.245
1506.97	430.01
1525.25	430.483
1556.61	431.24
1575.25	431.723

X	Y
1210.23	457.982
1214.98	457.771
1219.75	457.619
1223.2	457.551
1229.47	457.542
1237.34	457.134
1242.74	457.124
1244.87	457.123
1250.5	457.108
1255.81	457.095
1258.28	457.094
1263.69	457.079
1269.22	457.067
1272.04	457.065
1277.36	457.051
1281.33	457.047
1286.39	457.033
1290.87	457.023
1295.38	457.021
1297.96	457.014
1300.27	457.007
1303.26	457.001
1307.54	456.926
1309.13	456.912

Material Boundary

X	Y
1625.26	426.996
1635.32	429
1636.47	429.852

Material Boundary

X	Y
1636.47	429.852
1638.06	431.018
1639.39	432
1640.61	432.825
1642.63	433
1644.41	433

X	Y
1177.75	430.581
1209.11	429.721
1225.24	429.279
1258.76	428.36
1275.24	427.908
1308.4	426.999
1325.24	426.558
1336.44	426.255
1357.35	426.303
1375.24	426.765
1392.69	427.216
1425.24	428.008
1457.33	428.782
1475.24	429.245
1506.97	430.01
1525.25	430.483
1556.61	431.24
1575.25	431.723

Material Boundary

X	Y
1303.26	457.001

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

1310.22	456.934
1312.71	456.95
1315.31	456.928
1318.18	456.943
1319.05	456.937
1325.98	457
1330.25	457.015
1332.13	457.023
1335.83	457.004
1341.09	456.713
1349.01	455.739

1494.9	451.491
1499.02	451.735
1501.75	451.798
1506.24	451.806
1508.31	451.75
1509.58	451.79
1510.71	451.741
1514.59	450.792
1515.29	450
1515.92	449.16
1516.73	448.254
1516.95	448.01
1518.47	447.866
1520.26	447.808
1530.75	447.138
1535.53	447
1537.34	446.618
1541.22	445.869
1541.88	445
1542.6	444.009
1543.26	443
1543.92	442.245
1544.14	442
1547.54	441.955
1550.52	442
1552.07	442
1555.3	442
1556.37	441.885
1557.22	441.85
1563.3	440.868

Material Boundary

X	Y
1177.75	436.015
1209.11	435.155
1225.24	434.713
1258.76	433.794
1275.24	433.342
1308.4	432.433
1325.24	431.992
1336.44	431.689
1357.35	431.737
1375.24	432.2
1392.69	432.651
1425.24	433.442
1457.33	434.216
1475.24	434.679
1506.97	435.445
1525.25	435.918
1556.61	436.675
1570.46	437.033

Material Boundary

X	Y
1349.01	455.739
1350.16	454.727
1350.83	453.862
1351.68	453
1353	452.325
1353.49	452.075
1354.8	452
1357.32	452
1359.45	452
1360.58	452
1368.75	452
1373.54	452
1381.4	452
1387.52	452
1394.56	452
1401.23	452
1402.25	452
1406.03	452.015
1417.37	452.099
1418.26	452.096
1419.09	452.099
1431.68	452.004
1433.16	452
1435.21	451.928
1438.74	451.381
1440.71	451.284
1444.97	450.941
1445.83	450.815
1447.56	450.858
1452.33	451
1460.04	451.037
1469.43	451.059
1480.23	451.098
1481.31	451.079
1482.48	451.044
1487.27	451.396

Material Boundary

X	Y
1177.75	448.322
1209.11	447.462
1225.24	447.02
1258.76	446.101
1275.24	445.649
1308.4	444.739
1325.24	444.298
1336.44	443.996
1357.35	444.044

Material Boundary

X	Y
1177.75	441.642
1209.11	440.782
1225.24	440.34
1258.76	439.421
1275.24	438.969
1308.4	438.06
1325.24	437.619
1336.44	437.316
1357.35	437.364
1375.24	437.827
1392.69	438.278
1425.24	439.069
1457.33	439.843
1475.24	440.306
1506.97	441.072
1525.25	441.545
1544.14	442

Material Boundary

X	Y
1177.75	452.075
1353.49	452.075

Material Boundary

X	Y
1177.75	425.809
1209.11	424.949
1225.24	424.507

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

1258.76	423.588
1275.24	423.136
1308.4	422.227
1325.24	421.786
1336.44	421.483
1357.35	421.531
1375.24	421.994
1392.69	422.445
1425.24	423.236
1457.33	424.01
1475.24	424.473
1506.97	425.239
1525.25	425.712
1556.61	426.469
1575.25	426.951

1525.25	430.733
1556.61	431.49
1575.25	431.973

X	Y
1357.35	444.294
1375.24	444.756
1392.69	445.207
1425.24	445.999
1457.33	446.772
1475.24	447.236
1506.97	448.001
1516.73	448.254

Material Boundary

Material Boundary

X	Y
1575.25	426.951
1587.02	427.228
1591.92	427.344
1594.22	427.394

X	Y
1177.75	436.265
1209.11	435.405
1225.24	434.963
1258.76	434.044
1275.24	433.592
1308.4	432.683
1325.24	432.242
1336.44	431.939
1357.35	431.987
1375.24	432.45
1392.69	432.901
1425.24	433.692
1457.33	434.466
1475.24	434.929
1506.97	435.695
1525.25	436.168
1556.61	436.925
1570.17	437.276

Material Boundary

X	Y
1177.75	452.325
1353	452.325

Material Boundary

X	Y
1177.75	448.572
1209.11	447.712
1225.24	447.27
1258.76	446.351
1275.24	445.899
1308.4	444.989
1325.24	444.548
1336.44	444.246
1357.35	444.294

