McPHAIL ASSOCIATES, INC

Geotechnical Engineers

October 26, 2010

New Ventures Associates, LLC
85-87 Boston Street
Everett, MA 02149

Attention: Messrs. William Thibeault and Steven Trettel

Reference: Crow Lane Landfill Corrective Action Design; Newburyport, Massachusetts
Slope Stability Analysis Performed for Concept C Proposed Berm

Messrs. William Thibeault and Steven Trettel:

This letter documents the results of our slope stability analysis for the proposed Concept C site grading associated with the corrective action design for the Crow Lane Landfill located in Newburyport, Massachusetts. Furthermore, this letter responds to comments on the slope stability analysis by the Massachusetts Department of Environmental Protection (DEP) in e-mails originating from John Carrigan dated October 5 and 19, 2010.

Stability Analysis Results

The current proposed corrective action design (Concept C) includes the construction of a 2 horizontal (h) to 1 vertical (v) berm over the existing berm. A slope stability analysis was performed to determine the factor of safety against slope failure for both the existing and proposed Concept C conditions. The key component of the stability of the existing and proposed berm is the undrained shear strength, S_u, of a 24 to 55-foot thick deposit of marine clay that underlies the site. The upper bound shear strength profile considered by McPhail Associates, Inc. to be representative of the actual conditions and utilized in our analysis is discussed in further detail under the section of this letter entitled "Soil Properties for Slope Stability Analysis."

Our analysis focused on a critical cross-section of the berm, Section A-A, where the proposed grading is the highest and the clay deposit is the thickest. The location of Section A-A is indicated on the attached Figure 1. The two-dimensional factor of safety for our slope stability analysis of Section A-A utilizing the computer program SLIDE developed by Rocscience, Inc. was computed to be 1.2. However, since the critical section analyzed is of limited length, the two-dimensional factor of safety can be increased to account for three-dimensional effects.

Three dimensional effects, which take into consideration end effects, typically increase the factor of safety against slope failure computed using two-dimensional methods. Methodology presented by A.S. Azzouz in a 1978 publication entitled "Three-Dimensional Stability of Slopes" was utilized by McPhail to calculate the three-dimensional factor of safety for Section A-A. Using Azzouz's methodology, the two-dimensional factor of safety can be increased by approximately 30-percent to account for three-dimensional effects of the berm geometry.

Therefore, utilizing the computed two-dimensional factor of safety of 1.2 for Section A-A and an increase of 30 percent to account for three-dimensional effects, the resulting three-dimensional factor of safety is estimated to be about 1.6. A summary of our slope stability analysis results is presented in Table 1. The derivation of the three-dimensional factor of safety for Section A-A is included in Appendix A.

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It should also be noted that the Section A-A factor of safety against slope failure for the proposed grading conditions remains essentially unchanged as compared to the factor of safety computed for the existing conditions. As presented herein for other sections analyzed with different shear strength profiles, a similar conclusion was reached. Therefore, based upon the results of our slope stability analysis as contained herein, construction of the 2 h to 1 v berm **will not significantly change the factor of safety against slope failure from the existing conditions regardless of the shear strength profile utilized.**

Soil Properties for Slope Stability Analysis

The subsurface conditions present at the site are described in detail in documents prepared previously by Geocomp Corporation of Boxborough, Massachusetts. The derivation of the soil parameters used in the stability analysis by McPhail Associates, Inc. is included in Appendix B. Additional information utilized by McPhail Associates, Inc. included published research on geotechnical testing performed on a deposit of marine clay located in the Newbury/Newburyport area, referred to as Newbury Boston Blue Clay (NBBC). These references include:

- A doctor of philosophy dissertation submitted to the Graduate School of the University of Massachusetts Amherst entitled "Evaluation of Soil Suction as an Indicator of Sample Quality for a Soft Saturated Marine Clay" prepared by Steven E. Poirier, dated May 2005; and

- A study entitled "An Instrumented Multiple Deployment Model Pile (MDMP)" by the Federal Highway Administration (FHWA)" http://www.tfhrc.gov/structur/pubs/99194/05.htm.

It is noted that the Poirier and FHWA papers each contain research performed on the NBBC from the same Route 1 bridge site in Newbury, Massachusetts. In consideration that the Poirier paper contains significantly more data obtained from geotechnical testing of the NBBC than the FHWA paper, data presented in Poirier's paper were utilized in our analysis to model the possible lower bound shear strength of the marine clay.

The key component of the slope stability analysis is the undrained shear strength, S_u, of a 24 to 55-foot thick deposit of marine clay that underlies the site. The Stress History and Normalized Soil Engineering Properties (SHANSEP) method was used to estimate a lower bound and upper bound undrained shear strength, s_u, of the marine clay deposit. The SHANSEP method allows the undrained shear strength to be calculated utilizing the stress history of the deposit in conjunction with the equation, $S_u/\sigma'_v = S \times OCR^M$, where: σ'_v = in-situ effective vertical stress, σ'_{vm} = maximum past pressure, OCR = over-consolidation ratio (σ'_{vm}/σ'_v), and S and M are the SHANSEP parameters.

The SHANSEP parameters, S and M, from the above referenced publication by Poirier on the NBBC and from widely published data by Professor C.C. Ladd on a deposit of marine clay in the Boston area, referred to as Boston Blue Clay (BBC), were utilized. The SHANSEP parameters determined by Poirier and Ladd are considered to represent the possible range of lower and upper bound strengths, respectively, of the marine clay deposit at the project site.

The following are the equations which were used to calculate the lower and upper bound shear strength profile:

Lower Bound S_u: $S_u/\sigma'_v = 0.19 \times OCR^{0.62}$ (From Poirier work on NBBC)

Upper Bound S_u: $S_u/\sigma'_v = 0.2 \times OCR^{0.8}$ (From Ladd work on BBC)

McPhail Associates, Inc. used the results of four (4) consolidation tests performed on the marine clay conducted by Geocomp to estimate the OCR of the marine clay deposit. The maximum past pressure, σ'_{vm}, of three of the samples was interpreted by McPhail Associates, Inc. from the consolidation test data provided. We note that the data obtained from the consolidation test performed on the sample from boring B-2 indicates that the sample has been significantly disturbed such that interpretation of σ'_{vm} could not accurately be estimated. The attached Table 2 presents a summary of the estimated stress history of the marine clay deposit.

The in-situ vertical effective stress, σ'_v, of soil located beneath the berm and landfill is higher than soil located outside the footprint of the berm and landfill. For example, the soil beneath the landfill is located beneath approximately 80 feet of soil and refuse. Due to the weight of the additional material overlying the marine clay deposit beneath the berm and landfill, higher undrained shear strengths can be assigned to the marine clay utilizing the SHANSEP equation at these locations. Calculations of the average increase in the in-situ vertical effective stress beneath the berm and landfill are included in Appendix B. A graphical summary of the stress history of the marine clay deposit appears on Figure 2 following the text of this letter.

The marine clay deposit was divided into a total of nine layers for the purpose of our analysis. Table 3 presents a summary of the layers used to characterize the marine clay deposit as utilized in our analysis. The overconsolidation ratio of each of the nine clay layers was determined by obtaining the maximum past pressure from Figure 2 and dividing it by the calculated in-situ vertical effective stress. Calculations of the OCRs and the in-situ vertical effective stress of each clay layer are included in Appendix B.

Utilizing the OCRs and in-situ vertical effective stress of each of the nine clay layers, the lower and upper bound undrained shear strength of each layer was calculated utilizing the above SHANSEP equations derived by Poirier and Ladd, respectively. The upper and lower bound undrained shear strength of the marine clay layers located at the toe of the berm, under the berm, and under the landfill utilizing the Poirier and Ladd SHANSEP parameters are presented in the attached Table 3.

The undrained shear strength profile determined using the SHANSEP method for BBC correlates well with the consolidated undrained laboratory triaxial compression tests performed previously by Geocomp. For that reason we consider the upper bound shear strength profile determined utilizing the SHANSEP BBC equation to be more representative of the shear strength of the marine clay deposit at the project site.

From a practical standpoint, the marine clay deposit had already undergone its most critical condition with regard to slope stability immediately after completion of the existing berm. Upon completion of existing berm construction, little consolidation of the marine clay deposit had occurred and the undrained shear strength of the deposit was at its lowest value. It is understood that no indications of slope instability were observed at that time. Therefore, as the marine clay deposit continues to consolidate with time, the

marine clay undrained shear strength and the factor of safety with respect to slope stability are increasing with time as well.

Groundwater Table Used for Analysis

The groundwater profile utilized in the slope stability analysis was determined based on information contained on Geocomp's boring logs. Since water level data was not indicated on the boring logs provided, the groundwater level in the borings was interpolated based on soil descriptions which indicated the soil samples were "wet", "saturated" or "moist".

The groundwater level within borings performed at the toe of the berm was determined to generally vary from about Elevation +24.5 to Elevation +33. The groundwater level within borings performed on the berm was determined to generally vary from Elevation+34 to Elevation +52, excluding areas where moisture descriptions indicated on the logs was considered to be representative of a locally perched water level in a relatively impervious zone.

For our analysis, the water table was defined at Elevation +29 at the toe of the berm sloping upward to Elevation +43 at the interface of the berm and the landfill. Since our analysis (discussed below) indicates that the factor of safety generally remains unchanged from the existing to the proposed conditions, the use of a higher or lower water table is anticipated to affect the existing and proposed conditions similarly, and therefore, is not considered to be a key factor in the determination of the factor of safety against slope failure. Since the landfill membrane was installed in the Fall of 2009, runoff into the landfill has been minimized. Therefore, the groundwater level in the landfill is anticipated to be lower than prior to the Fall of 2009 and should continue to decrease.

Parametric Slope Stability Analysis

The existing and proposed berm geometry at four (4) sections (A-A, B-B, C-C and D-D) of the western portion of the berm was adopted from site plans prepared by SITEC, Inc., dated September 30, 2010. The location of the sections analyzed is indicated on the attached Figure 1. The elevation of the top and bottom of the marine clay deposit at each of the four sections was determined based on information contained on Geocomp's boring logs, as presented in Appendix C. These cross-sections were selected to model variations in the existing and proposed berm geometries and variation in the top and bottom elevation of the marine clay deposit.

The two-dimensional slope stability computer program SLIDE developed by Rocscience, Inc. was utilized to compute the factor of safety (FS) for existing and proposed conditions using the Bishop Simplified and Spencer Methods. Finally, the two-dimensional slope stability computer program XSTABL was utilized to compute the FS for the existing and proposed conditions at Section A-A utilizing the Bishop Simplified and Block Surface - Rankine method.

At the request of Shaw Environmental, Inc., we performed a parametric analysis utilizing a uniform undrained shear strength for the entire marine clay deposit (no vertical or horizontal delineation). Specifically, the existing and proposed conditions at Section A-A were analyzed utilizing uniform undrained shear strengths, S_u, of 900, 1,000, and 1,100 pounds per square-foot for the entire marine clay deposit. The computed FS for the various parametric slope stability analysis is summarized on the

attached Table 4. The results of our slope stability analysis is attached herein in Appendix D. The undrained shear strengths assumed for this parametric analysis are not considered to be representative of the actual strength of the clay deposit and were conducted primarily at the request of Shaw Environmental, Inc.

As indicated on the attached Table 4 and as previously identified for the analysis conducted for the critical Section A-A, the factor of safety against slope failure for the proposed conditions for the various sections analyzed for the different shear strength profiles and the non-critical Sections B-B, C-C and D-D (See Figure 1) generally remains unchanged from the factor of safety computed for the existing conditions. Based on our slope stability analysis, **construction of the 2 h to 1 v berm will not change the factor of safety against slope failure from the existing conditions regardless of the shear strength profile utilized.**

Influence of Decomposing Wood Layer Located Within Berm

A 5 to 11-foot thick deposit consisting of wood fibers mixed with silt, sand and gravel was encountered within the northern side of the northwest portion of the existing berm at a depth of approximately 10 feet below the existing top of berm. The construction of the proposed Concept C berm will raise the grade in the area of the decomposing wood layer by approximately 10 feet. It is anticipated that some settlement of the decomposing wood layer may result from the additional weight of the proposed berm construction and as a result of decomposition of the wood layer. Localized ground surface subsidence will likely occur as a result of the settlement, the overall stability of the berm will not be affected because critical failure surfaces are not located within the berm. Remediation to address deficiencies in the berm as a result of ground subsidence, if required, will consist of placing additional rip-rap in areas where subsidence has occurred. Because the previously proposed MSE berm is no longer part of the design, minor subsidence is not a significant concern.

Preliminary Slope Monitoring Plan

The DEP has requested monitoring of the berm performance to permit early detection of potential signs of slope instability. A series of deformation monitoring points (DMPs) and settlement platforms is recommended to comply with this request.

Deformation monitoring points would be located about twenty-five (25) feet in front of the toe of the berm where feasible, ten (10) feet in front of the berm, and midway between the toe and top of the existing berm. Deformation monitoring points will likely consist of 3/4-inch or 1-inch galvanized steel rods driven into the ground. The rods will likely be cased with PVC in the upper 3 feet and driven 5 feet below-grade to locate them below frost depth. Survey prisms will be affixed to the top of each DMP. The northing, easting, and vertical movement of each DMP can be recorded by survey methods to an accuracy of 0.01-foot.

Settlement platforms would be installed on the existing berm, midway between the existing berm and the top of the landfill, and on the top of the existing landfill. The vertical movement of each settlement platform will be recorded by survey methods to an accuracy of 0.01-foot.

Two to three DMPs and three settlement platforms would be located at each instrumentation section. We recommend that this instrumentation section be repeated at a total of about five(5) sections on the western, and northern side of the northwest portion of the berm. The location of instrumentation will be coordinated such that it does not interfere with construction. One instrumentation section should be located at critical Section A-A with two instrumentation sections flanking each side of Section A-A and spaced horizontally at approximate 60 feet on center as measured at the toe of the berm.

It is recommended that data from the DMPs and settlement platforms be obtained weekly during construction of the berm, twice a month following completion of the berm for a period of three (3) months, and monthly thereafter for a period of three months. The data will be reported in tabular form and will indicate recent and cumulative movement of each point.

Conclusions and Recommendations

In consideration of the results of the analysis presented herein, we offer the following conclusions and recommendations:

- Based on the estimated upper bound undrained shear strength profile, which is considered by McPhail to be representative of the actual strength conditions, and accounting for three-dimensional effects, a FS of 1.6 was calculated for the critical Section A-A of the proposed corrective action berm design.

- Assuming a lower bound undrained shear strength profile and accounting for three-dimensional effects, a FS of 1.4 was calculated for the critical cross-section of the proposed corrective action berm design.

- Based on our slope stability analysis, construction of the 2 h to 1 v corrective berm will not change the calculated factor of safety against slope stability failure from the existing conditions **regardless of the shear strength profile utilized**. This is significant because the existing berm was constructed without any sign of instability and has now been in place for more than five years.

- It is likely that the marine clay deposit had previously undergone its most critical condition with regard to slope stability immediately after completion of the existing berm since little consolidation of the marine clay deposit had occurred. Thus, as the marine clay deposit continues to consolidate with time, both the marine clay undrained shear strength and the factor of safety with respect to slope stability are increasing with time as well.

- The proposed berm can be constructed immediately as designed on SITEC's site plans without restrictions and without further laboratory soil testing because the proposed earthen berm geometry in Concept C does not decrease the factor of safety against slope failure from that of the existing conditions.

- Implementation of a program of geotechnical instrumentation consisting of deformation monitoring points and settlement platforms is recommended to provide the documentation required by the DEP during and following construction.

In the event that any changes in nature, design or location of the proposed berm are planned the conclusions and recommendations contained herein should not be considered valid unless the changes are reviewed and conclusions of this letter modified or verified in writing.

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, INC.

Jonathan W. Patch, P.E.

Chris M. Erikson, P.E.

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Figure 1
Plan Location of Sections Analyzed