Material Boundary

X	Y
1575.25	431.973
1586.88	432.247

X	Y
1177.75	441.892
1209.11	441.032
1225.24	440.59
1258.76	439.671
1275.24	439.219
1308.4	438.31
1325.24	437.869
1336.44	437.566
1357.35	437.614
1375.24	438.077
1392.69	438.528
1425.24	439.319
1457.33	440.093
1475.24	440.556
1506.97	441.322
1525.25	441.795
1543.92	442.245

Material Boundary

X	Y
1635.32	414
1652.77	413.444

Material Boundary

X	Y
1625.26	411.996
1635.32	414

Material Boundary

X	Y
1177.75	430.831
1209.11	429.971
1225.24	429.529
1258.76	428.61
1275.24	428.158
1308.4	427.249
1325.24	426.808
1336.44	426.505
1357.35	426.553
1375.24	427.015
1392.69	427.466
1425.24	428.258
1457.33	429.032
1475.24	429.495
1506.97	430.26

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		
			Project/ Proposal No.:	GD5497	Task No.: 03

1613.98	409.749
1625.26	411.996

1258.76	405.198
1275.24	404.856
1308.4	404.237
1325.24	403.928
1336.44	403.527
1357.35	403.38
1375.24	403.737
1392.69	403.99
1425.24	404.344
1457.33	405.678

1475.24	406.461
1506.97	407.199
1525.25	407.461
1556.61	408.155
1575.25	408.748
1591.92	409.078
1613.98	409.749

Material Boundary

X	Y
1177.75	407.532
1209.11	406.699
1225.24	406.222

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: North, Interim Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_North_Circular_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

- 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: 2

Global Minimums

Method: spencer

- FS: 2.052310
- Center: 1603.675, 568.451
- Radius: 171.684
- Left Slip Surface Endpoint: 1474.834, 454.981
- Right Slip Surface Endpoint: 1701.194, 427.153
- Resisting Moment=2.85883e+007 lb·ft
- Driving Moment=1.39298e+007 lb·ft
- Resisting Horizontal Force=152390 lb
- Driving Horizontal Force=74252.9 lb
- Total Slice Area=6912.78 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 9040
- Number of Invalid Surfaces: 19571

Error Codes:

- Error Code -103 reported for 17509 surfaces
- Error Code -107 reported for 4 surfaces
- Error Code -108 reported for 682 surfaces
- Error Code -111 reported for 1246 surfaces
- Error Code -112 reported for 130 surfaces

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: North, Long-Term Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_North_Block_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
 - 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

Written by:	Mustafa Erten / Meena Viswanath	Date:	02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date:	02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		Project/ Proposal No.:	GD5497	Task No.:	03

- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tube-Gravel Interface	Liner
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	86	100
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	24	19
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Foundation	Leveling Soil
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120
Cohesion [psf]	0	0
Friction Angle [deg]	37	30
Water Surface	Water Table	Water Table
Hu Value	1	1

Global Minimums

Method: janbu simplified

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

- FS: 2.828830
- Axis Location: 1566.178, 523.071
- Left Slip Surface Endpoint: 1514.188, 454.692
- Right Slip Surface Endpoint: 1589.688, 440.451
- Resisting Horizontal Force=48929.4 lb
- Driving Horizontal Force=17296.7 lb
- Total Slice Area=1139.54 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1514.19	454.692
1533.15	424.646
1556.61	425.165
1557.97	425.208
1589.69	440.451

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3088
- Number of Invalid Surfaces: 1912

Error Codes:

- Error Code -107 reported for 763 surfaces
- Error Code -108 reported for 604 surfaces
- Error Code -112 reported for 545 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: North, Long-Term Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_North_Circular_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- 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: 2

Global Minimums

Method: spencer

- FS: 2.780550
- Center: 1549.675, 473.193
- Radius: 42.084
- Left Slip Surface Endpoint: 1511.867, 454.709
- Right Slip Surface Endpoint: 1576.310, 440.610
- Resisting Moment=1.83525e+006 lb·ft
- Driving Moment=660031 lb·ft
- Resisting Horizontal Force=39146.6 lb
- Driving Horizontal Force=14078.7 lb
- Total Slice Area=797.585 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 6567
- Number of Invalid Surfaces: 22044

Error Codes:

- Error Code -103 reported for 19651 surfaces
- Error Code -107 reported for 131 surfaces
- Error Code -108 reported for 85 surfaces
- Error Code -112 reported for 2177 surfaces

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

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).
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: North, Residual Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_North_Block_Long Term_Residual
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Left to Right
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
-
- Number of slices: 50
 - 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

Written by:	Mustafa Erten / Meena Viswanath	Date:	02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date:	02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		Project/ Proposal No.:	GD5497	Task No.:	03

- Random Number Generation Method: Park and Miller v.3

Surface Options

-
- Surface Type: Non-Circular Block Search
 - Number of Surfaces: 5000
 - Pseudo-Random Surfaces: Enabled
 - Convex Surfaces Only: Disabled
 - Left Projection Angle (Start Angle): 95
 - Left Projection Angle (End Angle): 175
 - Right Projection Angle (Start Angle): 5
 - Right Projection Angle (End Angle): 85
 - Minimum Elevation: Not Defined
 - Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tube-Gravel Interface	Liner
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	86	100
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	24	19
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Foundation	Leveling Soil	Liner (Residual)
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	100
Cohesion [psf]	0	0	0
Friction Angle [deg]	37	30	17
Water Surface	Water Table	Water Table	Water Table
Hu Value	1	1	1

Global Minimums

Method: janbu simplified

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Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

- FS: 2.668650
- Axis Location: 1560.724, 532.399
- Left Slip Surface Endpoint: 1504.027, 454.766
- Right Slip Surface Endpoint: 1588.812, 440.462
- Resisting Horizontal Force=53082.5 lb
- Driving Horizontal Force=19891.2 lb
- Total Slice Area=1331.65 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
1504.03	454.766
1534.6	424.682
1556.61	425.214
1567.77	425.503
1588.81	440.462