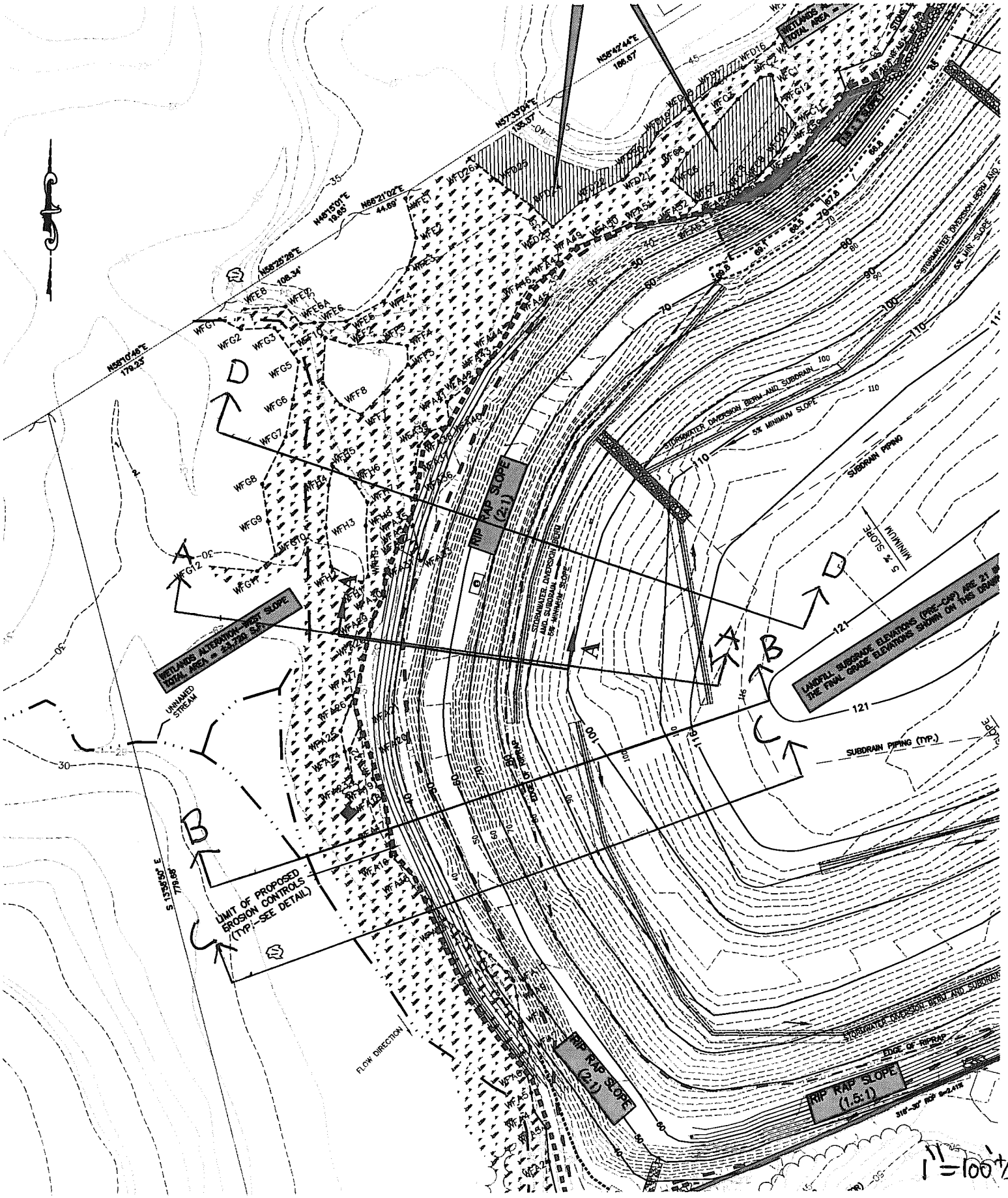

Figure 2
Vertical Stress History of Marine Clay

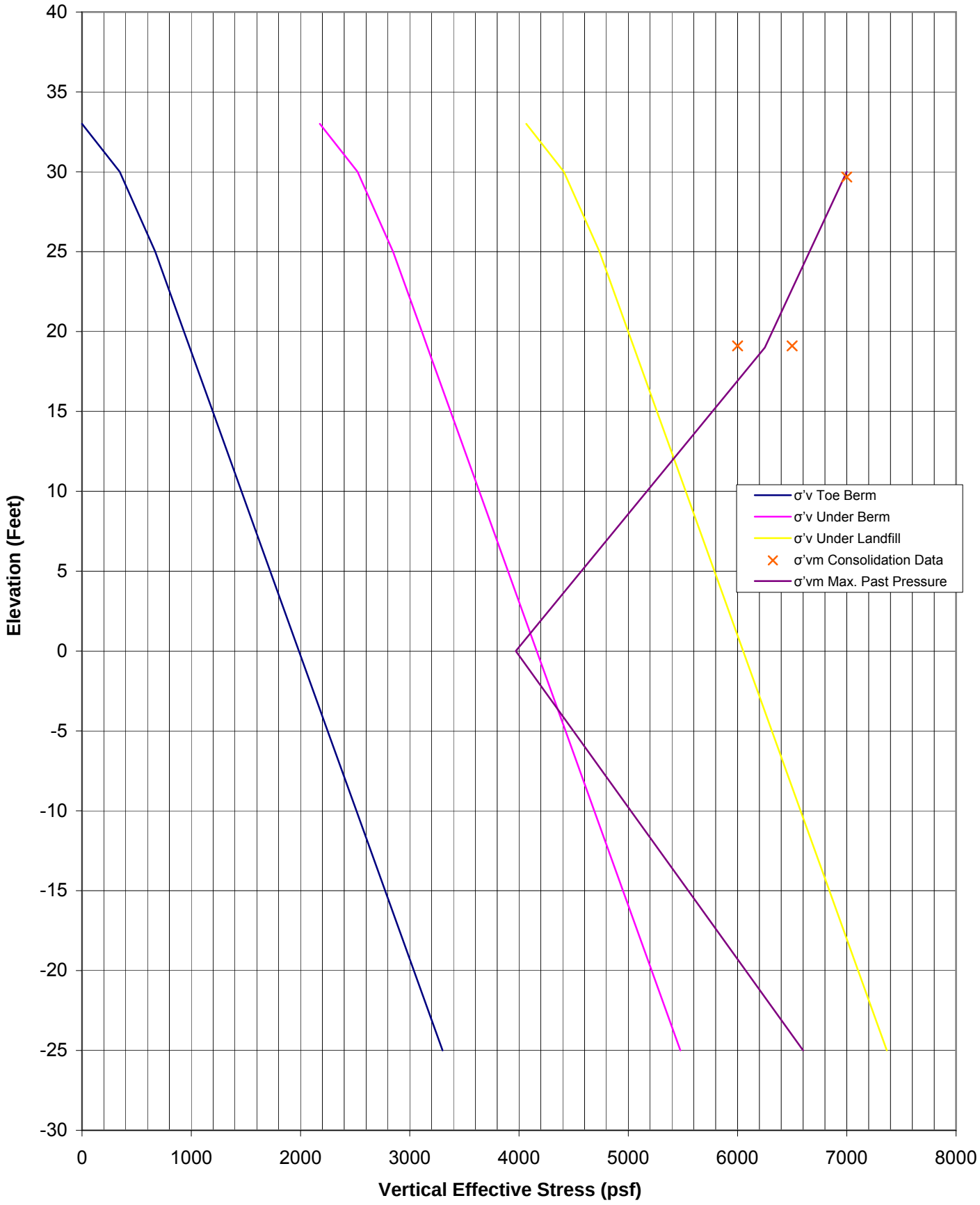

Table 1
Summary of Computed Factor of Safety
Critical Section A-A
Crow Lane Landfill
Concept C
Slope Stability Analysis

Stage	Shear Strength	Bottom of Clay El.	Min. 2D Factor of Safety	Min. 3D Factor of Safety	Notes
	[Feet]	[Feet]			
Existing	BBC	-27	1.2	1.6	Recommended Shear Strength Profile
Proposed	BBC	-27	1.2	1.6	Recommended Shear Strength Profile
Existing	NBBC	-27	1.1	1.4	Lower Bound Shear Strength Profile
Proposed	NBBC	-27	1.1	1.4	Lower Bound Shear Strength Profile

NBBC - Newbury Boston Blue Clay
Strength Profile (Lower Bound)
BBC - Boston Blue Clay (Upper Bound)

Table 2
Summary of Marine Clay Stress History
Crow Lane Landfill
Concept C

Elevation	σ'_{vm} (psf)	Overconsolidation Ratio (OCR)	Data Source
+30	7,000	17.8	Test Pit TP-3, Sample T-1 Consolidation Test
+19	6000	3.5	Boring B-8, Sample T-1 Consolidation Test
+19	6500	3.7	Boring B-9, Sample T-1 Consolidation Test
Below +19	NA	2	Poirier NBBC

Table 3
Summary of Marine Clay Shear Strength Profiles
Crow Lane Landfill
Concept C

Layer	Elevation	Shear Strength Profile	Undrained Shear Strength (psf)		
			Subsurface Section		
			Toe (Layer 1)	Berm (Layer 2)	Landfill (Layer 3)
A	+33	Upper Bound (SHANSEP BBC)	813	1120	1267
	+23	Lower Bound (SHANSEP NBBC)	485	902	1119
B	+23	Upper Bound (SHANSEP BBC)	848	1075	1181
	+13	Lower Bound (SHANSEP NBBC)	587	910	1086
C	+13	Upper Bound (SHANSEP BBC)	820	906	1284
	-27	Lower Bound (SHANSEP NBBC)	687	861	1220

Table 4
Summary of Computed Factor of Safety
Non-Critical Sections and Parametric Analysis
Crow Lane Landfill
Concept C
Slope Stability Analysis

Section	Stage	Shear Strength [Feet]	Bottom of Clay El. [Feet]	Minimum Factor of Safety	Notes
A-A	Existing	900	-27	1.0	Uniform Su = 900 psf for Marine Clay Deposit
A-A	Proposed	900	-27	1.0	Uniform Su = 900 psf for Marine Clay Deposit
A-A	Existing	1000	-27	1.1	Uniform Su = 1,000 psf for Marine Clay Deposit
A-A	Proposed	1000	-27	1.1	Uniform Su = 1,000 psf for Marine Clay Deposit
A-A	Existing	1100	-27	1.2	Uniform Su = 1,100 psf for Marine Clay Deposit
A-A	Proposed	1100	-27	1.2	Uniform Su = 1,100 psf for Marine Clay Deposit
A-A	Existing	900	-27	1.2	Block Surface Analysis - Rankine Method: Using XSTABL
A-A	Proposed	900	-27	1.0	Block Surface Analysis - Rankine Method: Using XSTABL
A-A	Existing	900	-27	1.1	Bishop Analysis Using XSTABL
A-A	Proposed	900	-27	1.2	Bishop Analysis Using XSTABL
B-B	Existing	NBBC	-26	1.2	Lower Bound Shear Strength Profile
B-B	Proposed	NBBC	-26	1.2	Lower Bound Shear Strength Profile
B-B	Existing	BBC	-26	1.3	Upper Bound Shear Strength Profile
B-B	Proposed	BBC	-26	1.3	Upper Bound Shear Strength Profile
C-C	Existing	NBBC	-7	1.4	Lower Bound Shear Strength Profile
C-C	Proposed	NBBC	-7	1.3	Lower Bound Shear Strength Profile
C-C	Existing	BBC	-7	1.4	Upper Bound Shear Strength Profile
C-C	Proposed	BBC	-7	1.4	Upper Bound Shear Strength Profile
D-D	Existing	NBBC	-1	1.3	Lower Bound Shear Strength Profile
D-D	Proposed	NBBC	-1	1.2	Lower Bound Shear Strength Profile
D-D	Existing	BBC	-1	1.4*	Upper Bound Shear Strength Profile *Minimum FS for Shallow Slip Surface on Face of Existing Berm was 1.3.
D-D	Proposed	BBC	-1	1.3	Upper Bound Shear Strength Profile

NBBC - Newbury Boston Blue Clay Strength Profile (Lower Bound)
BBC - Boston Blue Clay (Upper Bound)

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Appendix A

Evaluation of Three-Dimensional Effects

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Evaluate 3D Effects on Factor of Safety

An approximate 250 Linear Foot Section of Slope centered at Section A-A has a calculated 2D FS ranging from 1.0 to 1.2 for the proposed conditions. Utilize methodology by Azzouz, A.S. in "Three-Dimensional Stability of Slopes" as discussed below to calculate increase in FS due to 3D effects which account for End Effects.

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Based on Azzouz, A.S. and Baligh, M.M. (1978): "Three-dimensional stability of slopes," Publication No. PB-285740, National Technical Information Service, U.S. Dept. of Commerce, June,

$L = 250'/2 = 125'$

$R_{max} = 226'$ (Radius of Critical Failure Circle from Su = 1,000 psf Analysis)

$B = \tan^{-1}(\frac{1}{2}) = 26.6^{\circ}$

$R_{min} = 125'$ (min. distance from center of failure surface to slope)

$DR = R_{max} - R_{min} = 226' - 125' = 101'$

$2L = 250'$

$2L/DR = 250'/101' = 2.5$

$nH = 118' - -27 = 145'$ (vertical Distance from Top of slope to Failure Surface)

$H = 118' - 33' = 85'$ $\quad n = \frac{nH}{H} = 145'/85' = 1.7$

$\cot B = \frac{1}{\tan(26.6^{\circ})} = 2$

For $n = 1.5$, $\cot B = 2$, AND $2L/DR = 2.5$; $F/F^{\circ} = 1.3$

For $n = 2$, $\cot B = 2$ and $2L/DR = 2.5$; $F/F^{\circ} = 1.3$

Therefore, $F = 1.1 \times F^{\circ} = 1.1 \times 1.3 = 1.43$

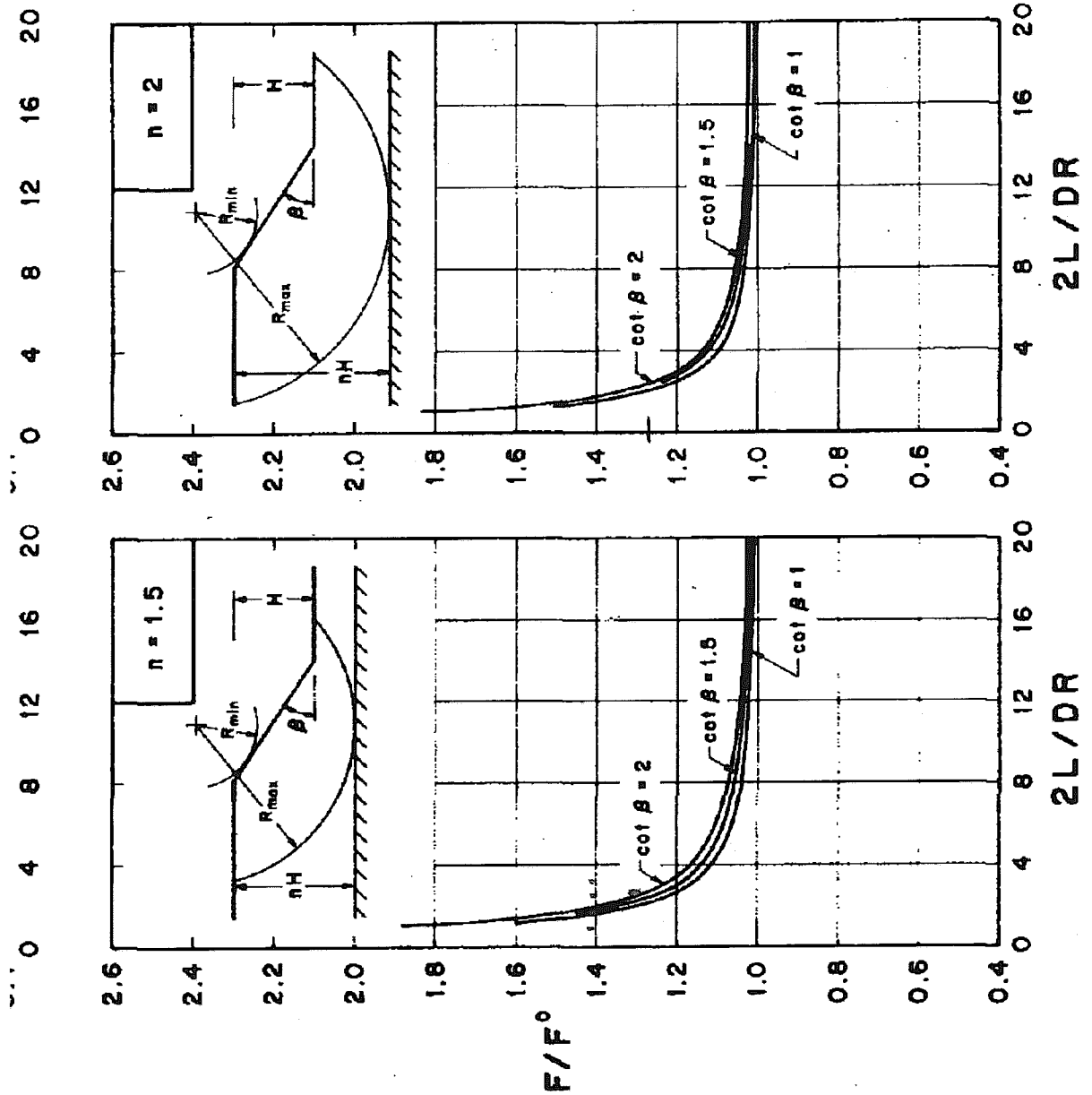

Figure 3.4 End Effects on the Stability of Homogeneous Isotropic Slopes

From AZZOUZ, A.S. and Baleigh, M.M. (1978): "Three-Dimensional Stability of Slopes," Publication No. PB-285740, National Technical Information Service, U.S. Dept. of Commerce, June,

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Appendix B

Derivation of Soil Parameters for Slope Stability Analysis

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Crow Lane Concept C

Derive Soil Parameters for Slope Stability Analyses

Existing Berm

Assume $\gamma = 118.5$ pcf

$\phi = 40^\circ$

Refer to June 16, 2009 GeoComp "Report on Additional Geotechnical Field and Laboratory Investigations, Section 5.2, for discussion of selection of $\phi = 40^\circ$

Landfill Waste

Refer to "Waste Containment Systems, Waste Stabilization and Landfills" by Hari D. Sharma and Sangeeta P. Lewis, 1994

from Section 2.4.6, $\gamma = 60$ to 70 pcf for "every well compacted new municipal solid waste landfill"

Assume $\gamma = 70$ pcf

From Section 2.4.7.

$C = 0$ to 400 psf for $\phi = 24^\circ$ to 36°

Assume $C = 200$ psf

$\phi = 25^\circ$

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Structural Fill

Soil Used to Construct Concept C Berm and Cap

$\gamma = 130^{\circ}$

$\phi = 40^{\circ}$

Marine Clay Deposit

Unit Weight, γ: Based on published research including "An Instrumented Multiple Deployment Model Pile (MDMP)" study by FHWA and doctor of philosophy dissertation submitted to UMass Amherst entitled "Evaluation of Soil Suction as an Indicator of sample quality for a Soft Saturated Marine Clay" prepared by Steven Poirier dated May 2005.

The Marine Clay deposit in the Newbury/Newburyport area is known as "Newbury Boston Blue Clay" and has similar properties to the widely researched Boston Blue Clay.

Utilize $\gamma = 115$ pcf

Shear Strength. Utilize the Stress History and Normalized Soil Engineering Properties (SHANSEP) method to estimate the undrained shear strength, S_u, of the Marine Clay deposit.

$$S_u / \sigma'_v = S\,(OCR)^m$$

Widely Published Data* for Boston Blue Clay indicates
$S = 0.2$
$m = 0.8$
] Average of the Plain Strain Properties

*"Engineering Properties of Boston Blue Clay from Special Testing Program" by Charles C. Ladd et al, 1999

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The FHWA Paper indicates the following Shansep parameters for Nearby Boston Blue Clay

$S = 0.162$ to 0.184
$m = 0.72$
] Based on OSS from two (2) tests

The Poirier Paper concludes the following for Nearby BBC:

$S = 0.19$
$m = 0.62$
] Based on Several Tests, USE Poirier for Lower Bound

Geocomp performed four (4) consolidation tests on the Marine Clay from the Crow Lane Site, McPhail interpreted the maximum past pressure from three (3) of these tests. The fourth was not used because the results indicate the sample was significantly disturbed

Sample JP-3 T-1 EL+29.7

$\sigma'_m = 7{,}000$ psf

$\sigma'_v = \underset{\text{(Topsoil)}}{1' \times 105 \text{ pcf}} + \underset{\text{(Fill w/orgs)}}{2.5' \times 115 \text{ pcf}} = 392.5$ psf

$OCR = \frac{7000}{392.5} = 17.8$

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Boring B-8 T-1 EL+19.1

$\sigma'_{vm} = 6{,}000$ psf

$\sigma'_{vo} = 10' \times 118.5\text{pcf} + 10'(115 - 62.4\text{pcf}) = 1{,}711$ psf

$OCR = \frac{6{,}000}{1{,}711} = 3.5$

Boring B-9 T-1 EL+19.1

$\sigma'_{vm} = 6{,}000$ psf

$\sigma'_{vo} = 9' \times 118.5\text{pcf} + 6'(118.5 - 62.4) + 4'(115 - 62.4) = 1{,}614$ psf

$OCR = \frac{6{,}000}{1{,}614} = 3.7$

Berm B-2 T-3 EL+5.9

Unable to accurately determine σ'_{vm} from test results provided. Sample is believed to be highly disturbed.

Need to define initial stress history of marine clay at site to apply Shansep procedure. Based on Poirier research, NBCC is over consolidated w/ OCR = 2 to 3 below, heavily over consolidated crust w/ OCR = 3 to 10.

Assume OCR = 2 below EL 0 based on Poirier

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SHEET NO. A5 OF
CALCULATED BY JMP DATE 10/18/10
CHECKED BY DATE
SCALE

Based on OCR Information, determine vertical stress profile.

The in-situ vertical effective stress, σ_v' is higher under the berm and landfill due to the weight of soil in the berm and within landfill

Ground surface EL at toe of Berm = EL +33' ±

At Berm

Top of exist. berm at section A-A is EL +54' ±

$\Delta\sigma_v$ at berm = (54 − 33) × 118.5 pcf = 2489 psf
− 5' × 62.4 pcf = 312 psf
2,177 psf

At Landfill

Top of Landfill varies from EL +54 to EL +116

Assume average EL +100 for landfill

$\Delta\sigma_v$ below landfill = (100 − 33) × 70 pcf = 4,690 psf
− (10 × 62.4) = 624 psf
4,066 psf

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JOB 5118 - Crow Lane Concept C
SHEET NO. A6 OF
CALCULATED BY JMP DATE 10/18/10
CHECKED BY DATE
SCALE

Divide the Marine Clay Deposit into 3 horizontal and 3 Vertical Layers

Layer 1A
Top of Clay/G.S. to EL +23

σ'_{v+28} @ toe of berm $= 4'(115) + 1'(115-62.4) = 512.6$ psf

From Figure 2 $\sigma'_{vm} = 6{,}800$ psf for EL+28

$$OCR = \frac{6{,}800}{512.6} = 13.3$$

Layer 2A Below Berm EL +33 to +23

$\sigma'_v = 512.6$ psf $+ 2{,}177$ psf $= 2{,}690$ psf (2,177 psf From A5)

$OCR = 6{,}800/2{,}690 = 2.5$

Layer 3A Below Landfill EL +33 to +23

$\sigma'_v = 512.6 + 4{,}066 = 4579$ psf (4,066 From A5)

$OCR = 6{,}800/4579 = 1.5$

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JOB 5118 Crow Lane Longfd C
SHEET NO. A7 OF
CALCULATED BY JMP DATE 10/18/10
CHECKED BY DATE
SCALE

Layer 1B Toe of Berm EL +23 to +13

$\sigma'_{v_{+18}} = 512.6 psf + 10(115-62.4) = 1038.6 psf$

From Figure 2, $\sigma'_{vm} = 6,100$ psf for EL +18

$OCR = 6,100/1039 = 5.8$

Layer 2B Below Berm EL +23 to +13

$\sigma'_{v_{+18}} = 1039 psf + 2,177 psf = 3,216 psf$

$OCR = \frac{6,100}{3,216} = 1.9$

Layer 3B Below Land fill

$\sigma'_{v_{+18}} = 1,039 psf + 4,066 psf = 5,105$

$OCR = \frac{6,100}{5,105} = 1.2$

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JOB 5118 - Crow Lane Concept C
SHEET NO. A8 OF
CALCULATED BY JMP DATE 10/18/10
CHECKED BY DATE
SCALE

Layer 1 C TOE of Berm EL +13 and Below

- Deepest observed Bottom of clay in Borings was in Boring B-8 at EL -27

- Midpoint of +13 to -27 is EL -7

$\sigma_{v-7} = 1039 psf + 25' (115-62.4) = 2,354 psf$

From Figure 2, σ_{vm} @ EL -7 = 4,700 psf

OCR = 4,700/2354 = 2.0

Layer 2C Below Berm

$\sigma_v' = 2,354 + 2,177 = 4,531 psf$

OCR = 4,700/4,531 = 1.0

Layer 3C Below Land fill

$\sigma_v' = 2,354 + 4,066 = 6,420 psf$

OCR = 1.0

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JOB 5118 Crowlane Concept C
SHEET NO. A9 OF
CALCULATED BY JMP DATE 10/18/10
CHECKED BY DATE
SCALE

Calculate the undrained shear strengths of the nine(9) marine clay layers using the various strength equations for Boston Blue Clay and New Jersey BBC.