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3008
- Number of Invalid Surfaces: 1992

Error Codes:

- Error Code -107 reported for 746 surfaces
- Error Code -108 reported for 694 surfaces
- Error Code -112 reported for 552 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

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Cross-Section B-B: South, Interim Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_South_Block_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
 - 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (undrained)	Dredge Material	Tube-Tube Interface (Horizontal)	Tube-Gravel Interface	Liner
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Discrete function	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	86	100
Cohesion [psf]	0	0	0		0	0	0	0
Friction Angle [deg]	30	35	38		15	15	24	19
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Discrete Functions

- Name: SOLW (Undrained, U=0%)

X (ft)	Y (ft)	Cu (lbs/ft²)
1120	440	600
1120	427.5	600
1120	424.5	600
1120	424.4	600
1120	424.3	600
1120	424.2	600
1120	424.1	600
1120	424	600
1120	423.9	597.683
1120	423.8	592.646
1120	423.7	587.563
1120	423.6	582.359

1120	423.5	577.087
1120	423.4	571.796
1120	423.3	566.533
1120	423.2	561.342
1120	423.1	556.26
1120	423	551.323
1120	422.9	546.561
1120	422.8	542.001
1120	422.7	537.664
1120	422.6	533.568
1120	422.5	529.723
1120	422.4	526.138
1120	422.3	522.812
1120	422.2	519.744
1120	422.1	516.924
1120	422	514.337

1120	421.9	511.963
1120	421.8	509.777
1120	421.7	507.745
1120	421.6	505.83
1120	421.5	503.987
1120	421.4	502.166
1120	421.3	500.311
1120	421.2	498.358
1120	421.1	496.255
1120	421	494.037
1120	420.9	491.775
1120	420.8	489.544
1120	420.7	487.425
1120	420.6	485.503
1120	420.5	483.868
1120	420.4	482.606

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1120 420.3 481.724	1120 415 513.862	1120 409.7 574.229
1120 420.2 481.188	1120 414.9 514.874	1120 409.6 575.919
1120 420.1 480.964	1120 414.8 515.867	1120 409.5 577.588
1120 420 481.009	1120 414.7 516.847	1120 409.4 579.225
1120 419.9 481.278	1120 414.6 517.822	1120 409.3 580.834
1120 419.8 481.721	1120 414.5 518.799	1120 409.2 582.418
1120 419.7 482.284	1120 414.4 519.785	1120 409.1 583.981
1120 419.6 482.909	1120 414.3 520.787	1120 409 585.528
1120 419.5 483.532	1120 414.2 521.803	1120 408.9 587.063
1120 419.4 484.1	1120 414.1 522.831	1120 408.8 588.59
1120 419.3 484.61	1120 414 523.868	1120 408.7 590.115
1120 419.2 485.072	1120 413.9 524.913	1120 408.6 591.641
1120 419.1 485.498	1120 413.8 525.963	1120 408.5 593.175
1120 419 485.898	1120 413.7 527.015	1120 408.4 594.719
1120 418.9 486.285	1120 413.6 528.065	1120 408.3 596.275
1120 418.8 486.671	1120 413.5 529.112	1120 408.2 597.843
1120 418.7 487.068	1120 413.4 530.151	1120 408.1 599.422
1120 418.6 487.491	1120 413.3 531.18	1120 408 601.013
1120 418.5 487.953	1120 413.2 532.198	1120 407.9 602.616
1120 418.4 488.463	1120 413.1 533.204	1120 407.8 604.231
1120 418.3 489.017	1120 413 534.2	1120 407.7 605.857
1120 418.2 489.603	1120 412.9 535.186	1120 407.6 607.494
1120 418.1 490.211	1120 412.8 536.163	1120 407.5 609.144
1120 418 490.827	1120 412.7 537.13	1120 407.4 610.804
1120 417.9 491.439	1120 412.6 538.09	1120 407.3 612.475
1120 417.8 492.033	1120 412.5 539.042	1120 407.2 614.157
1120 417.7 492.595	1120 412.4 539.988	1120 407.1 615.848
1120 417.6 493.107	1120 412.3 540.929	1120 407 617.549
1120 417.5 493.555	1120 412.2 541.87	1120 406.9 619.258
1120 417.4 493.926	1120 412.1 542.814	1120 406.8 620.975
1120 417.3 494.234	1120 412 543.764	1120 406.7 622.698
1120 417.2 494.5	1120 411.9 544.722	1120 406.6 624.428
1120 417.1 494.745	1120 411.8 545.694	1120 406.5 626.164
1120 417 494.991	1120 411.7 546.682	1120 406.4 627.905
1120 416.9 495.263	1120 411.6 547.691	1120 406.3 629.65
1120 416.8 495.584	1120 411.5 548.723	1120 406.2 631.398
1120 416.7 495.979	1120 411.4 549.783	1120 406.1 633.149
1120 416.6 496.476	1120 411.3 550.873	1120 406 634.901
1120 416.5 497.101	1120 411.2 551.997	1120 405.9 636.654
1120 416.4 497.863	1120 411.1 553.158	1120 405.8 638.407
1120 416.3 498.75	1120 411 554.36	1120 405.7 640.16
1120 416.2 499.746	1120 410.9 555.605	1120 405.6 641.91
1120 416.1 500.836	1120 410.8 556.898	1120 405.5 643.658
1120 416 502	1120 410.7 558.242	1120 405.4 645.402
1120 415.9 503.222	1120 410.6 559.64	1120 405.3 647.143
1120 415.8 504.482	1120 410.5 561.097	1120 405.2 648.88
1120 415.7 505.76	1120 410.4 562.613	1120 405.1 650.615
1120 415.6 507.035	1120 410.3 564.183	1120 405 652.348
1120 415.5 508.285	1120 410.2 565.798	1120 404.9 654.078
1120 415.4 509.49	1120 410.1 567.449	1120 404.8 655.807
1120 415.3 510.644	1120 410 569.127	1120 404.7 657.534
1120 415.2 511.753	1120 409.9 570.823	1120 404.6 659.261
1120 415.1 512.824	1120 409.8 572.527	1120 404.5 660.986