Layer	Location	Midpoint	σ_v' (psf)	OCR	S_u^1 BBC (psf)	S_u^2 NBBC (psf)
1A	TOE	+28	512.6	13.3	813	485
1B	TOE	+18	1039	5.8	848	587
1C	TOE	-7	2,354	2.0	820	687
2A	Berm	+28	2,690	2.5	1,120	902
2B	Berm	+18	3,216	1.9	1,075	910
2C	Berm	-7	4,531	1.0	906	861
3A	Landfill	+28	4579	1.5	1,267	1,119
3B	Landfill	+18	5,105	1.2	1,181	1,086
3C	Landfill	-7	6,420	1.0	1,284	1,220

1. From Ladd 1999 $S_u/\sigma_v' = 0.2 \times OCR^{0.8}$

2. From Poirier $S_u/\sigma_v' = 0.19 \times OCR^{0.62}$

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Appendix C

Determination of Clay Thickness at Sections

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JOB 5118 Crow Lane Concept C
SHEET NO. B1 OF
CALCULATED BY JMP DATE 10/19/10
CHECKED BY DATE
SCALE

Determine top and Bottom of Clay Deposit at Sections

Section A-A (Refer to Figure 1)

Cross-Section in area where proposed fill height over existing berm is greatest

Use Borings B-8, B-3 and Test Pits 3/3A

Boring B-3/3A terminated at shallow depth in Fill

B-8 Top of Clay @ EL +28 +/-
Bottom of Clay @ EL -27 +/-

TP-3 Top of Clay @ EL +29.5 +/-

Say Top of Clay @ EL +33
Bottom of Clay @ EL -27

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SHEET NO. B2 OF
CALCULATED BY JMP DATE 10/19/10
CHECKED BY DATE
SCALE

Section B-B

150' South of A-A as measured at toe of berm

Use Borings B-7 and B-7A

Boring B-7/7A Granular Soil to EL +18
Marine Clay from +18 to EL -26

Fill $\gamma = 118.5$ pcf
$\phi = 30°$

Section C-C

~80' South of Section B-B

Use Boring B-2 Top of Clay EL +17
Bottom of Clay EL -7

By Inspection Existing and Proposed Grading at Section B-B is substantially similar. Use plane geometry from B-B for Analyses.

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JOB 5118 Crow Lane Concept C
SHEET NO. B3 OF
CALCULATED BY JMP DATE 10/19/10
CHECKED BY DATE
SCALE

Section D-D

100 Ft North of A-A as measured at toe of berm

Use Borings B-10 and B-4 Top of Clay EL +23
Bottom of Clay EL -1

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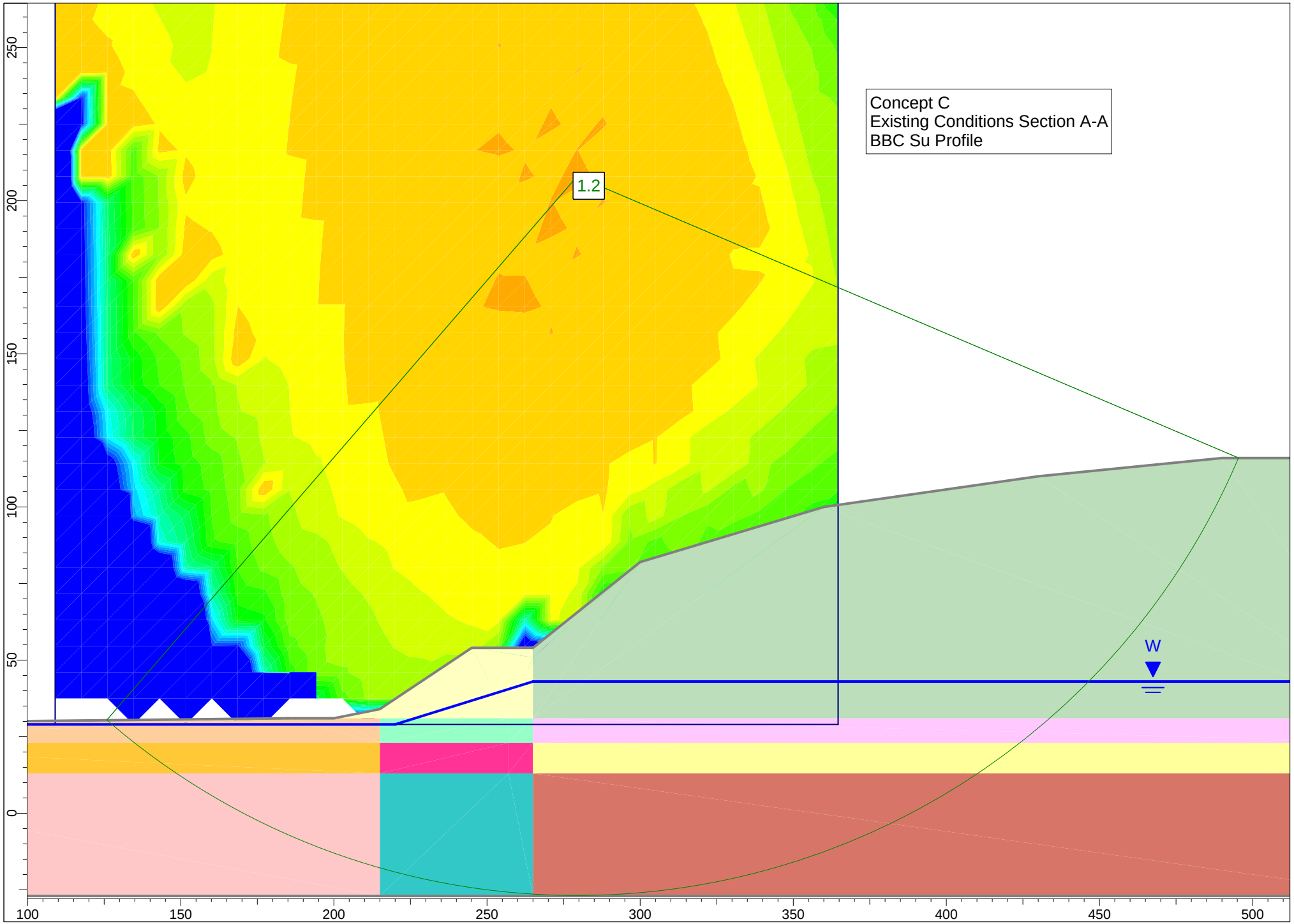
Appendix D

Slope Stability Analysis Performed by McPhail Associates, Inc.


Concept C
Existing Conditions Section A-A
BBC Su Profile
1.2
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200
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100
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350
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450
500

Slide Analysis Information

Document Name

File Name: BBC_AA_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 813 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 2A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1120 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 3A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1267 psf
Water Surface: Water Table

Custom Hu value: 0

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: Water Table
Custom Hu value: 0

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: Water Table
Custom Hu value: 0

List of All Coordinates

Material Boundary

0.000	13.000
215.000	13.000
257.000	13.000
265.000	13.000
550.000	13.000

Material Boundary

0.000	23.000
215.000	23.000
257.000	23.000
265.000	23.000
550.000	23.000

Material Boundary

200.000	31.000
215.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

265.000	-27.000
265.000	13.000
265.000	23.000
265.000	31.000
265.000	50.889
265.000	54.000

Material Boundary

215.000	-27.000
215.000	13.000
215.000	23.000
215.000	31.000
215.000	34.000

External Boundary

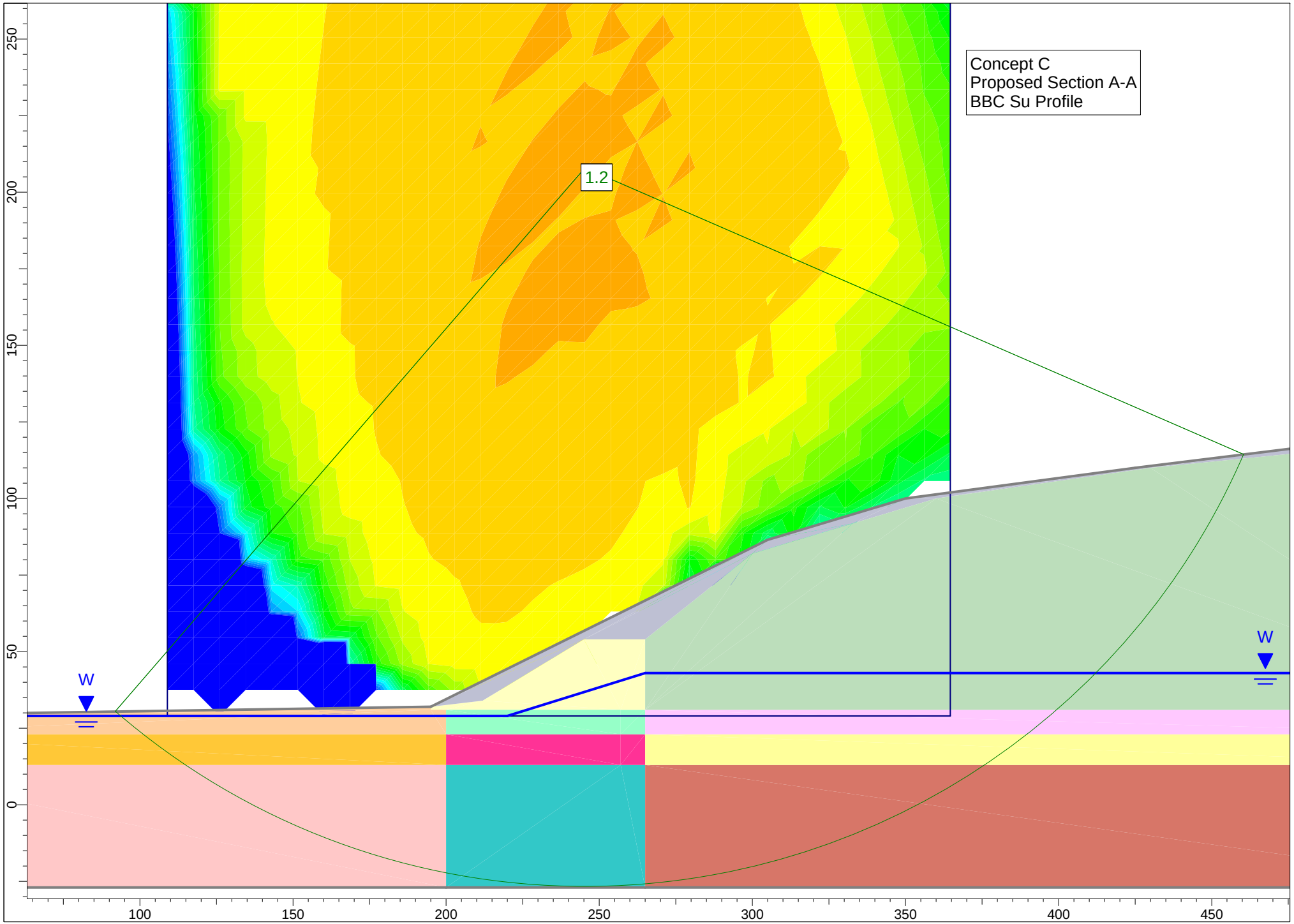
0.000	-27.000
215.000	-27.000
265.000	-27.000
550.000	-27.000
550.000	13.000
550.000	23.000
550.000	31.000
550.000	116.000
490.000	116.000
430.000	110.000
360.000	100.000
300.000	82.000
265.000	54.000
245.000	54.000
215.000	34.000
200.000	31.000
185.000	31.000
0.000	29.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651


Concept C
Proposed Section A-A
BBC Su Profile
1.2
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250
300
350
400
450

Slide Analysis Information

Document Name

File Name: BBC_AA_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 813 psf
Water Surface: None

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1120 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1267 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf

Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.202940
Center: 245.326, 207.956
Radius: 234.643
Left Slip Surface Endpoint: 91.911, 30.414
Right Slip Surface Endpoint: 460.498, 114.369
Resisting Moment=1.06547e+008 lb-ft
Driving Moment=8.85724e+007 lb-ft

Method: spencer
FS: 1.188670
Center: 245.326, 207.956
Radius: 234.643
Left Slip Surface Endpoint: 91.911, 30.414
Right Slip Surface Endpoint: 460.498, 114.369
Resisting Moment=1.05283e+008 lb-ft
Driving Moment=8.85724e+007 lb-ft
Resisting Horizontal Force=383529 lb
Driving Horizontal Force=322654 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6636
Number of Invalid Surfaces: 3935
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -112 reported for 338 surfaces

Method: spencer
Number of Valid Surfaces: 6378
Number of Invalid Surfaces: 4193
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -108 reported for 124 surfaces
Error Code -111 reported for 110 surfaces
Error Code -112 reported for 362 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.

-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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

0.000	13.000
200.000	13.000
257.000	13.000
265.000	13.000
550.000	13.000

Material Boundary

0.000	23.000
200.000	23.000
257.000	23.000
265.000	23.000
550.000	23.000

Material Boundary

200.000	23.000
200.000	31.000

Material Boundary

200.000	-27.000
200.000	13.000

200.000 23.000

Material Boundary
200.000 31.000
257.000 31.000
265.000 31.000
550.000 31.000

Material Boundary
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360.000 100.000
430.000 110.000
490.000 116.000
550.000 116.000

Material Boundary
265.000 -27.000
265.000 13.000
265.000 23.000
265.000 31.000
265.000 54.000

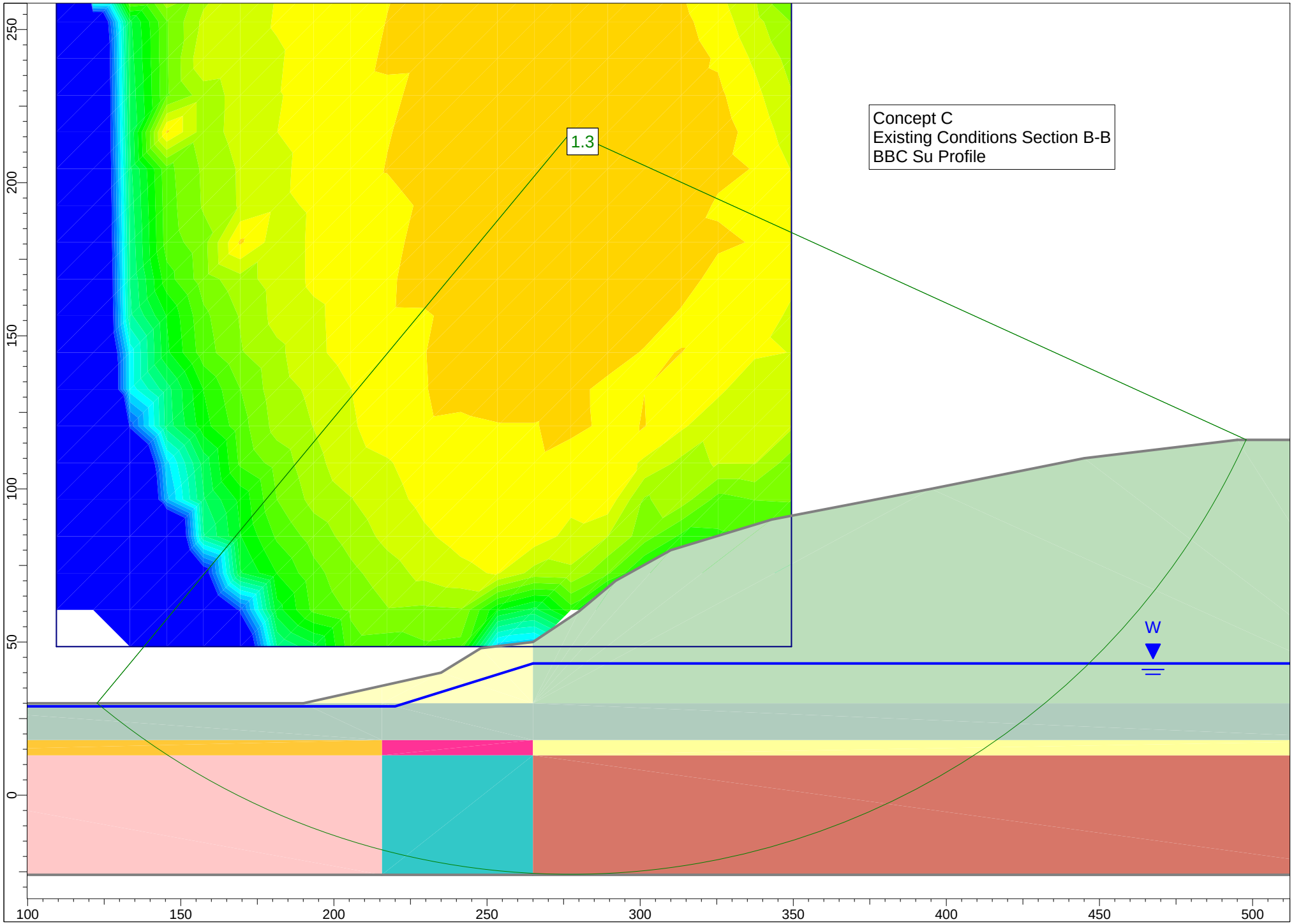
Material Boundary
195.000 32.000
195.000 31.000
200.000 31.000

Material Boundary
195.000 32.000
212.000 34.000
245.000 54.000
265.000 54.000

External Boundary
0.000 -27.000
200.000 -27.000
265.000 -27.000
550.000 -27.000
550.000 13.000
550.000 23.000
550.000 31.000
550.000 116.000
550.000 118.000
490.000 118.000
425.000 110.000
350.000 100.000
305.000 86.500
195.000 32.000
0.000 29.000
0.000 23.000
0.000 13.000

Water Table
0.000 29.000

220.000	29.000
265.000	43.000
550.000	43.000


Concept C
Existing Conditions Section B-B
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1.3
W
250
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Slide Analysis Information

Document Name

File Name: BBC_BB_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.308700

Center: 277.414, 216.531
Radius: 242.400
Left Slip Surface Endpoint: 122.612, 30.000
Right Slip Surface Endpoint: 497.983, 116.000
Resisting Moment=1.18048e+008 lb-ft
Driving Moment=9.02021e+007 lb-ft

Method: spencer
FS: 1.292870
Center: 277.414, 216.531
Radius: 242.400
Left Slip Surface Endpoint: 122.612, 30.000
Right Slip Surface Endpoint: 497.983, 116.000
Resisting Moment=1.1662e+008 lb-ft
Driving Moment=9.02021e+007 lb-ft
Resisting Horizontal Force=413566 lb
Driving Horizontal Force=319882 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2907
Number of Invalid Surfaces: 1944
Error Codes:
Error Code -103 reported for 1559 surfaces
Error Code -107 reported for 67 surfaces
Error Code -108 reported for 250 surfaces
Error Code -112 reported for 68 surfaces

Method: spencer
Number of Valid Surfaces: 2813
Number of Invalid Surfaces: 2038
Error Codes:
Error Code -103 reported for 1559 surfaces
Error Code -107 reported for 67 surfaces
Error Code -108 reported for 300 surfaces
Error Code -111 reported for 22 surfaces
Error Code -112 reported for 90 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched
slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

0.000	18.000
215.664	18.000
265.000	18.000
550.000	18.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	-26.000
265.000	13.000
265.000	18.000
265.000	30.000
265.000	50.000

Material Boundary

215.664	-26.000
215.664	13.000
215.664	18.000
215.664	30.000
215.664	35.703

Material Boundary

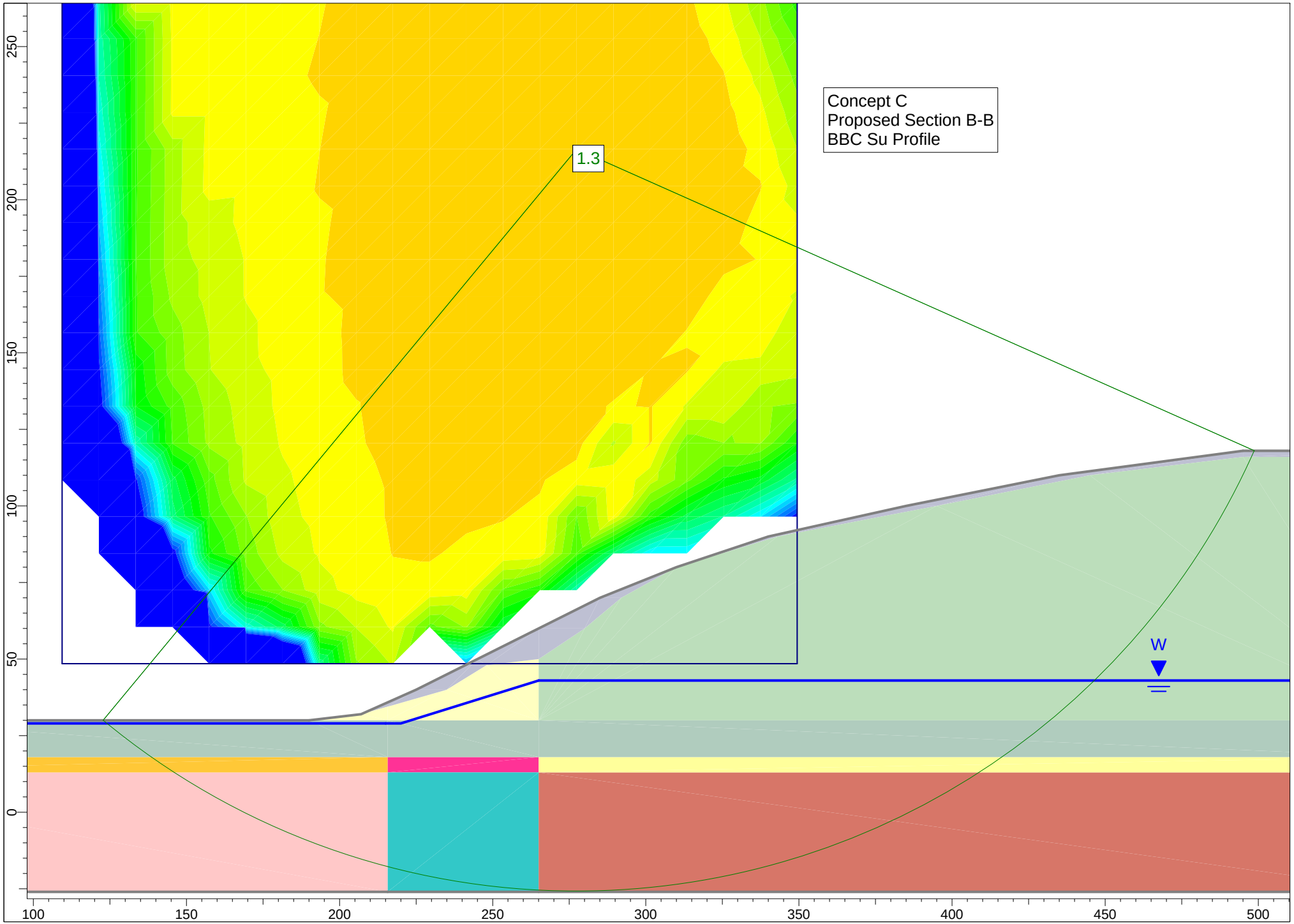
190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

External Boundary

0.000	-26.000
215.664	-26.000
265.000	-26.000
550.000	-26.000
550.000	13.000
550.000	18.000
550.000	30.000
550.000	116.000
495.000	116.000
445.000	110.000
395.000	100.000
343.000	90.000
310.000	80.000
292.000	70.000
280.000	60.000
265.000	50.000
248.000	48.000
235.000	40.000
215.664	35.703
190.000	30.000
45.000	30.000
0.000	31.000
0.000	18.000
0.000	13.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: BBC_BB_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf

Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.269130
Center: 277.414, 216.531
Radius: 242.309
Left Slip Surface Endpoint: 122.754, 30.000
Right Slip Surface Endpoint: 498.784, 118.000
Resisting Moment=1.19999e+008 lb-ft
Driving Moment=9.45523e+007 lb-ft

Method: spencer
FS: 1.252990
Center: 277.414, 216.531
Radius: 242.309
Left Slip Surface Endpoint: 122.754, 30.000
Right Slip Surface Endpoint: 498.784, 118.000
Resisting Moment=1.18473e+008 lb-ft
Driving Moment=9.45523e+007 lb-ft
Resisting Horizontal Force=418591 lb
Driving Horizontal Force=334074 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2886
Number of Invalid Surfaces: 1965
Error Codes:
Error Code -103 reported for 1541 surfaces
Error Code -107 reported for 82 surfaces
Error Code -108 reported for 247 surfaces
Error Code -112 reported for 95 surfaces

Method: spencer
Number of Valid Surfaces: 2772
Number of Invalid Surfaces: 2079
Error Codes:
Error Code -103 reported for 1541 surfaces
Error Code -107 reported for 82 surfaces
Error Code -108 reported for 310 surfaces
Error Code -111 reported for 25 surfaces
Error Code -112 reported for 121 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched

slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

0.000	18.000
215.664	18.000
265.000	18.000
550.000	18.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	-26.000
265.000	13.000
265.000	18.000
265.000	30.000
265.000	50.000
265.000	60.000

Material Boundary

190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

Material Boundary

207.000	32.000
215.664	34.475
235.000	40.000
248.000	48.000
265.000	50.000
280.000	60.000
292.000	70.000
310.000	80.000
343.000	90.000
395.000	100.000
445.000	110.000
495.000	116.000
550.000	116.000

Material Boundary

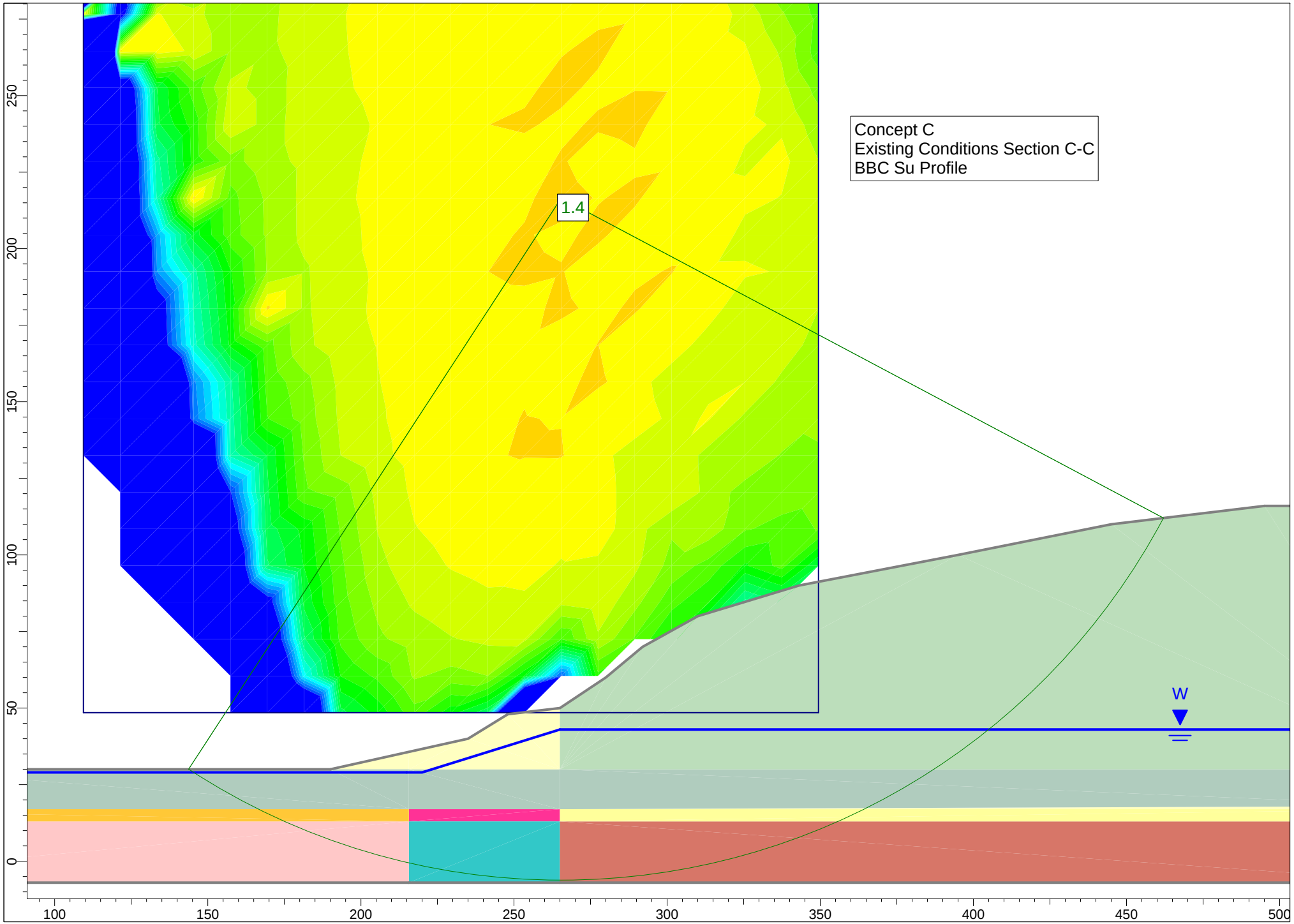
215.664	-26.000
215.664	13.000
215.664	18.000
215.664	30.000
215.664	34.475

External Boundary

0.000	-26.000
215.664	-26.000
265.000	-26.000
550.000	-26.000
550.000	13.000
550.000	18.000
550.000	30.000
550.000	116.000
550.000	118.000
495.000	118.000
435.000	110.000
385.000	100.000
340.000	90.000
310.000	80.000
285.000	70.000
265.000	60.000
245.000	50.000
225.000	40.000
207.000	32.000
190.000	30.000
45.000	30.000
0.000	31.000
0.000	18.000
0.000	13.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: BBC_CC_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.438870

Center: 109.391, 276.539
Radius: 267.692
Left Slip Surface Endpoint: 236.870, 41.151
Right Slip Surface Endpoint: 248.962, 48.113
Resisting Moment=80701.2 lb-ft
Driving Moment=56086.3 lb-ft

Method: spencer
FS: 1.439150
Center: 265.412, 216.531
Radius: 222.725
Left Slip Surface Endpoint: 143.705, 30.000
Right Slip Surface Endpoint: 462.112, 112.053
Resisting Moment=8.77005e+007 lb-ft
Driving Moment=6.09391e+007 lb-ft
Resisting Horizontal Force=346861 lb
Driving Horizontal Force=241018 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2279
Number of Invalid Surfaces: 2572
Error Codes:
Error Code -103 reported for 2231 surfaces
Error Code -107 reported for 56 surfaces
Error Code -108 reported for 251 surfaces
Error Code -112 reported for 34 surfaces

Method: spencer
Number of Valid Surfaces: 2224
Number of Invalid Surfaces: 2627
Error Codes:
Error Code -103 reported for 2231 surfaces
Error Code -107 reported for 56 surfaces
Error Code -108 reported for 285 surfaces
Error Code -111 reported for 15 surfaces
Error Code -112 reported for 40 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched
slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

265.000	17.000
550.000	18.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	-7.000
265.000	13.000
265.000	17.000
265.000	30.000
265.000	50.000

Material Boundary

215.664	-7.000
215.664	13.000
215.664	17.000
215.664	30.000
215.664	35.703

Material Boundary

190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

Material Boundary

0.000	17.000
215.664	17.000

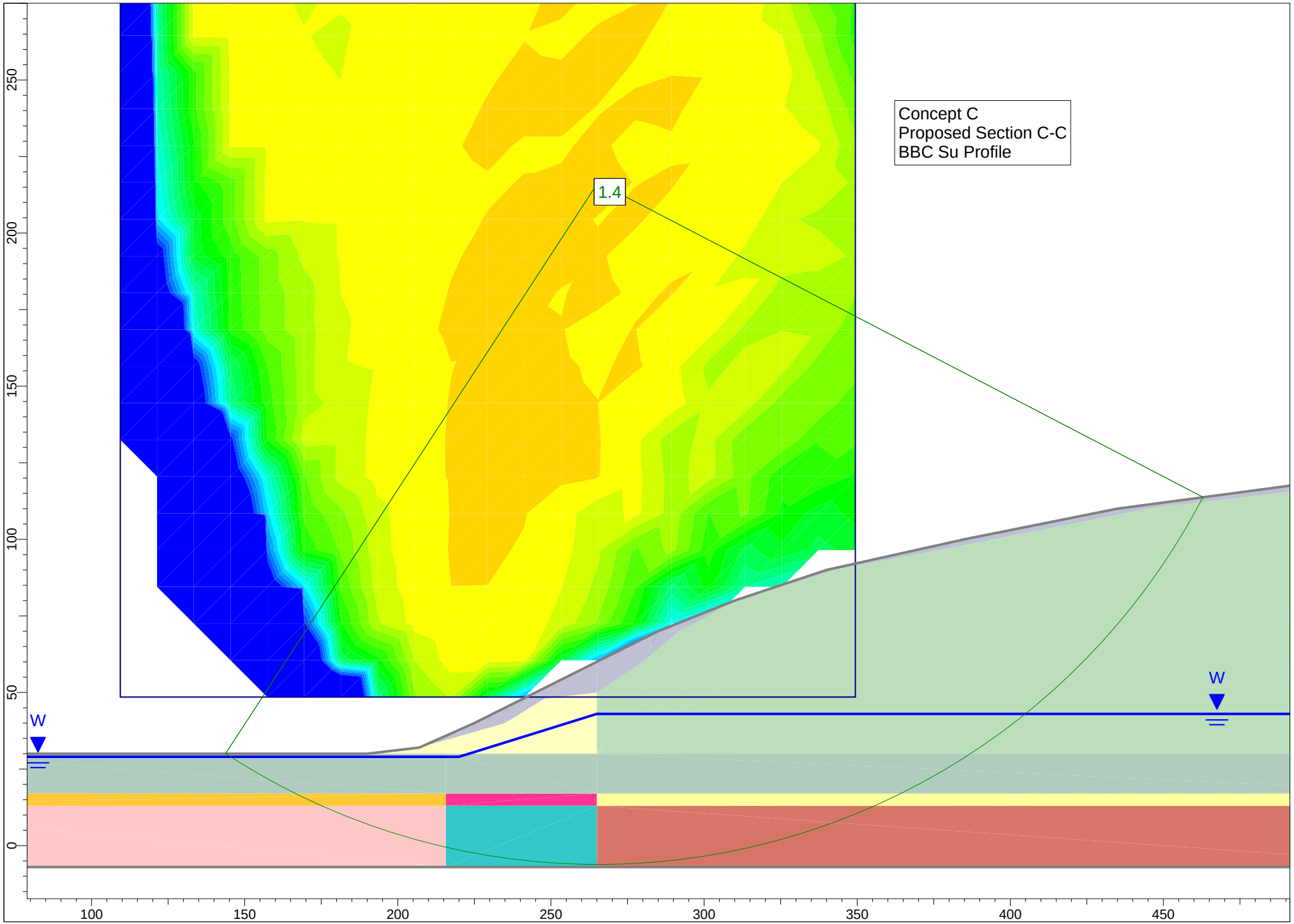
265.000	17.000
550.000	17.000

External Boundary

215.664	-7.000
265.000	-7.000
550.000	-7.000
550.000	13.000
550.000	17.000
550.000	18.000
550.000	30.000
550.000	116.000
495.000	116.000
445.000	110.000
395.000	100.000
343.000	90.000
310.000	80.000
292.000	70.000
280.000	60.000
265.000	50.000
248.000	48.000
235.000	40.000
215.664	35.703
190.000	30.000
45.000	30.000
0.000	31.000
0.000	17.000
0.000	13.000
0.000	-7.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: BBC_CC_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf

Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.415760
Center: 265.412, 216.531
Radius: 222.724
Left Slip Surface Endpoint: 143.708, 30.000
Right Slip Surface Endpoint: 462.993, 113.732
Resisting Moment=9.15754e+007 lb-ft
Driving Moment=6.46831e+007 lb-ft

Method: spencer
FS: 1.386900
Center: 265.412, 216.531
Radius: 222.724
Left Slip Surface Endpoint: 143.708, 30.000
Right Slip Surface Endpoint: 462.993, 113.732
Resisting Moment=8.97091e+007 lb-ft
Driving Moment=6.46831e+007 lb-ft
Resisting Horizontal Force=353549 lb
Driving Horizontal Force=254920 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2267
Number of Invalid Surfaces: 2584
Error Codes:
Error Code -103 reported for 2214 surfaces
Error Code -107 reported for 70 surfaces
Error Code -108 reported for 248 surfaces
Error Code -112 reported for 52 surfaces

Method: spencer
Number of Valid Surfaces: 2202
Number of Invalid Surfaces: 2649
Error Codes:
Error Code -103 reported for 2214 surfaces
Error Code -107 reported for 70 surfaces
Error Code -108 reported for 290 surfaces
Error Code -111 reported for 14 surfaces
Error Code -112 reported for 61 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched

slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

0.000	17.000
215.664	17.000
265.000	17.000
550.000	17.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	13.000
265.000	17.000
265.000	30.000
265.000	50.000
265.000	60.000

Material Boundary

190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

Material Boundary

207.000	32.000
215.664	34.475
235.000	40.000
248.000	48.000
265.000	50.000
280.000	60.000
292.000	70.000
310.000	80.000
343.000	90.000
395.000	100.000
445.000	110.000
495.000	116.000
550.000	116.000