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1120 404.4 662.712	1120 399.1 761.108	1120 393.8 859.492
1120 404.3 664.437	1120 399 762.923	1120 393.7 861.33
1120 404.2 666.163	1120 398.9 764.721	1120 393.6 863.182
1120 404.1 667.89	1120 398.8 766.503	1120 393.5 865.051
1120 404 669.618	1120 398.7 768.273	1120 393.4 866.938
1120 403.9 671.347	1120 398.6 770.032	1120 393.3 868.842
1120 403.8 673.079	1120 398.5 771.785	1120 393.2 870.765
1120 403.7 674.813	1120 398.4 773.533	1120 393.1 872.703
1120 403.6 676.55	1120 398.3 775.279	1120 393 874.658
1120 403.5 678.29	1120 398.2 777.025	1120 392.9 876.626
1120 403.4 680.033	1120 398.1 778.775	1120 392.8 878.609
1120 403.3 681.781	1120 398 780.532	1120 392.7 880.605
1120 403.2 683.533	1120 397.9 782.298	1120 392.6 882.614
1120 403.1 685.29	1120 397.8 784.076	1120 392.5 884.633
1120 403 687.052	1120 397.7 785.87	1120 392.4 886.663
1120 402.9 688.82	1120 397.6 787.681	1120 392.3 888.703
1120 402.8 690.594	1120 397.5 789.513	1120 392.2 890.751
1120 402.7 692.375	1120 397.4 791.369	1120 392.1 892.807
1120 402.6 694.163	1120 397.3 793.247	1120 392 894.87
1120 402.5 695.958	1120 397.2 795.146	1120 391.9 896.939
1120 402.4 697.762	1120 397.1 797.063	1120 391.8 899.012
1120 402.3 699.573	1120 397 798.996	1120 391.7 901.09
1120 402.2 701.394	1120 396.9 800.944	1120 391.6 903.17
1120 402.1 703.224	1120 396.8 802.903	1120 391.5 905.253
1120 402 705.064	1120 396.7 804.873	1120 391.4 907.337
1120 401.9 706.914	1120 396.6 806.851	1120 391.3 909.422
1120 401.8 708.775	1120 396.5 808.835	1120 391.2 911.508
1120 401.7 710.647	1120 396.4 810.823	1120 391.1 913.596
1120 401.6 712.531	1120 396.3 812.812	1120 391 915.685
1120 401.5 714.427	1120 396.2 814.8	1120 390.9 917.776
1120 401.4 716.336	1120 396.1 816.785	1120 390.8 919.868
1120 401.3 718.259	1120 396 818.764	1120 390.7 921.961
1120 401.2 720.194	1120 395.9 820.736	1120 390.6 924.056
1120 401.1 722.142	1120 395.8 822.697	1120 390.5 926.152
1120 401 724.101	1120 395.7 824.646	1120 390.4 928.25
1120 400.9 726.069	1120 395.6 826.58	1120 390.3 930.349
1120 400.8 728.044	1120 395.5 828.497	1120 390.2 932.45
1120 400.7 730.026	1120 395.4 830.394	1120 390.1 934.552
1120 400.6 732.011	1120 395.3 832.273	1120 390 936.656
1120 400.5 734	1120 395.2 834.135	1120 389.9 938.761
1120 400.4 735.989	1120 395.1 835.982	1120 389.8 940.868
1120 400.3 737.977	1120 395 837.817	1120 389.7 942.976
1120 400.2 739.963	1120 394.9 839.64	1120 389.6 945.086
1120 400.1 741.945	1120 394.8 841.454	1120 389.5 947.198
1120 400 743.92	1120 394.7 843.26	1120 389.4 949.312
1120 399.9 745.888	1120 394.6 845.06	1120 389.3 951.427
1120 399.8 747.845	1120 394.5 846.857	1120 389.2 953.543
1120 399.7 749.791	1120 394.4 848.652	1120 389.1 955.662
1120 399.6 751.723	1120 394.3 850.446	1120 389 957.782
1120 399.5 753.639	1120 394.2 852.243	1120 388.9 959.904
1120 399.4 755.538	1120 394.1 854.044	1120 388.8 962.028
1120 399.3 757.416	1120 394 855.851	1120 388.7 964.153
1120 399.2 759.274	1120 393.9 857.667	1120 388.6 966.281

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1120 388.5 968.41	1120 384.6 1053.02	1120 380.7 1141.19
1120 388.4 970.541	1120 384.5 1055.23	1120 380.6 1143.5
1120 388.3 972.673	1120 384.4 1057.45	1120 380.5 1145.82
1120 388.2 974.808	1120 384.3 1059.66	1120 380.4 1148.14
1120 388.1 976.944	1120 384.2 1061.88	1120 380.3 1150.46
1120 388 979.083	1120 384.1 1064.11	1120 380.2 1152.78
1120 387.9 981.223	1120 384 1066.33	1120 380.1 1155.11
1120 387.8 983.365	1120 383.9 1068.56	1120 380 1157.44
1120 387.7 985.509	1120 383.8 1070.79	1120 379.9 1159.77
1120 387.6 987.655	1120 383.7 1073.02	1120 379.8 1162.1
1120 387.5 989.804	1120 383.6 1075.26	1120 379.7 1164.44
1120 387.4 991.954	1120 383.5 1077.5	1120 379.6 1166.78
1120 387.3 994.106	1120 383.4 1079.74	1120 379.5 1169.12
1120 387.2 996.26	1120 383.3 1081.98	1120 379.4 1171.47
1120 387.1 998.416	1120 383.2 1084.22	1120 379.3 1173.82
1120 387 1000.57	1120 383.1 1086.47	1120 379.2 1176.17
1120 386.9 1002.73	1120 383 1088.72	1120 379.1 1178.52
1120 386.8 1004.9	1120 382.9 1090.98	1120 379 1180.88
1120 386.7 1007.06	1120 382.8 1093.23	1120 378.9 1183.24
1120 386.6 1009.23	1120 382.7 1095.49	1120 378.8 1185.6
1120 386.5 1011.4	1120 382.6 1097.75	1120 378.7 1187.97
1120 386.4 1013.57	1120 382.5 1100.01	1120 378.6 1190.33
1120 386.3 1015.74	1120 382.4 1102.28	1120 378.5 1192.7
1120 386.2 1017.91	1120 382.3 1104.55	1120 378.4 1195.08
1120 386.1 1020.09	1120 382.2 1106.82	1120 378.3 1197.45
1120 386 1022.27	1120 382.1 1109.09	1120 378.2 1199.83
1120 385.9 1024.45	1120 382 1111.36	1120 378.1 1202.21
1120 385.8 1026.64	1120 381.9 1113.64	1120 378 1204.6
1120 385.7 1028.82	1120 381.8 1115.92	1120 377.9 1206.99
1120 385.6 1031.01	1120 381.7 1118.21	1120 377.8 1209.38
1120 385.5 1033.2	1120 381.6 1120.49	1120 377.7 1211.77
1120 385.4 1035.39	1120 381.5 1122.78	1120 377.6 1214.16
1120 385.3 1037.59	1120 381.4 1125.07	1120 377.5 1216.56
1120 385.2 1039.78	1120 381.3 1127.37	
1120 385.1 1041.98	1120 381.2 1129.67	
1120 385 1044.19	1120 381.1 1131.96	
1120 384.9 1046.39	1120 381 1134.27	
1120 384.8 1048.6	1120 380.9 1136.57	
1120 384.7 1050.81	1120 380.8 1138.88	

Property	Foundation	Leveling Soil
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120
Cohesion [psf]	0	0
Friction Angle [deg]	37	30
Water Surface	Water Table	Water Table
Hu Value	1	1

Support Properties

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
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Geotube

- Support Type: GeoTextile
- Force Application: Passive
- Force Orientation: Tangent to Slip Surface
- Anchorage: Both Ends
- Shear Strength Model: Linear
- Strip Coverage: 100 percent
- Tensile Strength: 1600 lb/ft

Global Minimum

Method: janbu simplified

- FS: 2.263660
- Axis Location: 427.648, 574.668
- Left Slip Surface Endpoint: 390.082, 443.747
- Right Slip Surface Endpoint: 509.845, 466.063
- Resisting Horizontal Force=59448.5 lb
- Driving Horizontal Force=26262.1 lb
- Total Slice Area=1304.79 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
390.082	443.747
411.77	435.272
414.841	435.208
425.217	434.968
437.815	434.67
509.845	466.063

Valid / Invalid Surfaces

Method: janbu simplified

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
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- Number of Valid Surfaces: 2259
- Number of Invalid Surfaces: 2741

Error Codes:

- Error Code -107 reported for 300 surfaces
- Error Code -108 reported for 2137 surfaces
- Error Code -112 reported for 304 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

List Of Coordinates

Water Table

X	Y
-3.55271e-015	441.092
8.20625	441.159
15.7106	441.204
26.4529	441.32
39.5792	441.424
49.948	441.502
57.9412	441.556
80.8057	441.881
82.6513	441.896
89.1287	442
91.4643	442.015
93.8654	442
97.4303	441.315
99.8627	441
103.632	440.277
106.595	439.646
110.967	439
116.065	437.497
118.266	436.357
120.745	435.444
122.687	435
125.831	434

129.562	433
132.704	432
134.941	431
137.195	430
139.464	429
142.855	428.433
146.259	427.609
158.753	427.13
163.694	427.028
165.119	426.426
166.853	425.244
168.002	424.54
170.515	423
171.956	422
173.549	421
175.162	420
191.544	419.526
201.655	419.257
204.998	419.174
205.147	419.172
207.684	419.137
211.264	419
218.926	419
221.747	419
225.454	419

228.797	419.001
232.165	419.001
234.063	419.001
238.013	419.002
240.224	419.002
250.11	419.002
258.106	423
259.14	423
265.164	423
268.782	423
271.578	423
348.093	422
372.42	420.24
375.216	420.037
414.841	417.826
425.217	417.703
464.483	417.034
475.218	416.817
514.125	416.335
525.219	416.184
543.392	416.084
563.767	415.971
575.221	415.904
600	415.77

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Piezoline

X	Y
354.636	436.986
355.914	437
359.162	437.029
367.613	437.106
369.734	437.088
375.216	437.037
396.68	436.591
414.841	436.213
425.217	435.973
464.483	435.043
475.218	434.791
514.125	434.339
525.219	434.201
543.392	434.063
563.767	433.909
575.221	433.822
600	433.634

234.063	434.001
232.165	434.001
228.317	434
225.454	434
221.747	434
218.926	434
211.264	434
207.684	434.137
204.998	434.174
201.655	434.257
191.544	434.526
175.162	435
173.549	436
171.956	437
170.515	438
168.002	439.54
166.853	440.244
165.119	441.426
163.694	442.028
158.753	442.13
146.259	442.609
142.855	443.433
139.464	444
137.195	445
134.941	446
132.704	447
129.562	448
125.831	449
122.687	450
120.745	450.444
118.266	451.357
116.065	452.497
110.967	454
106.595	454.646
103.632	455.277
99.8627	456
97.4303	456.315
93.8654	457
91.4643	457.015
89.1287	457
82.6513	456.896
80.8057	456.881
57.9412	456.556
49.948	456.502
39.5792	456.424