Material Boundary

215.664	13.000
215.664	17.000
215.664	30.000
215.664	34.475

Material Boundary

215.664	-7.000
215.664	13.000

Material Boundary

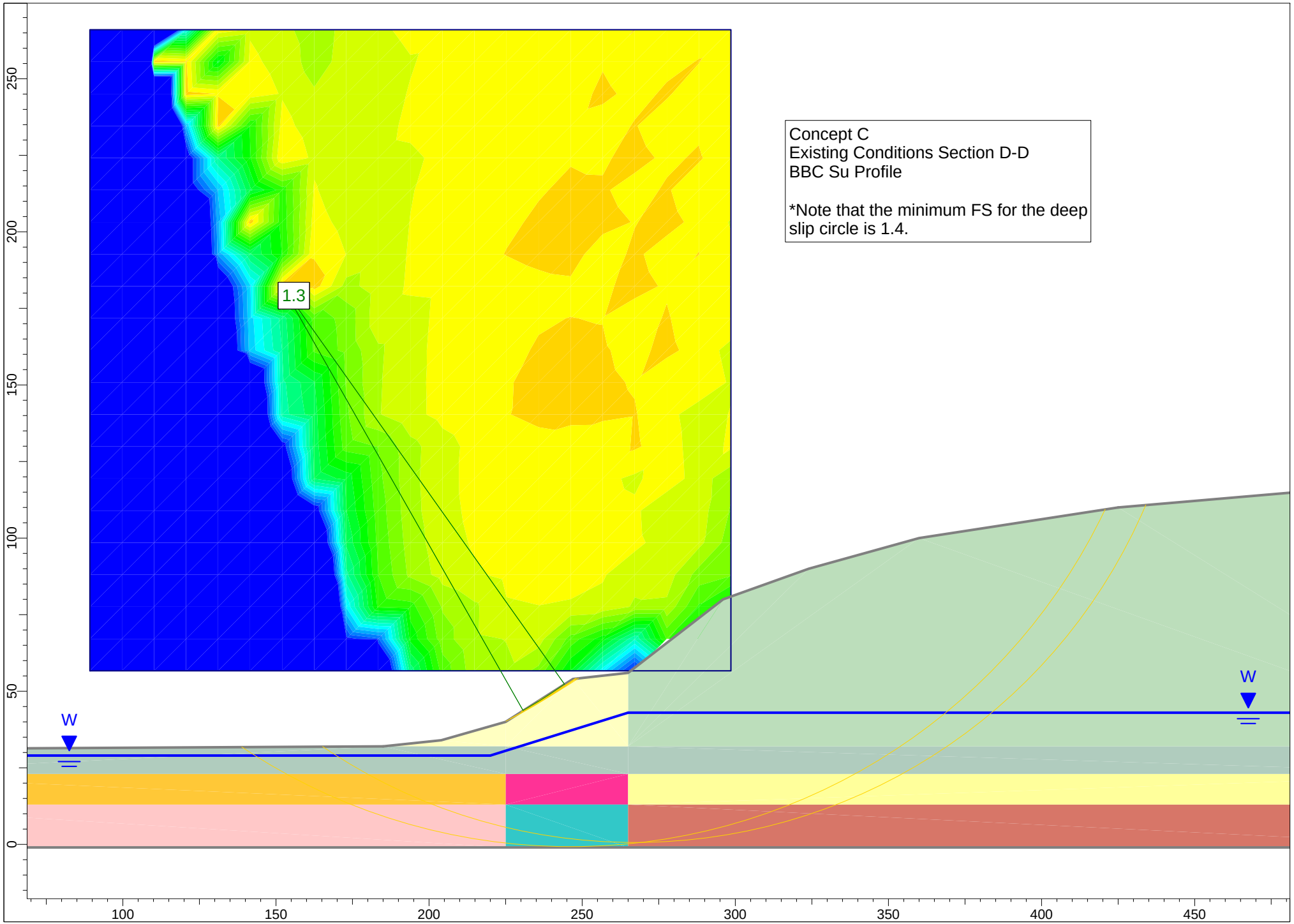
265.000	-7.000
265.000	13.000

External Boundary

0.000	-7.000
215.664	-7.000
265.000	-7.000
550.000	-7.000
550.000	13.000
550.000	17.000
550.000	30.000
550.000	116.000
550.000	118.000
495.000	118.000
435.000	110.000
385.000	100.000
340.000	90.000
310.000	80.000
285.000	70.000
265.000	60.000
245.000	50.000
225.000	40.000
207.000	32.000
190.000	30.000
45.000	30.000
0.000	31.000
0.000	17.000
0.000	13.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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*Note that the minimum FS for the deep slip circle is 1.4.
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Slide Analysis Information

Document Name

File Name: BBC_DD_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.319630

Center: 152.028, 182.245
Radius: 159.385
Left Slip Surface Endpoint: 230.735, 43.649
Right Slip Surface Endpoint: 244.245, 52.247
Resisting Moment=28686.2 lb-ft
Driving Moment=21738 lb-ft

Method: spencer
FS: 1.319530
Center: 152.028, 182.245
Radius: 159.385
Left Slip Surface Endpoint: 230.735, 43.649
Right Slip Surface Endpoint: 244.245, 52.247
Resisting Moment=28684 lb-ft
Driving Moment=21738 lb-ft
Resisting Horizontal Force=151.9 lb
Driving Horizontal Force=115.117 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2376
Number of Invalid Surfaces: 2475
Error Codes:
Error Code -103 reported for 2464 surfaces
Error Code -106 reported for 1 surface
Error Code -112 reported for 10 surfaces

Method: spencer
Number of Valid Surfaces: 2355
Number of Invalid Surfaces: 2496
Error Codes:
Error Code -103 reported for 2464 surfaces
Error Code -106 reported for 1 surface
Error Code -108 reported for 10 surfaces
Error Code -111 reported for 8 surfaces
Error Code -112 reported for 13 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched
slope model with two sets of Slope Limits.

-106 = Average slice width is less than
0.0001 * (maximum horizontal extent of soil region).
This limitation is imposed to avoid numerical errors
which may result from too many slices, or too
small a slip region.

-108 = Total driving moment

or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

89.231	56.651
298.555	56.651
298.555	265.975
89.231	265.975

Material Boundary

265.000	-1.000
265.000	13.000
265.000	23.000
265.000	32.000
265.000	56.000

Material Boundary

225.000	-1.000
225.000	13.000
225.000	23.000
225.000	32.000
225.000	40.000

Material Boundary

0.000	23.000
225.000	23.000
265.000	23.000
550.000	23.000

Material Boundary

0.000	13.000
225.000	13.000
265.000	13.000
550.000	13.000

Material Boundary

185.000	32.000
225.000	32.000
265.000	32.000
550.000	32.000

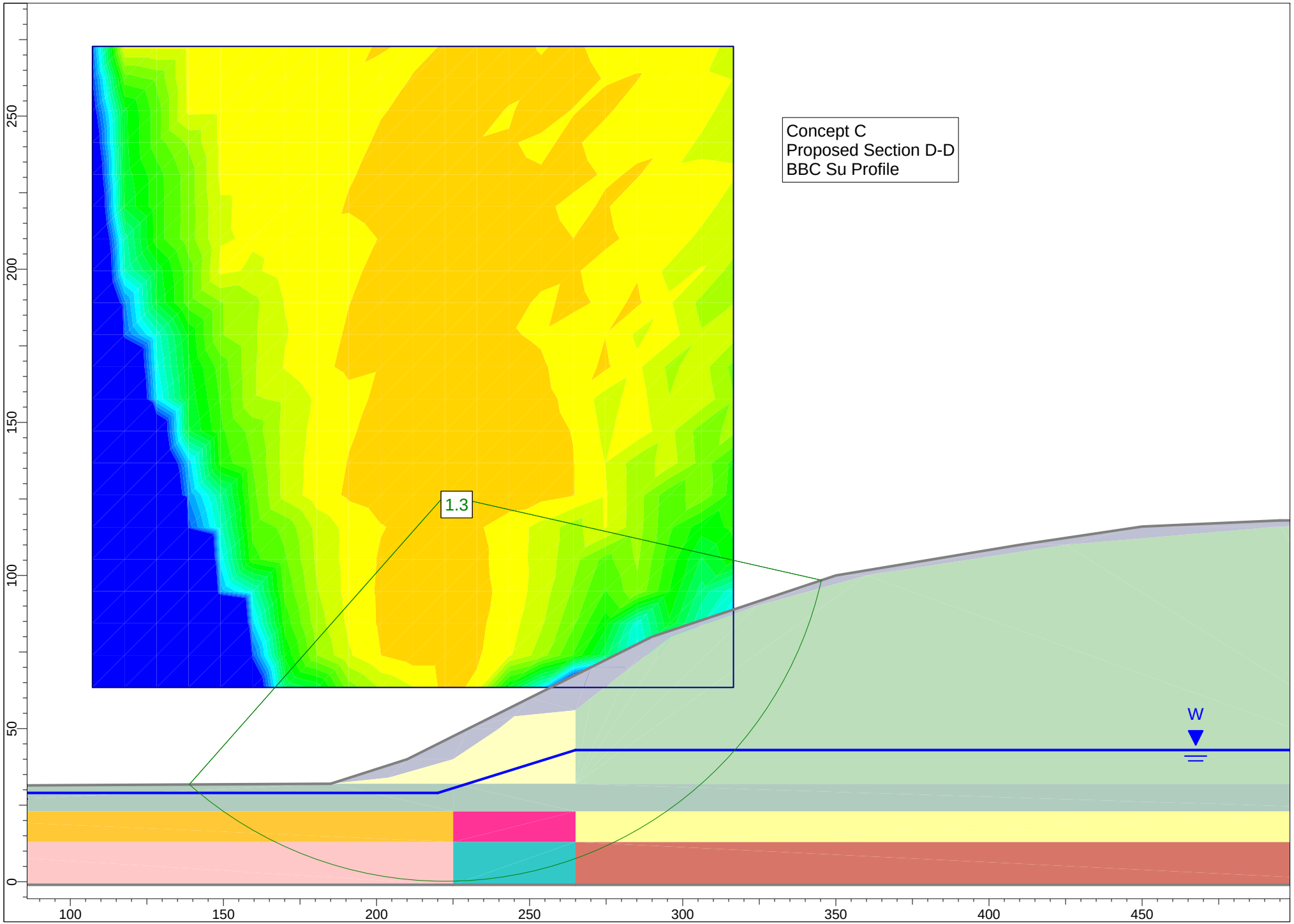
External Boundary

0.000	-1.000

225.000	-1.000
265.000	-1.000
550.000	-1.000
550.000	13.000
550.000	23.000
550.000	32.000
550.000	116.000
495.000	116.000
425.000	110.000
360.000	100.000
324.000	90.000
296.000	80.000
265.000	56.000
247.000	54.000
225.000	40.000
204.000	34.000
185.000	32.000
0.000	31.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: BBC_DD_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 848 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 820 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1075 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 906 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1181 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1284 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf

Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.335390
Center: 222.354, 126.246
Radius: 126.105
Left Slip Surface Endpoint: 138.849, 31.751
Right Slip Surface Endpoint: 345.359, 98.453
Resisting Moment=2.90511e+007 lb-ft
Driving Moment=2.17548e+007 lb-ft

Method: spencer
FS: 1.312790
Center: 222.354, 136.713
Radius: 133.850
Left Slip Surface Endpoint: 139.292, 31.753
Right Slip Surface Endpoint: 351.124, 100.187
Resisting Moment=3.06801e+007 lb-ft
Driving Moment=2.33701e+007 lb-ft
Resisting Horizontal Force=192854 lb
Driving Horizontal Force=146903 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2361
Number of Invalid Surfaces: 2490
Error Codes:
Error Code -103 reported for 2470 surfaces
Error Code -112 reported for 20 surfaces

Method: spencer
Number of Valid Surfaces: 2333
Number of Invalid Surfaces: 2518
Error Codes:
Error Code -103 reported for 2470 surfaces
Error Code -108 reported for 13 surfaces
Error Code -111 reported for 12 surfaces
Error Code -112 reported for 23 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.

-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.

List of All Coordinates

Search Grid

107.226	63.449
316.550	63.449
316.550	272.773
107.226	272.773

Material Boundary

185.000	32.000
204.000	34.000
225.000	40.000
240.000	50.000
245.000	54.000
265.000	56.000
270.000	60.000
283.000	70.000
296.000	80.000
324.000	90.000
360.000	100.000
425.000	110.000
495.000	116.000
550.000	116.000

Material Boundary

265.000	-1.000
265.000	13.000
265.000	23.000
265.000	32.000
265.000	56.000

Material Boundary

225.000	-1.000
225.000	13.000
225.000	23.000
225.000	32.000
225.000	40.000

Material Boundary

0.000	23.000
225.000	23.000
265.000	23.000

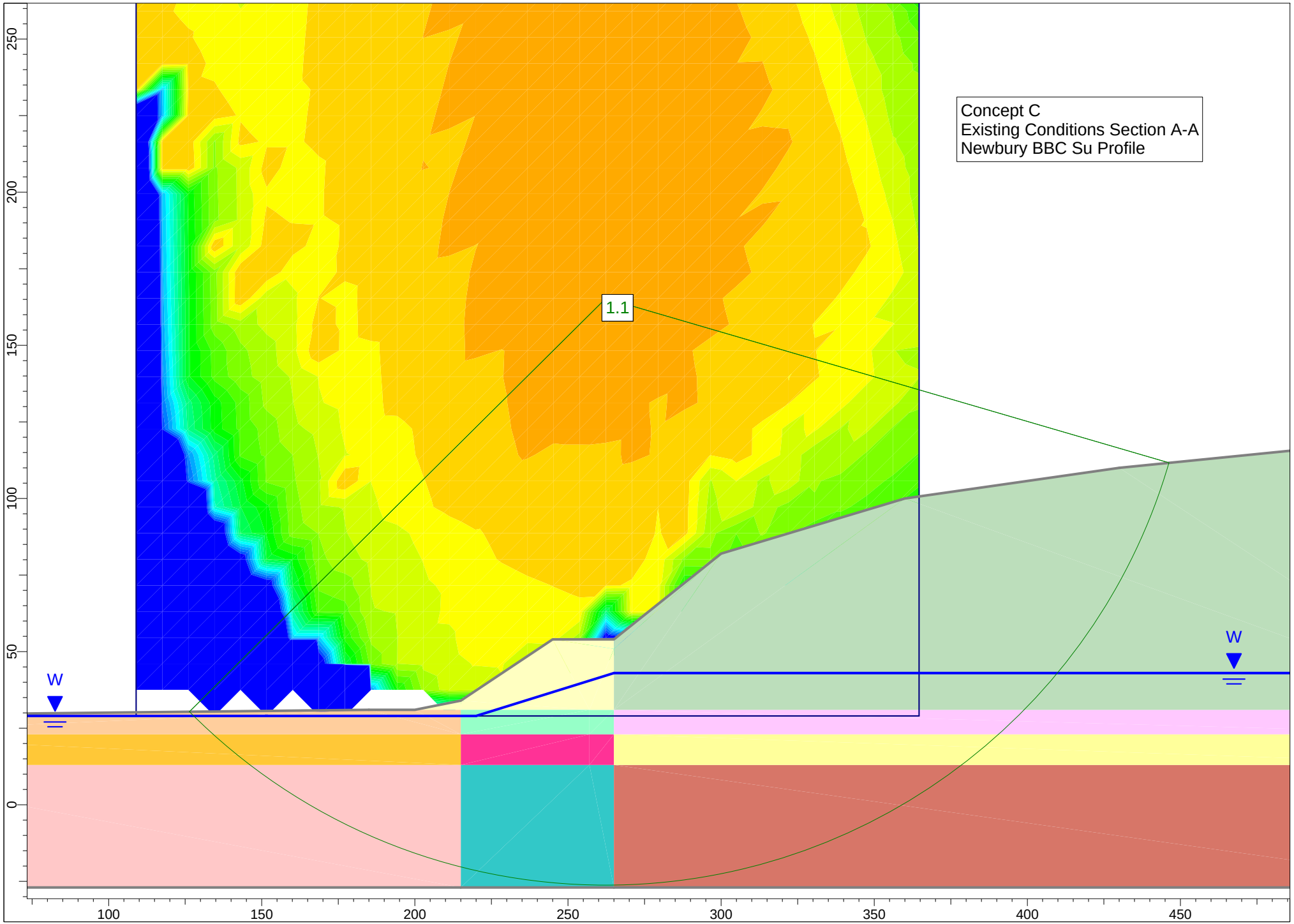
550.000 23.000

Material Boundary
0.000 13.000
225.000 13.000
265.000 13.000
550.000 13.000

Material Boundary
185.000 32.000
225.000 32.000
265.000 32.000
550.000 32.000

External Boundary
0.000 -1.000
225.000 -1.000
265.000 -1.000
550.000 -1.000
550.000 13.000
550.000 23.000
550.000 32.000
550.000 116.000
550.000 118.000
495.000 118.000
450.000 116.000
410.000 110.000
350.000 100.000
320.000 90.000
290.000 80.000
270.000 70.000
250.000 60.000
230.000 50.000
210.000 40.000
185.000 32.000
0.000 31.000
0.000 23.000
0.000 13.000

Water Table
0.000 29.000
220.000 29.000
265.000 43.000
550.000 43.000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Slide Analysis Information

Document Name

File Name: NBBC_AA_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 485 psf
Water Surface: None

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 902 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1119 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf

Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.129730
Center: 262.370, 165.347
Radius: 191.640
Left Slip Surface Endpoint: 126.333, 30.366
Right Slip Surface Endpoint: 446.329, 111.633
Resisting Moment=7.18029e+007 lb-ft
Driving Moment=6.35578e+007 lb-ft

Method: spencer
FS: 1.114110
Center: 270.892, 190.912
Radius: 216.702
Left Slip Surface Endpoint: 125.353, 30.355
Right Slip Surface Endpoint: 473.623, 114.362
Resisting Moment=8.74241e+007 lb-ft
Driving Moment=7.84697e+007 lb-ft
Resisting Horizontal Force=342333 lb
Driving Horizontal Force=307269 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6660
Number of Invalid Surfaces: 3911
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -112 reported for 289 surfaces

Method: spencer
Number of Valid Surfaces: 6421
Number of Invalid Surfaces: 4150
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -108 reported for 105 surfaces
Error Code -111 reported for 100 surfaces
Error Code -112 reported for 323 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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

0.000	13.000
215.000	13.000
257.000	13.000
265.000	13.000
550.000	13.000

Material Boundary

0.000	23.000
215.000	23.000
257.000	23.000
265.000	23.000
550.000	23.000

Material Boundary

200.000	31.000
215.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

265.000	-27.000
265.000	13.000
265.000	23.000
265.000	31.000
265.000	50.889
265.000	54.000

Material Boundary

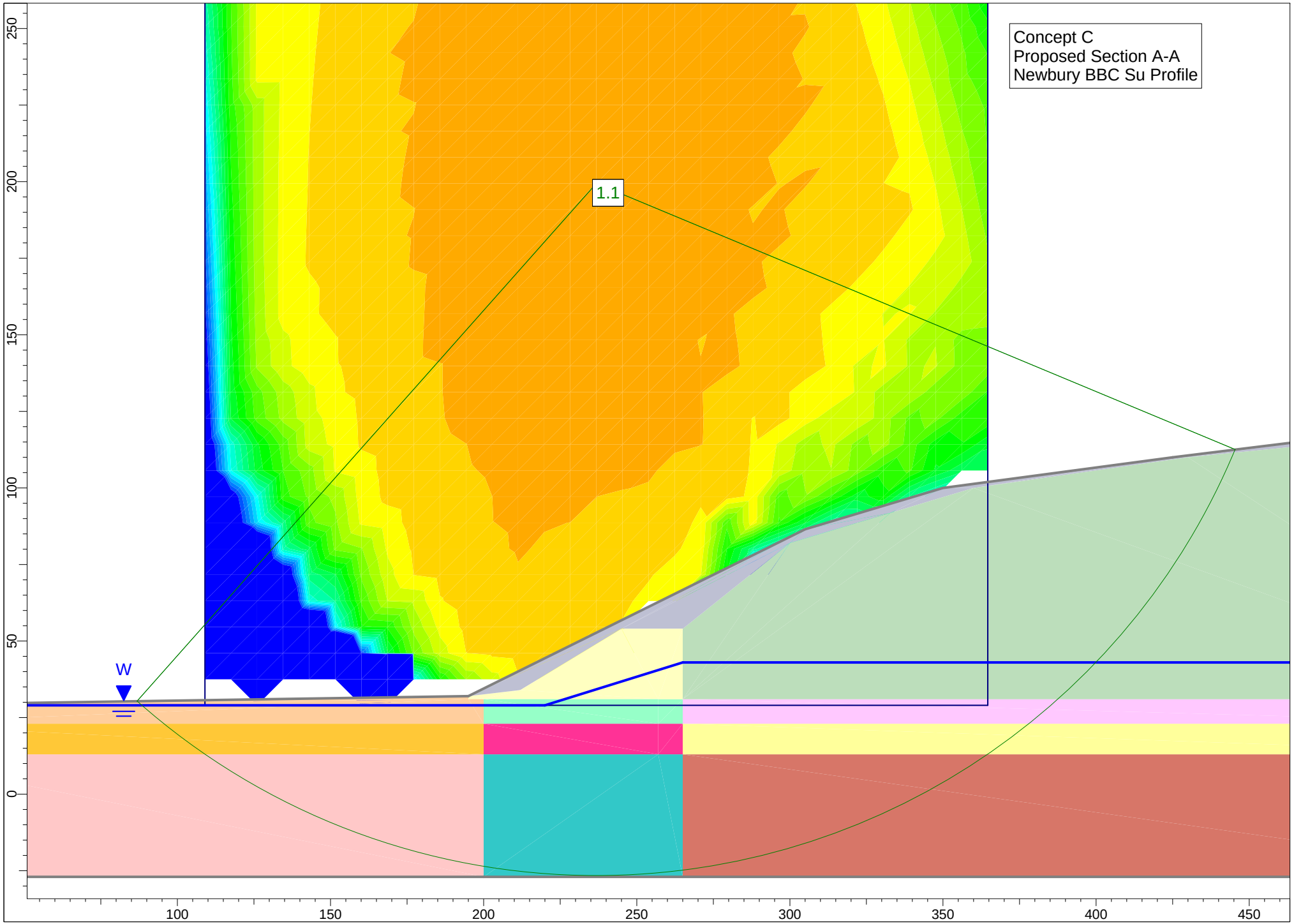
215.000	-27.000
215.000	13.000
215.000	23.000
215.000	31.000
215.000	34.000

External Boundary

0.000	-27.000
215.000	-27.000
265.000	-27.000
550.000	-27.000
550.000	13.000
550.000	23.000
550.000	31.000
550.000	116.000
490.000	116.000
430.000	110.000
360.000	100.000
300.000	82.000
265.000	54.000
245.000	54.000
215.000	34.000
200.000	31.000
185.000	31.000
0.000	29.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: NBBC_AA_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 485 psf
Water Surface: None

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 902 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3A
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1119 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf

Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.100500
Center: 236.805, 199.434
Radius: 226.041
Left Slip Surface Endpoint: 86.803, 30.335
Right Slip Surface Endpoint: 445.468, 112.519
Resisting Moment=9.03091e+007 lb-ft
Driving Moment=8.2062e+007 lb-ft

Method: spencer
FS: 1.087820
Center: 236.805, 199.434
Radius: 226.041
Left Slip Surface Endpoint: 86.803, 30.335
Right Slip Surface Endpoint: 445.468, 112.519
Resisting Moment=8.92686e+007 lb-ft
Driving Moment=8.2062e+007 lb-ft
Resisting Horizontal Force=335453 lb
Driving Horizontal Force=308372 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6629
Number of Invalid Surfaces: 3942
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -112 reported for 345 surfaces

Method: spencer
Number of Valid Surfaces: 6400
Number of Invalid Surfaces: 4171
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -108 reported for 105 surfaces
Error Code -111 reported for 101 surfaces
Error Code -112 reported for 368 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.