309.486	340
375.216	340
543.392	340
600	340
600	380
600	415.77
600	430.77
600	432.634
600	433.634
600	433.884
600	439.31
600	439.56
600	443.389
600	443.639
600	451.199
600	451.449
600	455.196
600	455.446
600	461.138
600	464.274
600	466.274
580.717	466.416
561.167	466.56
543.392	466.691
528.091	466.804
525.329	466.824
479.758	464.583
472.404	462.619
470.389	462.08
469.207	461.763
462.067	459.851
460.647	459.471
456.455	458.349
402.348	443.869
367.082	443.517
363.452	443.48
340.819	443.254
318.881	443.035
316.275	441.993
312.007	442.1
309.486	443.109
289.221	441
271.578	438

Block Search Polyline

X	Y
354.636	436.981
367.613	436.101
369.734	436.083
375.216	436.031
414.841	435.208
425.217	434.968
464.483	434.038
475.218	433.786
514.125	433.334
525.219	433.196
543.392	433.058
563.767	432.904
575.221	432.817
600	432.629

120.745	450.444
118.266	451.357
116.065	452.497
110.967	454
106.595	454.646
103.632	455.277
99.8627	456
97.4303	456.315
93.8654	457
91.4643	457.015
89.1287	457
82.6513	456.896
80.8057	456.881
57.9412	456.556
49.948	456.502
39.5792	456.424

26.4529	456.32
15.7106	456.204
8.20625	456.159
0	456.092
-3.55271e-015	441.092
0	340
132.717	340
258.106	340

External Boundary

X	Y
268.782	438
265.164	438
259.14	438
258.106	438
250.11	434.002
240.224	434.002
238.013	434.002

132.717	340
258.106	340

Material Boundary

X	Y
309.486	441.109
311.938	440.128
316.262	440.008
318.881	441.037

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Material Boundary

X	Y
318.881	441.037
323.436	441.082

319.015	404.117
327.288	403.189
341.758	401.566
355.711	400
364.83	398.977
375.061	397.829
388.165	396.359
400.275	395
406.653	394.284
411.701	393.718
424.707	392.259
435.391	391.06
444.839	390
462.008	387.867
484.965	385
490.161	384.282
505.363	382.181
517.1	380.558
521.14	380

375.216	435.037
414.841	432.826

Material Boundary

X	Y
375.216	437.037
396.68	436.591

Material Boundary

X	Y
414.841	432.826
425.217	432.703

Material Boundary

X	Y
375.216	436.036
414.841	435.213
425.217	434.973
464.483	434.043
475.218	433.791
514.125	433.339
525.219	433.201

319.015	404.117
327.288	403.189
341.758	401.566
355.711	400
364.83	398.977
375.061	397.829
388.165	396.359
400.275	395
406.653	394.284
411.701	393.718
424.707	392.259
435.391	391.06
444.839	390
462.008	387.867
484.965	385
490.161	384.282
505.363	382.181
517.1	380.558
521.14	380

Material Boundary

X	Y
425.217	432.703
464.483	432.034
475.218	431.817
514.125	431.335
525.219	431.184

Material Boundary

Material Boundary

X	Y
118.266	451.357
132.717	442.514

Material Boundary

X	Y
323.436	441.082
325.34	441.101
340.819	441.254
363.452	441.48
367.082	441.517
402.348	441.869
456.455	456.349
460.647	457.471
462.067	457.851
469.207	459.763
470.389	460.08
472.382	460.613
473.728	460.974
479.758	462.583
499.854	463.293
524.43	464.83
525.666	464.821
528.091	464.804

Material Boundary

X	Y
271.578	438
348.093	437

Material Boundary

X	Y
348.093	437
372.42	435.24

X	Y
396.68	436.591
396.87	436.837
397.772	438.006

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

398.664	439
399.392	439.983
402.625	441
405.553	441.399
409.481	442
410.033	442.239
411.479	442.863
412.427	443.404
413.193	443.841
420.225	444.979
421.997	444.98
428.815	444.988
433.288	444.993
439.77	445
444.169	445.164
445.293	445.252
445.444	445.499
445.75	446
446.784	447.15
447.433	448.135
447.874	449.099
448.687	450.241
449.434	451
450.815	451.368
453.146	452
454.455	452.043
462.308	452.493
465.392	452.585
466.475	452.81
468.325	453.194
469.09	454
469.995	454.913
470.931	455.375
475.068	455.607
477.511	455.975
478.622	455.983
482.105	455.986
482.959	455.99
485.081	455.989
485.922	455.992
487.428	456.211
487.568	456.459
487.993	457.216
488.614	458.552
489.241	460.038
490.305	460.634
491.228	461.074
493.757	462
495.125	462.487
497.23	463
499.854	463.093
508.104	463
511.548	462.68

512.963	462.625
515.968	462.553
518.738	462.321
523.784	462.18
524.641	462.109
527.555	462
528.902	461.796

332.443	439.064
333.789	438.839
335.555	438.486
338.11	438
339.748	437.826
348.093	437

Material Boundary

X	Y
396.68	436.591
414.841	436.213

Material Boundary

X	Y
325.34	441.101
325.453	441.073
327.99	440.5
332.443	439.564
333.789	439.339
335.555	438.986
338.11	438.5
339.748	438.326
348.093	437.5
354.636	436.986

Material Boundary

X	Y
414.841	436.213
425.217	435.973
464.483	435.043
475.218	434.791
514.125	434.339
525.219	434.201

Material Boundary

X	Y
354.636	436.986
355.914	437

Material Boundary

X	Y
369.734	437.088
375.216	437.037

Material Boundary

X	Y
355.914	437
359.162	437.029
367.613	437.106
369.734	437.088

Material Boundary

X	Y
354.636	436.986
367.613	436.106
369.734	436.088
375.216	436.036

Material Boundary

X	Y
271.578	438
285.085	439
287.153	440
289.221	441

Material Boundary

X	Y
323.436	441.082
325.453	440.573
327.99	440

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

X	Y
409.481	442
414.841	441.888

Material Boundary

X	Y
465.392	452.585
475.218	452.356

Material Boundary

X	Y
475.218	444.796
514.125	444.344

Material Boundary

X	Y
414.841	441.888
425.217	441.649
464.483	440.718
475.218	440.467
514.125	440.015
525.219	439.876
543.392	439.739

Material Boundary

X	Y
475.218	452.356
514.125	451.903

Material Boundary

X	Y
514.125	444.344
525.219	444.206
543.392	444.068

Material Boundary

X	Y
445.293	445.252
464.483	444.797
475.218	444.546

Material Boundary

X	Y
514.125	451.903
525.219	451.765
543.392	451.627

Material Boundary

X	Y
487.568	456.459
514.125	456.15
525.219	456.012
543.392	455.874

Material Boundary

X	Y
514.125	444.094
525.219	443.956
543.392	443.818

X	Y
414.841	442.138
425.217	441.899
464.483	440.968
475.218	440.717
514.125	440.265
525.219	440.126
543.392	439.989

Material Boundary

X	Y
475.218	452.606
514.125	452.153

Material Boundary

Material Boundary

X	Y
487.428	456.211
514.125	455.9
525.219	455.762
543.392	455.624

Material Boundary

X	Y
410.033	442.239
414.841	442.138

X	Y
514.125	452.153
525.219	452.015
543.392	451.877

Material Boundary

Material Boundary

X	Y
475.218	444.546
514.125	444.094

X	Y
445.444	445.499
464.483	445.047
475.218	444.796

X	Y
466.475	452.81
475.218	452.606

Material Boundary

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

X	Y
396.87	436.837
414.841	436.463

586.892	461.66
594.607	461.405
599.204	461.161
600	461.138

Material Boundary

X	Y
414.841	436.463
425.217	436.223
464.483	435.293
475.218	435.041
514.125	434.589
525.219	434.451
543.392	434.313

Material Boundary

X	Y
525.219	434.201
543.392	434.063

Material Boundary

X	Y
543.392	434.063
563.767	433.909
575.221	433.822
600	433.634

Material Boundary

Material Boundary

X	Y
525.219	433.201
543.392	433.063
563.767	432.909
575.221	432.822
600	432.634

Material Boundary

X	Y
543.392	439.739
563.767	439.584
575.221	439.498
600	439.31

Material Boundary

Material Boundary

X	Y
525.219	431.184
543.392	431.084
563.767	430.971
575.221	430.904
600	430.77

Material Boundary

X	Y
543.392	443.818
563.767	443.664
575.221	443.577
600	443.389

Material Boundary

Material Boundary

X	Y
525.219	431.184
543.392	431.084
563.767	430.971
575.221	430.904
600	430.77

Material Boundary

X	Y
543.392	451.627
563.767	451.473
575.221	451.386
600	451.199

X	Y
528.902	461.796
531.96	461.759
536.781	461.532
538.948	461.393
543.392	461.364
548.521	461.331
550.578	461.233
551.501	461.171
563.212	461.132
564.952	461.079
567.682	461.015
568.771	461.017
572.058	461.013
572.938	461.008
575.506	460.999
576.595	461
578.728	460.92
581.186	460.197
582.675	460.963
585.833	461.563

X	Y
521.14	380
536.923	377.819
543.392	376.964
553.743	375.597
556.047	376.28
565.664	379.131
568.595	380
578.485	380
587.662	380
591.277	380
596.03	380
600	380

Material Boundary

X	Y
543.392	455.624
563.767	455.47
575.221	455.383
600	455.196

Material Boundary

X	Y
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Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015	
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design			
			Project/ Proposal No.:	GD5497	Task No.:	03

543.392	455.874
563.767	455.72
575.221	455.633
600	455.446

39.5792	441.424
49.948	441.502
57.9412	441.556
80.8057	441.881
82.6513	441.896
89.1287	442
91.4643	442.015
93.8654	442
97.4303	441.315
99.8627	441
103.632	440.277
106.595	439.646
110.967	439
116.065	437.497
118.266	436.357
120.745	435.444
122.687	435
125.831	434
129.562	433
132.704	432
134.941	431
137.195	430
139.464	429
142.855	428.433
146.259	427.609
158.753	427.13
163.694	427.028
165.119	426.426
166.853	425.244
168.002	424.54
170.515	423
171.956	422
173.549	421
175.162	420
191.544	419.526
201.655	419.257
204.998	419.174
205.147	419.172
207.684	419.137
211.264	419
218.926	419
221.747	419
225.454	419
228.797	419.001
232.165	419.001
234.063	419.001
238.013	419.002
240.224	419.002
250.11	419.002
258.106	423
259.14	423
265.164	423
268.782	423

271.578	423
---------	-----

Material Boundary

X	Y
271.578	423
348.093	422

Material Boundary

X	Y
543.392	451.877
563.767	451.723
575.221	451.636
600	451.449

Material Boundary

X	Y
348.093	422
372.42	420.24
375.216	420.037
414.841	417.826

Material Boundary

X	Y
543.392	444.068
563.767	443.914
575.221	443.827
600	443.639

Material Boundary

X	Y
414.841	417.826
425.217	417.703

Material Boundary

X	Y
543.392	439.989
563.767	439.834
575.221	439.748
600	439.56

Material Boundary

X	Y
425.217	417.703
464.483	417.034
475.218	416.817
514.125	416.335
525.219	416.184

Material Boundary

X	Y
543.392	434.313
563.767	434.159
575.221	434.072
600	433.884

Material Boundary

X	Y
525.219	416.184
543.392	416.084
563.767	415.971
575.221	415.904
600	415.77

Material Boundary

X	Y
-3.55271e-015	441.092
8.20625	441.159
15.7106	441.204
26.4529	441.32

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: South, Interim Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_South_Circular_Interim
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