-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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

0.000	13.000
200.000	13.000
257.000	13.000
265.000	13.000
550.000	13.000

Material Boundary

0.000	23.000
200.000	23.000
257.000	23.000
265.000	23.000
550.000	23.000

Material Boundary

200.000	23.000
200.000	31.000

Material Boundary

200.000	-27.000
200.000	13.000

200.000 23.000

Material Boundary
200.000 31.000
257.000 31.000
265.000 31.000
550.000 31.000

Material Boundary
265.000 54.000
300.000 82.000
332.759 91.828
360.000 100.000
430.000 110.000
490.000 116.000
550.000 116.000

Material Boundary
265.000 -27.000
265.000 13.000
265.000 23.000
265.000 31.000
265.000 54.000

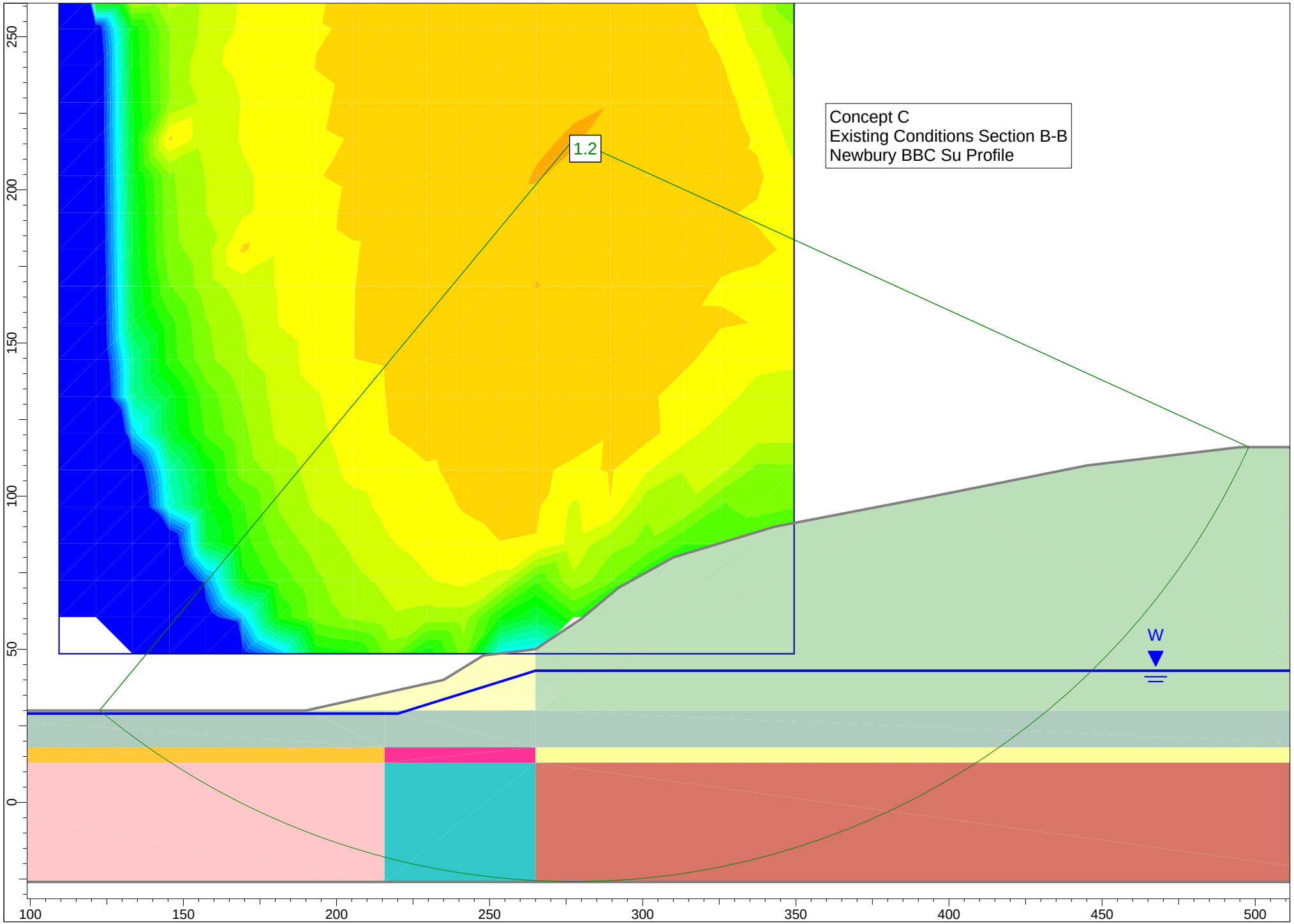
Material Boundary
195.000 32.000
195.000 31.000
200.000 31.000

Material Boundary
195.000 32.000
212.000 34.000
245.000 54.000
265.000 54.000

External Boundary
0.000 -27.000
200.000 -27.000
265.000 -27.000
550.000 -27.000
550.000 13.000
550.000 23.000
550.000 31.000
550.000 116.000
550.000 118.000
490.000 118.000
425.000 110.000
350.000 100.000
305.000 86.500
195.000 32.000
0.000 29.000
0.000 23.000
0.000 13.000

Water Table
0.000 29.000

220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: NBBC_BB_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.234000

Center: 277.414, 216.531
Radius: 242.400
Left Slip Surface Endpoint: 122.612, 30.000
Right Slip Surface Endpoint: 497.983, 116.000
Resisting Moment=1.11309e+008 lb-ft
Driving Moment=9.02021e+007 lb-ft

Method: spencer
FS: 1.220640
Center: 277.414, 216.531
Radius: 242.400
Left Slip Surface Endpoint: 122.612, 30.000
Right Slip Surface Endpoint: 497.983, 116.000
Resisting Moment=1.10104e+008 lb-ft
Driving Moment=9.02021e+007 lb-ft
Resisting Horizontal Force=389126 lb
Driving Horizontal Force=318789 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2896
Number of Invalid Surfaces: 1955
Error Codes:
Error Code -103 reported for 1559 surfaces
Error Code -107 reported for 67 surfaces
Error Code -108 reported for 250 surfaces
Error Code -112 reported for 79 surfaces

Method: spencer
Number of Valid Surfaces: 2801
Number of Invalid Surfaces: 2050
Error Codes:
Error Code -103 reported for 1559 surfaces
Error Code -107 reported for 67 surfaces
Error Code -108 reported for 301 surfaces
Error Code -111 reported for 20 surfaces
Error Code -112 reported for 103 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched
slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

0.000	18.000
215.664	18.000
265.000	18.000
550.000	18.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	-26.000
265.000	13.000
265.000	18.000
265.000	30.000
265.000	50.000

Material Boundary

215.664	-26.000
215.664	13.000
215.664	18.000
215.664	30.000
215.664	35.703

Material Boundary

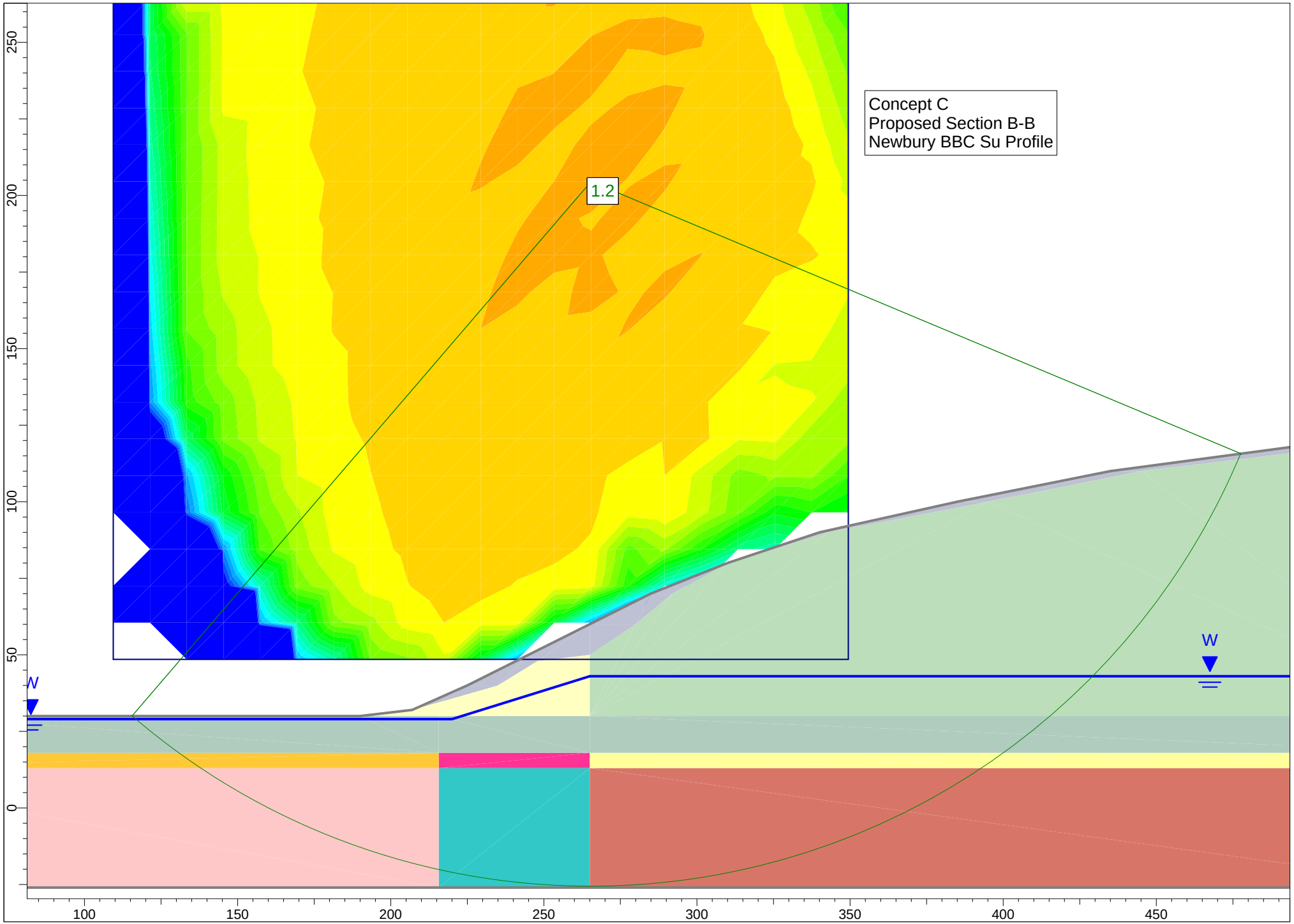
190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

External Boundary

0.000	-26.000
215.664	-26.000
265.000	-26.000
550.000	-26.000
550.000	13.000
550.000	18.000
550.000	30.000
550.000	116.000
495.000	116.000
445.000	110.000
395.000	100.000
343.000	90.000
310.000	80.000
292.000	70.000
280.000	60.000
265.000	50.000
248.000	48.000
235.000	40.000
215.664	35.703
190.000	30.000
45.000	30.000
0.000	31.000
0.000	18.000
0.000	13.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: NBBC_BB_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf

Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.195870
Center: 265.412, 204.530
Radius: 230.075
Left Slip Surface Endpoint: 115.499, 30.000
Right Slip Surface Endpoint: 477.641, 115.685
Resisting Moment=1.01125e+008 lb-ft
Driving Moment=8.45621e+007 lb-ft

Method: spencer
FS: 1.180990
Center: 265.412, 204.530
Radius: 230.075
Left Slip Surface Endpoint: 115.499, 30.000
Right Slip Surface Endpoint: 477.641, 115.685
Resisting Moment=9.9867e+007 lb-ft
Driving Moment=8.45621e+007 lb-ft
Resisting Horizontal Force=368840 lb
Driving Horizontal Force=312314 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2879
Number of Invalid Surfaces: 1972
Error Codes:
Error Code -103 reported for 1541 surfaces
Error Code -107 reported for 82 surfaces
Error Code -108 reported for 247 surfaces
Error Code -112 reported for 102 surfaces

Method: spencer
Number of Valid Surfaces: 2767
Number of Invalid Surfaces: 2084
Error Codes:
Error Code -103 reported for 1541 surfaces
Error Code -107 reported for 82 surfaces
Error Code -108 reported for 311 surfaces
Error Code -111 reported for 23 surfaces
Error Code -112 reported for 127 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched

slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

0.000	18.000
215.664	18.000
265.000	18.000
550.000	18.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	-26.000
265.000	13.000
265.000	18.000
265.000	30.000
265.000	50.000
265.000	60.000

Material Boundary

190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

Material Boundary

207.000	32.000
215.664	34.475
235.000	40.000
248.000	48.000
265.000	50.000
280.000	60.000
292.000	70.000
310.000	80.000
343.000	90.000
395.000	100.000
445.000	110.000
495.000	116.000
550.000	116.000

Material Boundary

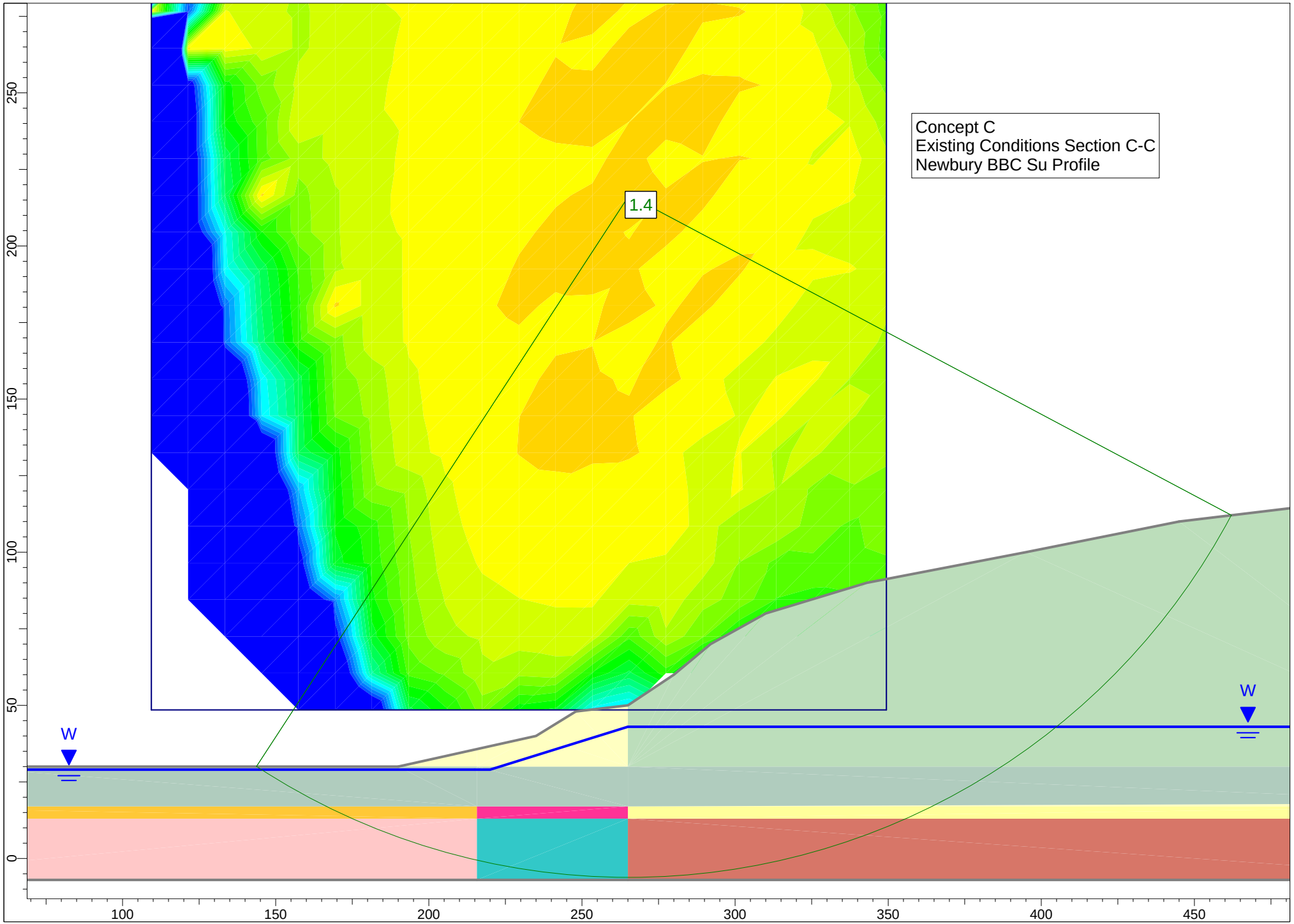
215.664	-26.000
215.664	13.000
215.664	18.000
215.664	30.000
215.664	34.475

External Boundary

0.000	-26.000
215.664	-26.000
265.000	-26.000
550.000	-26.000
550.000	13.000
550.000	18.000
550.000	30.000
550.000	116.000
550.000	118.000
495.000	118.000
435.000	110.000
385.000	100.000
340.000	90.000
310.000	80.000
285.000	70.000
265.000	60.000
245.000	50.000
225.000	40.000
207.000	32.000
190.000	30.000
45.000	30.000
0.000	31.000
0.000	18.000
0.000	13.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: NBBC_CC_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.397250

Center: 265.412, 216.531
Radius: 222.725
Left Slip Surface Endpoint: 143.705, 30.000
Right Slip Surface Endpoint: 462.112, 112.053
Resisting Moment=8.51469e+007 lb-ft
Driving Moment=6.09391e+007 lb-ft

Method: spencer
FS: 1.372300
Center: 265.412, 216.531
Radius: 222.725
Left Slip Surface Endpoint: 143.705, 30.000
Right Slip Surface Endpoint: 462.112, 112.053
Resisting Moment=8.36267e+007 lb-ft
Driving Moment=6.09391e+007 lb-ft
Resisting Horizontal Force=329635 lb
Driving Horizontal Force=240207 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2278
Number of Invalid Surfaces: 2573
Error Codes:
Error Code -103 reported for 2231 surfaces
Error Code -107 reported for 56 surfaces
Error Code -108 reported for 251 surfaces
Error Code -112 reported for 35 surfaces

Method: spencer
Number of Valid Surfaces: 2223
Number of Invalid Surfaces: 2628
Error Codes:
Error Code -103 reported for 2231 surfaces
Error Code -107 reported for 56 surfaces
Error Code -108 reported for 287 surfaces
Error Code -111 reported for 14 surfaces
Error Code -112 reported for 40 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched
slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

265.000	17.000
550.000	18.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	-7.000
265.000	13.000
265.000	17.000
265.000	30.000
265.000	50.000

Material Boundary

215.664	-7.000
215.664	13.000
215.664	17.000
215.664	30.000
215.664	35.703

Material Boundary

190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

Material Boundary

0.000	17.000
215.664	17.000

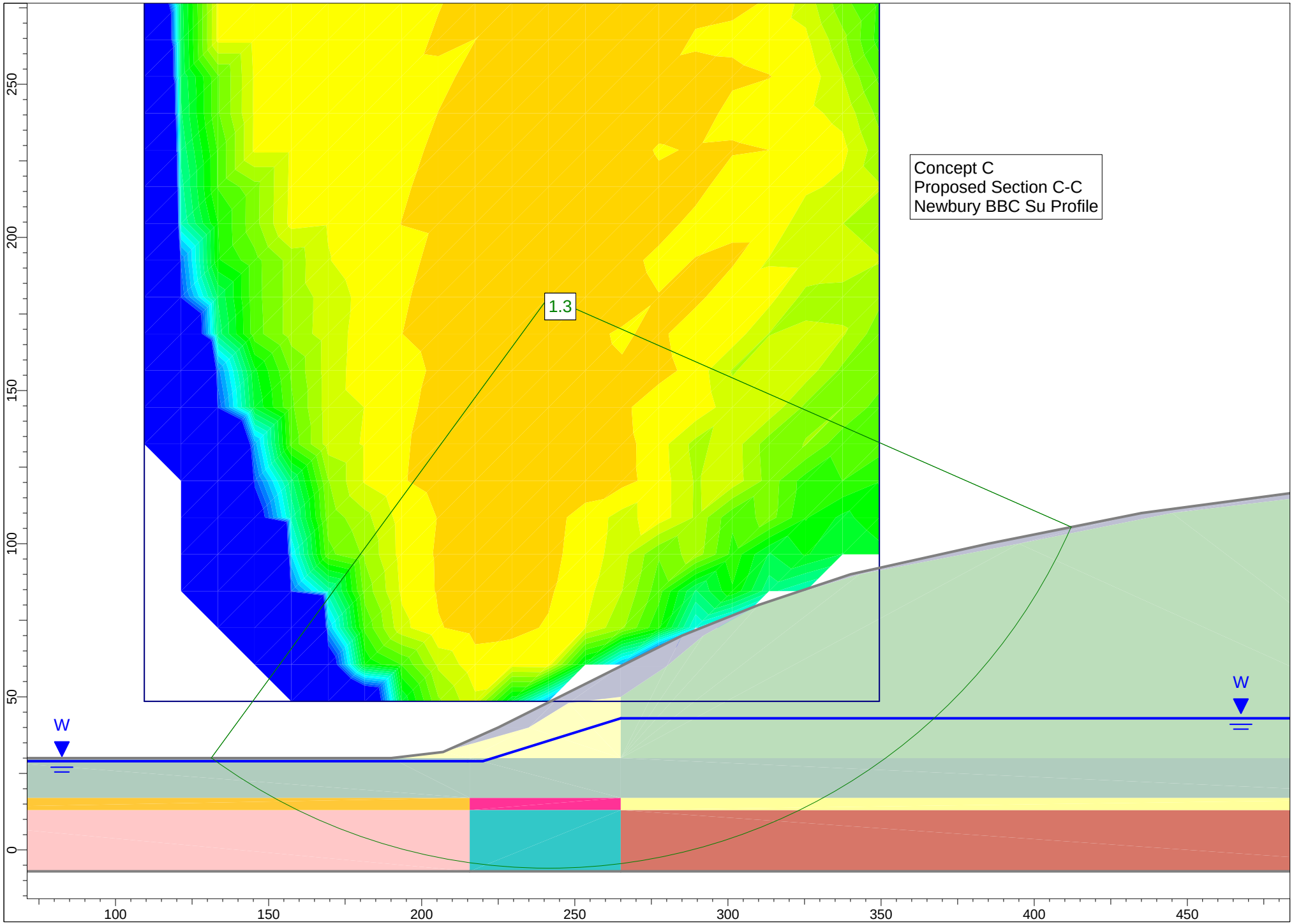
265.000	17.000
550.000	17.000

External Boundary

215.664	-7.000
265.000	-7.000
550.000	-7.000
550.000	13.000
550.000	17.000
550.000	18.000
550.000	30.000
550.000	116.000
495.000	116.000
445.000	110.000
395.000	100.000
343.000	90.000
310.000	80.000
292.000	70.000
280.000	60.000
265.000	50.000
248.000	48.000
235.000	40.000
215.664	35.703
190.000	30.000
45.000	30.000
0.000	31.000
0.000	17.000
0.000	13.000
0.000	-7.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000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Slide Analysis Information

Document Name

File Name: NBBC_CC_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf

Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.338750
Center: 241.409, 180.527
Radius: 186.524
Left Slip Surface Endpoint: 131.259, 30.000
Right Slip Surface Endpoint: 412.147, 105.429
Resisting Moment=5.9034e+007 lb-ft
Driving Moment=4.40964e+007 lb-ft

Method: spencer
FS: 1.319920
Center: 241.409, 180.527
Radius: 186.524
Left Slip Surface Endpoint: 131.259, 30.000
Right Slip Surface Endpoint: 412.147, 105.429
Resisting Moment=5.82036e+007 lb-ft
Driving Moment=4.40964e+007 lb-ft
Resisting Horizontal Force=267915 lb
Driving Horizontal Force=202978 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2265
Number of Invalid Surfaces: 2586
Error Codes:
Error Code -103 reported for 2214 surfaces
Error Code -107 reported for 70 surfaces
Error Code -108 reported for 248 surfaces
Error Code -112 reported for 54 surfaces

Method: spencer
Number of Valid Surfaces: 2201
Number of Invalid Surfaces: 2650
Error Codes:
Error Code -103 reported for 2214 surfaces
Error Code -107 reported for 70 surfaces
Error Code -108 reported for 292 surfaces
Error Code -111 reported for 12 surfaces
Error Code -112 reported for 62 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections,
but one or more surface / nonslope external polygon
intersections lie between them. This usually occurs
when the slip surface extends past the bottom of the
soil region, but may also occur on a benched

slope model with two sets of Slope Limits.

-107 = Total driving moment or
total driving force is negative. This will occur
if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

-108 = Total driving moment
or total driving force < 0.1. This is to
limit the calculation of extremely high safety
factors if the driving force is very small
(0.1 is an arbitrary number).

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

109.391	48.509
349.423	48.509
349.423	288.541
109.391	288.541

Material Boundary

0.000	17.000
215.664	17.000
265.000	17.000
550.000	17.000

Material Boundary

0.000	13.000
215.664	13.000
265.000	13.000
550.000	13.000

Material Boundary

265.000	13.000
265.000	17.000
265.000	30.000
265.000	50.000
265.000	60.000

Material Boundary

190.000	30.000
215.664	30.000
265.000	30.000
550.000	30.000

Material Boundary

207.000	32.000
215.664	34.475
235.000	40.000
248.000	48.000
265.000	50.000
280.000	60.000
292.000	70.000
310.000	80.000
343.000	90.000
395.000	100.000
445.000	110.000
495.000	116.000
550.000	116.000

Material Boundary

215.664	13.000
215.664	17.000
215.664	30.000
215.664	34.475

Material Boundary

215.664	-7.000
215.664	13.000

Material Boundary

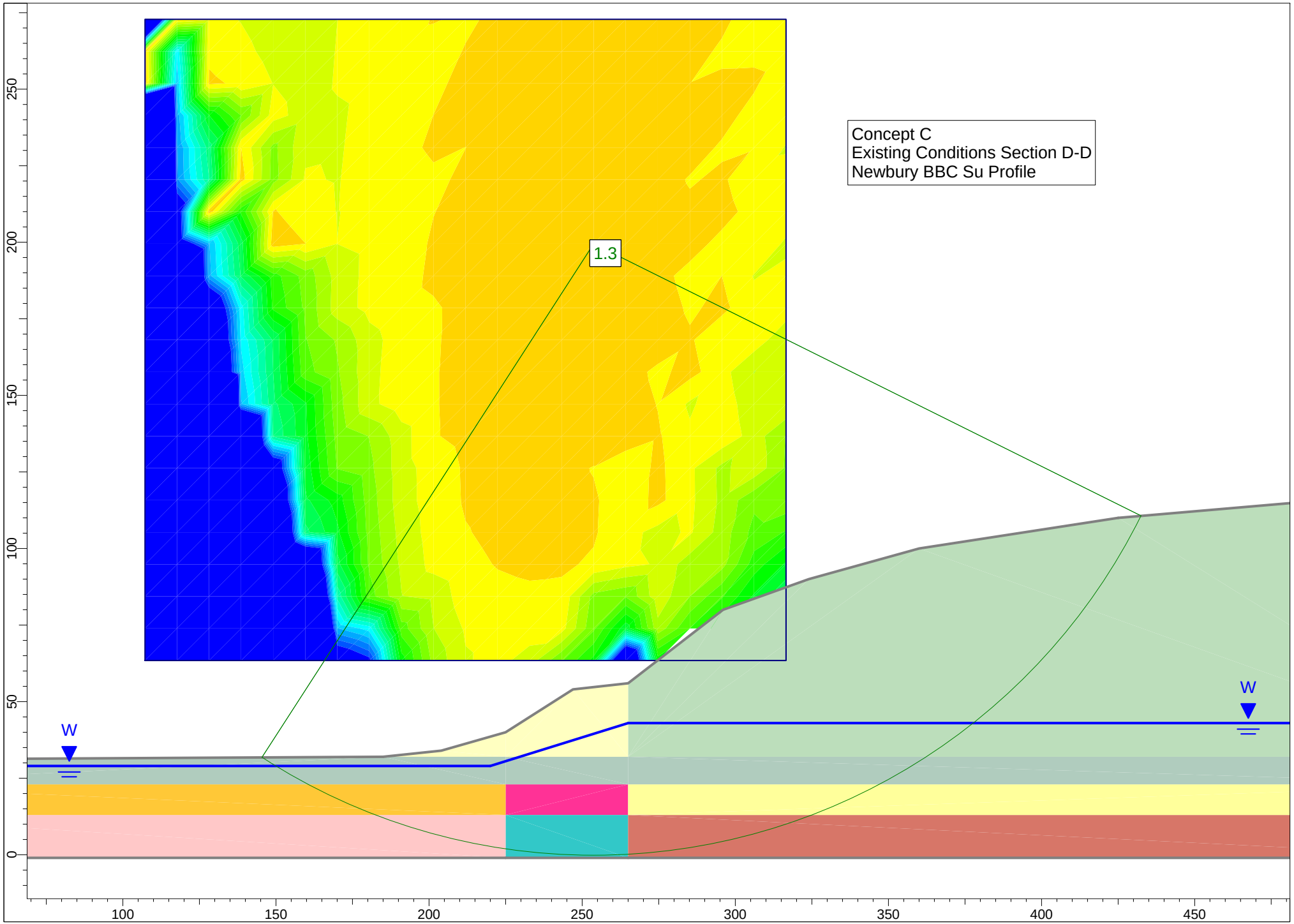
265.000	-7.000
265.000	13.000

External Boundary

0.000	-7.000
215.664	-7.000
265.000	-7.000
550.000	-7.000
550.000	13.000
550.000	17.000
550.000	30.000
550.000	116.000
550.000	118.000
495.000	118.000
435.000	110.000
385.000	100.000
340.000	90.000
310.000	80.000
285.000	70.000
265.000	60.000
245.000	50.000
225.000	40.000
207.000	32.000
190.000	30.000
45.000	30.000
0.000	31.000
0.000	17.000
0.000	13.000

Water Table

0.000	29.000
215.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000


Concept C
Existing Conditions Section D-D
Newbury BBC Su Profile
1.3
W
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0
50
100
150
200
250
100
150
200
250
300
350
400
450

Slide Analysis Information

Document Name

File Name: NBBC_DD_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.317820

Center: 107.226, 251.841
Radius: 241.962
Left Slip Surface Endpoint: 235.203, 46.493
Right Slip Surface Endpoint: 239.046, 48.938
Resisting Moment=659.483 lb-ft
Driving Moment=500.436 lb-ft

Method: spencer
FS: 1.309020
Center: 253.753, 199.510
Radius: 199.676
Left Slip Surface Endpoint: 145.406, 31.786
Right Slip Surface Endpoint: 432.566, 110.649
Resisting Moment=6.49914e+007 lb-ft
Driving Moment=4.96491e+007 lb-ft
Resisting Horizontal Force=283930 lb
Driving Horizontal Force=216904 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2321
Number of Invalid Surfaces: 2530
Error Codes:
Error Code -103 reported for 2517 surfaces
Error Code -112 reported for 13 surfaces

Method: spencer
Number of Valid Surfaces: 2298
Number of Invalid Surfaces: 2553
Error Codes:
Error Code -103 reported for 2517 surfaces
Error Code -108 reported for 9 surfaces
Error Code -111 reported for 10 surfaces
Error Code -112 reported for 17 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.

-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.

List of All Coordinates

Search Grid

107.226	63.449
316.550	63.449
316.550	272.773
107.226	272.773

Material Boundary

265.000	-1.000
265.000	13.000
265.000	23.000
265.000	32.000
265.000	56.000

Material Boundary

225.000	-1.000
225.000	13.000
225.000	23.000
225.000	32.000
225.000	40.000

Material Boundary

0.000	23.000
225.000	23.000
265.000	23.000
550.000	23.000

Material Boundary

0.000	13.000
225.000	13.000
265.000	13.000
550.000	13.000

Material Boundary

185.000	32.000
225.000	32.000
265.000	32.000
550.000	32.000

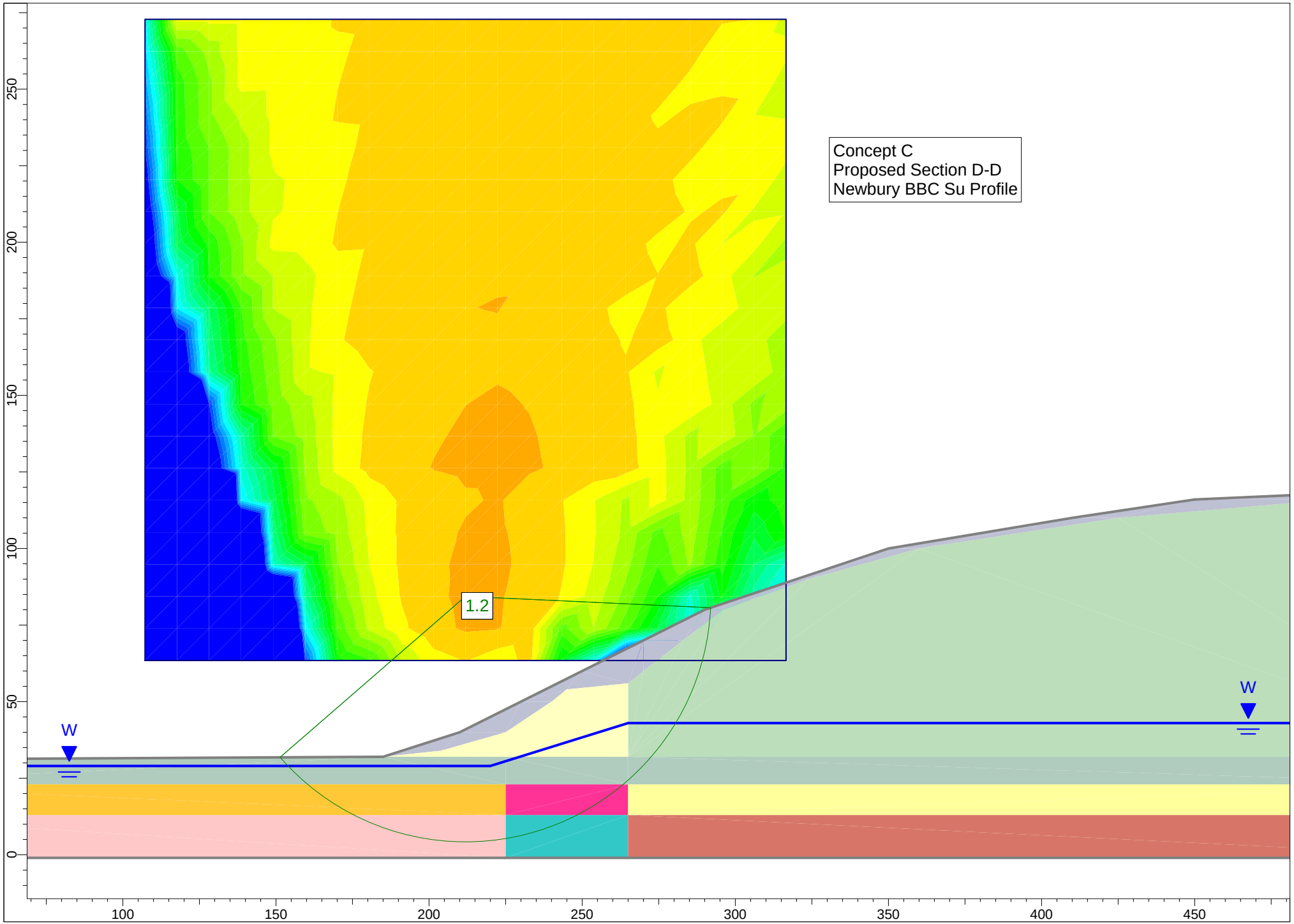
External Boundary

0.000	-1.000
225.000	-1.000
265.000	-1.000
550.000	-1.000
550.000	13.000
550.000	23.000
550.000	32.000
550.000	116.000
495.000	116.000

425.000	110.000
360.000	100.000
324.000	90.000
296.000	80.000
265.000	56.000
247.000	54.000
225.000	40.000
204.000	34.000
185.000	32.000
0.000	31.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000


Concept C
Proposed Section D-D
Newbury BBC Su Profile
1.2
W
W
0
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100
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200
250
100
150
200
250
300
350
400
450

Slide Analysis Information

Document Name

File Name: NBBC_DD_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Zone 1B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 587 psf
Water Surface: None

Material: Clay Zone 1C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 687 psf
Water Surface: None

Material: Clay Zone 2B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 910 psf
Water Surface: None

Material: Clay Zone 2C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 861 psf
Water Surface: None

Material: Clay Zone 3B
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1086 psf
Water Surface: None

Material: Clay Zone 3C
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1220 psf
Water Surface: None

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf

Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.205630
Center: 211.888, 84.382
Radius: 80.173
Left Slip Surface Endpoint: 151.351, 31.818
Right Slip Surface Endpoint: 291.975, 80.658
Resisting Moment=1.06793e+007 lb-ft
Driving Moment=8.85785e+006 lb-ft

Method: spencer
FS: 1.205960
Center: 222.354, 126.246
Radius: 126.105
Left Slip Surface Endpoint: 138.849, 31.751
Right Slip Surface Endpoint: 345.359, 98.453
Resisting Moment=2.62353e+007 lb-ft
Driving Moment=2.17548e+007 lb-ft
Resisting Horizontal Force=170988 lb
Driving Horizontal Force=141786 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2359
Number of Invalid Surfaces: 2492
Error Codes:
Error Code -103 reported for 2470 surfaces
Error Code -112 reported for 22 surfaces

Method: spencer
Number of Valid Surfaces: 2330
Number of Invalid Surfaces: 2521
Error Codes:
Error Code -103 reported for 2470 surfaces
Error Code -108 reported for 13 surfaces
Error Code -111 reported for 13 surfaces
Error Code -112 reported for 25 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.

-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.