- 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: 2

Global Minimums

Method: spencer

- FS: 1.767300
- Center: 426.887, 519.841
- Radius: 83.029
- Left Slip Surface Endpoint: 393.588, 443.782
- Right Slip Surface Endpoint: 489.271, 465.051
- Resisting Moment=3.62419e+006 lb·ft
- Driving Moment=2.0507e+006 lb·ft
- Resisting Horizontal Force=39857.3 lb
- Driving Horizontal Force=22552.7 lb
- Total Slice Area=1059.01 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 23765
- Number of Invalid Surfaces: 4846

Error Codes:

- Error Code -103 reported for 2965 surfaces
- Error Code -108 reported for 583 surfaces
- Error Code -111 reported for 1067 surfaces
- Error Code -112 reported for 201 surfaces
- Error Code -115 reported for 30 surfaces

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				Task No.:	03

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.
- 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.
- 115 = Surface too shallow, below the minimum depth.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: South, Long-Term Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_South_Block_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

- Units of Measurement: Imperial Units
- Time Units: seconds
- Permeability Units: feet/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 30
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tube-Gravel Interface	Liner
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	86	100
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	24	19
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Foundation	Leveling Soil
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120
Cohesion [psf]	0	0
Friction Angle [deg]	37	30
Water Surface	Water Table	Water Table
Hu Value	1	1

Global Minimums

Method: janbu simplified

- FS: 2.104340
- Axis Location: 422.572, 549.804
- Left Slip Surface Endpoint: 396.270, 443.808
- Right Slip Surface Endpoint: 491.587, 465.165

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Resisting Horizontal Force=57754.9 lb
- Driving Horizontal Force=27445.6 lb
- Total Slice Area=1410.62 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
396.27	443.808
412.098	432.984
414.841	432.831
425.217	432.708
452.901	432.236
491.587	465.165

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3229
- Number of Invalid Surfaces: 1771

Error Codes:

- Error Code -107 reported for 300 surfaces
- Error Code -108 reported for 587 surfaces
- Error Code -112 reported for 884 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: South, Long-Term Condition, Global Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_South_Circular_Long Term
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

-
- Units of Measurement: Imperial Units
 - Time Units: seconds
 - Permeability Units: feet/second
 - Failure Direction: Right to Left
 - Data Output: Standard
 - Maximum Material Properties: 30
 - Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
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- 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: 2

Global Minimums

Method: spencer

- FS: 2.138490
- Center: 415.066, 496.864
- Radius: 54.883
- Left Slip Surface Endpoint: 400.851, 443.854
- Right Slip Surface Endpoint: 453.320, 457.510
- Resisting Moment=831877 lb·ft
- Driving Moment=389001 lb·ft
- Resisting Horizontal Force=14260.2 lb
- Driving Horizontal Force=6668.35 lb
- Total Slice Area=252.511 ft²

Valid / Invalid Surfaces

Method: spencer

- Number of Valid Surfaces: 20065
- Number of Invalid Surfaces: 8546

Error Codes:

- Error Code -103 reported for 6578 surfaces
- Error Code -108 reported for 35 surfaces
- Error Code -111 reported for 10 surfaces
- Error Code -112 reported for 1923 surfaces

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
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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.
- 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.

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497

Cross-Section B-B: South, Residual Condition, Block Stability

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

-
- File Name: CS-B_NorthSouth_South_Block_Long Term_Residual
 - Slide Modeler Version: 6.033
 - Project Title: SLIDE - An Interactive Slope Stability Program
 - Date Created: 8/20/2014, 1:36:58 PM

General Settings

- Units of Measurement: Imperial Units
- Time Units: seconds
- Permeability Units: feet/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 30
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Janbu simplified
- Number of slices: 50
- 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

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design		
			Project/ Proposal No.:	GD5497	Task No.:
					03

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 175
- Right Projection Angle (Start Angle): 5
- Right Projection Angle (End Angle): 85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Final Cover Soil	Dike Soil	Gravel	SOLW (Drained)	Dredge Material (Long Term)	Tube-Tube Interface (Horizontal)	Tube-Gravel Interface	Foundation
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	120	120	82	86	86	86	120
Cohesion [psf]	0	0	0	0	0	0	0	0
Friction Angle [deg]	30	35	38	34	30	15	24	37
Water Surface	Water Table	Water Table	Piezometric Line 1	Water Table	Water Table	Water Table	Water Table	Water Table
Hu Value	1	1	1	1	1	1	1	1

Property	Leveling Soil	Liner (Residual)
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft³]	120	100
Cohesion [psf]	0	0
Friction Angle [deg]	30	17
Water Surface	Water Table	Water Table
Hu Value	1	1

Global Minimums

Method: janbu simplified

- FS: 1.991310
- Axis Location: 419.840, 552.277
- Left Slip Surface Endpoint: 392.239, 443.768
- Right Slip Surface Endpoint: 490.086, 465.091

Written by:	Mustafa Erten / Meena Viswanath	Date: 02/09/2015	Reviewed by:	Ali Ebrahimi / Jay Beech	Date: 02/09/2015
Client:	Honeywell	Project:	Onondaga Lake SCA Final Cover Design	Project/ Proposal No.:	GD5497
				Task No.:	03

- Resisting Horizontal Force=54959.2 lb
- Driving Horizontal Force=27599.4 lb
- Total Slice Area=1497.75 ft²

Global Minimum Coordinates

Method: janbu simplified

X	Y
392.239	443.768
408.027	433.211
414.841	432.831
425.217	432.708
456.998	432.166
490.086	465.091

Valid / Invalid Surfaces

Method: janbu simplified

- Number of Valid Surfaces: 3166
- Number of Invalid Surfaces: 1834

Error Codes:

- Error Code -107 reported for 300 surfaces
- Error Code -108 reported for 619 surfaces
- Error Code -112 reported for 915 surfaces

Error Codes

The following errors were encountered during the computation:

- 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).
- 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.