List of All Coordinates

Search Grid

107.226	63.449
316.550	63.449
316.550	272.773
107.226	272.773

Material Boundary

185.000	32.000
204.000	34.000
225.000	40.000
240.000	50.000
245.000	54.000
265.000	56.000
270.000	60.000
283.000	70.000
296.000	80.000
324.000	90.000
360.000	100.000
425.000	110.000
495.000	116.000
550.000	116.000

Material Boundary

265.000	-1.000
265.000	13.000
265.000	23.000
265.000	32.000
265.000	56.000

Material Boundary

225.000	-1.000
225.000	13.000
225.000	23.000
225.000	32.000
225.000	40.000

Material Boundary

0.000	23.000
225.000	23.000
265.000	23.000

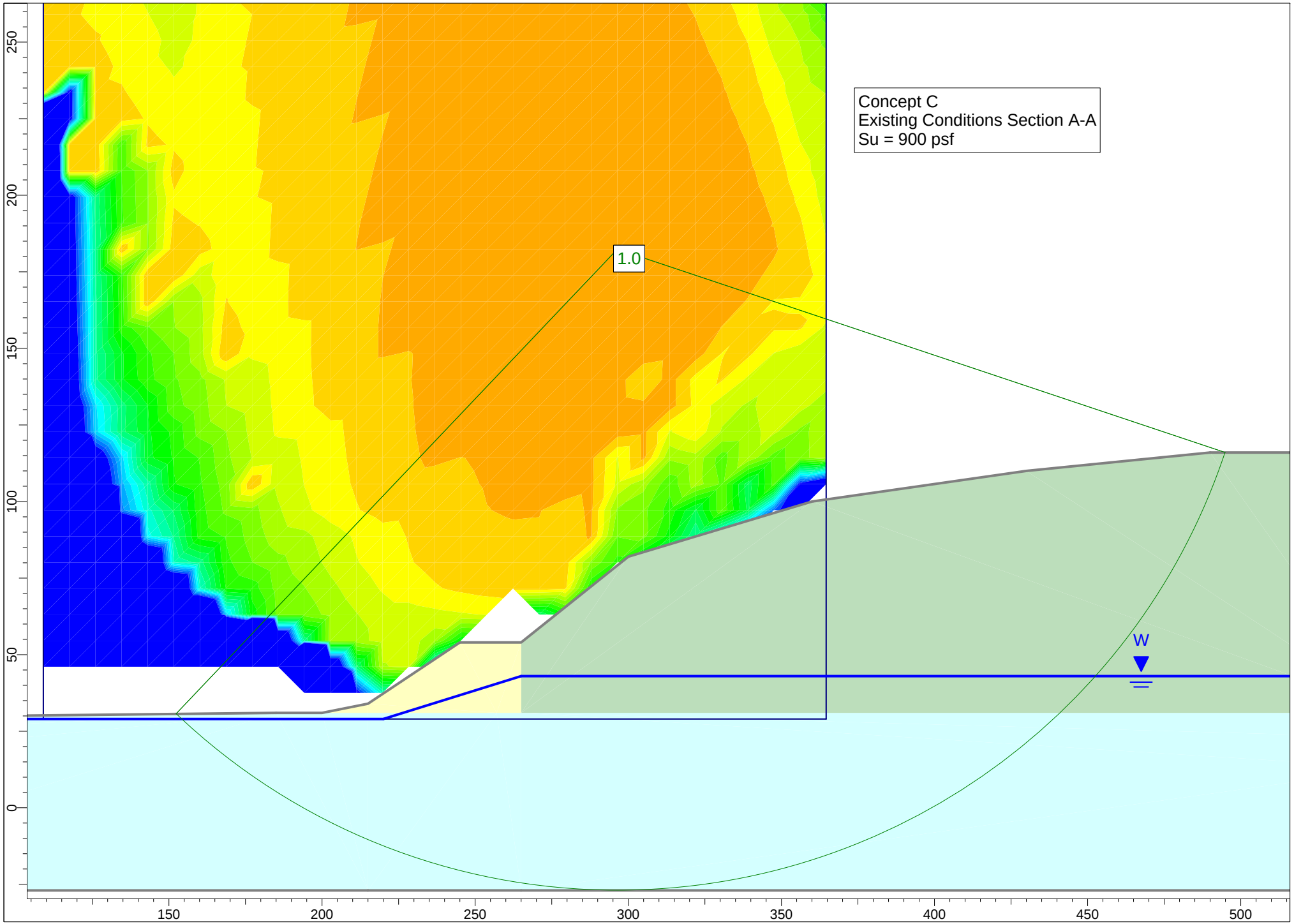
550.000 23.000

Material Boundary
0.000 13.000
225.000 13.000
265.000 13.000
550.000 13.000

Material Boundary
185.000 32.000
225.000 32.000
265.000 32.000
550.000 32.000

External Boundary
0.000 -1.000
225.000 -1.000
265.000 -1.000
550.000 -1.000
550.000 13.000
550.000 23.000
550.000 32.000
550.000 116.000
550.000 118.000
495.000 118.000
450.000 116.000
410.000 110.000
350.000 100.000
320.000 90.000
290.000 80.000
270.000 70.000
250.000 60.000
230.000 50.000
210.000 40.000
185.000 32.000
0.000 31.000
0.000 23.000
0.000 13.000

Water Table
0.000 29.000
220.000 29.000
265.000 43.000
550.000 43.000


Concept C
Existing Conditions Section A-A
Su = 900 psf
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W
250
200
150
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0
150
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350
400
450
500

Slide Analysis Information

Document Name

File Name: 900_AA_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay 900psf
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 900 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.052840
Center: 296.457, 182.391
Radius: 209.318
Left Slip Surface Endpoint: 152.277, 30.646
Right Slip Surface Endpoint: 494.967, 116.000
Resisting Moment=8.04262e+007 lb-ft
Driving Moment=7.63897e+007 lb-ft

Method: spencer
FS: 1.039610
Center: 296.457, 182.391
Radius: 209.318
Left Slip Surface Endpoint: 152.277, 30.646
Right Slip Surface Endpoint: 494.967, 116.000
Resisting Moment=7.94154e+007 lb-ft
Driving Moment=7.63897e+007 lb-ft
Resisting Horizontal Force=315233 lb
Driving Horizontal Force=303223 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6642
Number of Invalid Surfaces: 3929
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -112 reported for 307 surfaces

Method: spencer
Number of Valid Surfaces: 6359
Number of Invalid Surfaces: 4212
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -108 reported for 143 surfaces
Error Code -111 reported for 106 surfaces
Error Code -112 reported for 341 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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

200.000	31.000
215.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

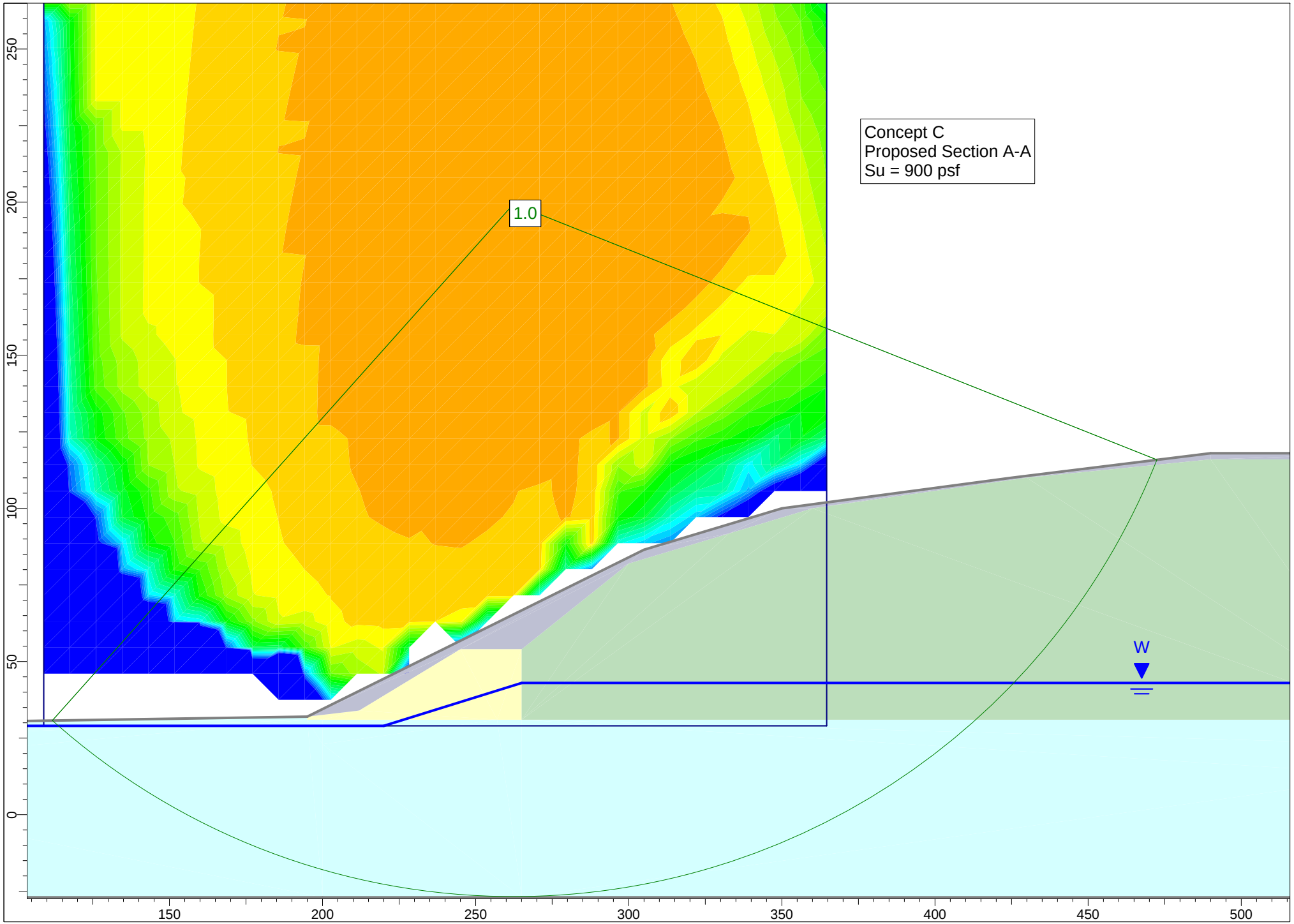
265.000	31.000
265.000	54.000

External Boundary

0.000	-27.000
215.000	-27.000
265.000	-27.000
550.000	-27.000
550.000	13.000
550.000	23.000
550.000	31.000
550.000	116.000
490.000	116.000
430.000	110.000
360.000	100.000
300.000	82.000
265.000	54.000
245.000	54.000
215.000	34.000
200.000	31.000
185.000	31.000
0.000	29.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000


Concept C
Proposed Section A-A
Su = 900 psf
1.0
W
250
200
150
100
50
0
150
200
250
300
350
400
450
500

Slide Analysis Information

Document Name

File Name: 900_AA_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay 900psf
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 900 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.055090
Center: 262.370, 199.434
Radius: 226.189
Left Slip Surface Endpoint: 111.716, 30.719
Right Slip Surface Endpoint: 472.550, 115.852
Resisting Moment=9.03587e+007 lb-ft
Driving Moment=8.56407e+007 lb-ft

Method: spencer
FS: 1.043560
Center: 262.370, 199.434
Radius: 226.189
Left Slip Surface Endpoint: 111.716, 30.719
Right Slip Surface Endpoint: 472.550, 115.852
Resisting Moment=8.93709e+007 lb-ft
Driving Moment=8.56407e+007 lb-ft
Resisting Horizontal Force=332833 lb
Driving Horizontal Force=318941 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6625
Number of Invalid Surfaces: 3946
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -112 reported for 349 surfaces

Method: spencer
Number of Valid Surfaces: 6341
Number of Invalid Surfaces: 4230
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -108 reported for 150 surfaces
Error Code -111 reported for 101 surfaces
Error Code -112 reported for 382 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.

-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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

200.000	23.000
200.000	31.000

Material Boundary

200.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

265.000	54.000
300.000	82.000
332.759	91.828
360.000	100.000
430.000	110.000
490.000	116.000
550.000	116.000

Material Boundary

195.000	32.000
195.000	31.000

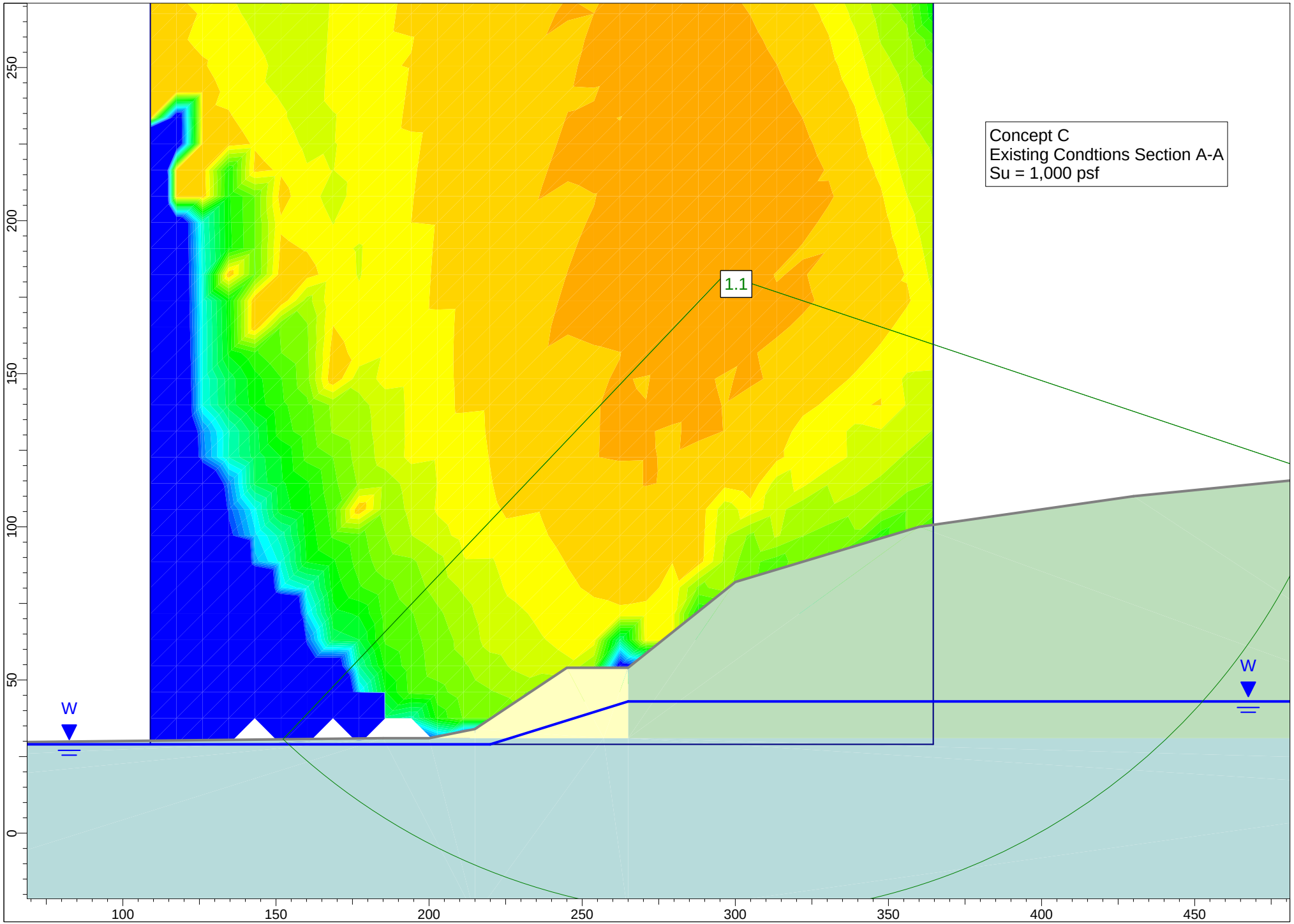
200.000 31.000

Material Boundary
195.000 32.000
212.000 34.000
245.000 54.000
265.000 54.000

Material Boundary
265.000 31.000
265.000 54.000

External Boundary
0.000 -27.000
200.000 -27.000
265.000 -27.000
550.000 -27.000
550.000 13.000
550.000 23.000
550.000 31.000
550.000 116.000
550.000 118.000
490.000 118.000
425.000 110.000
350.000 100.000
305.000 86.500
195.000 32.000
0.000 29.000
0.000 23.000
0.000 13.000

Water Table
0.000 29.000
220.000 29.000
265.000 43.000
550.000 43.000


Concept C
Existing Condtions Section A-A
Su = 1,000 psf
1.1
W
W
250
200
150
100
50
0
100
150
200
250
300
350
400
450

Slide Analysis Information

Document Name

File Name: 1000_AA_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay 1000psf
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1000 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.149280
Center: 296.457, 182.391
Radius: 209.318
Left Slip Surface Endpoint: 152.277, 30.646
Right Slip Surface Endpoint: 494.967, 116.000
Resisting Moment=8.77932e+007 lb-ft
Driving Moment=7.63897e+007 lb-ft

Method: spencer
FS: 1.133570
Center: 296.457, 182.391
Radius: 209.318
Left Slip Surface Endpoint: 152.277, 30.646
Right Slip Surface Endpoint: 494.967, 116.000
Resisting Moment=8.65927e+007 lb-ft
Driving Moment=7.63897e+007 lb-ft
Resisting Horizontal Force=345525 lb
Driving Horizontal Force=304813 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6656
Number of Invalid Surfaces: 3915
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -112 reported for 293 surfaces

Method: spencer
Number of Valid Surfaces: 6375
Number of Invalid Surfaces: 4196
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -108 reported for 142 surfaces
Error Code -111 reported for 104 surfaces
Error Code -112 reported for 328 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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

200.000	31.000
215.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

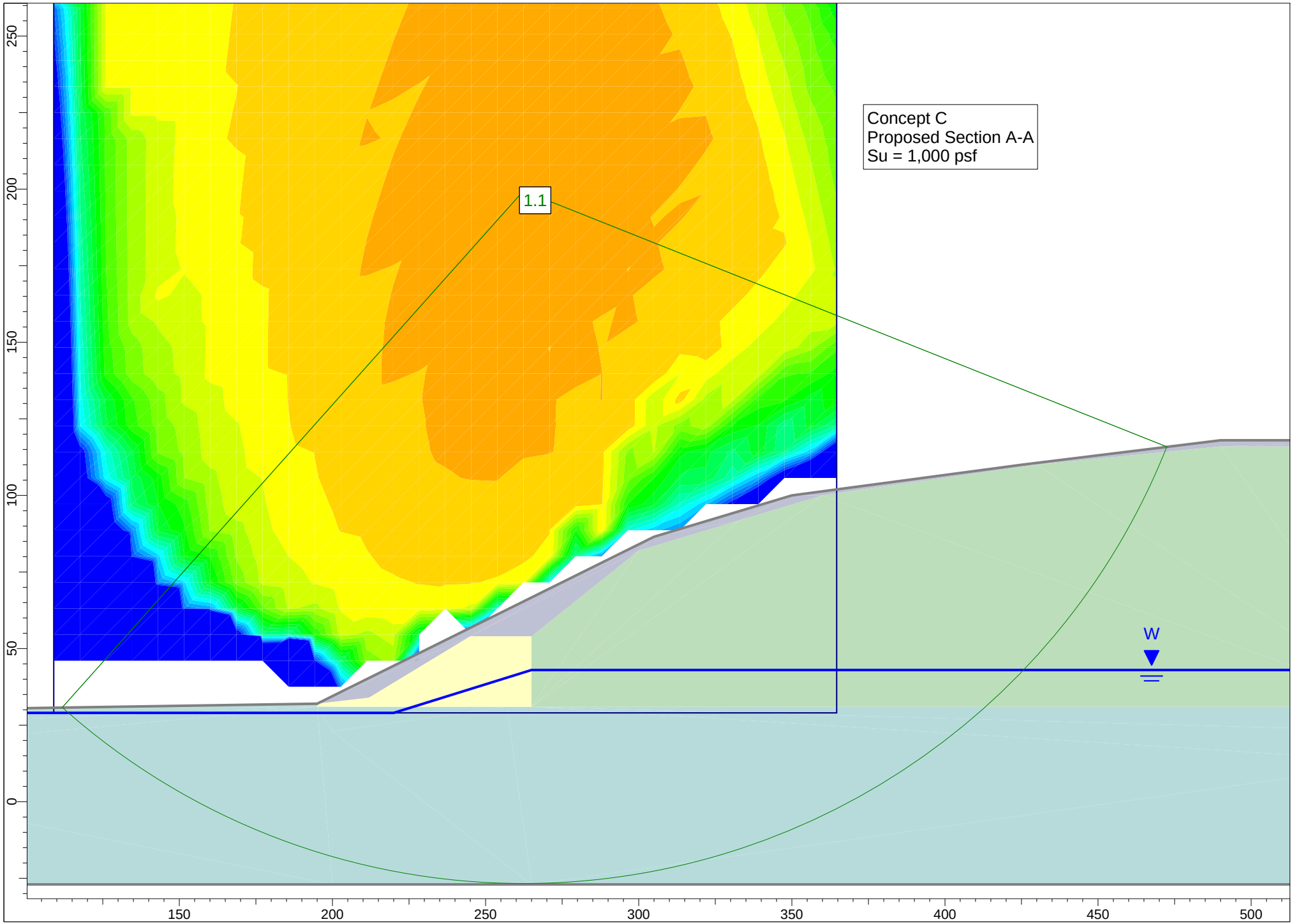
265.000	31.000
265.000	54.000

External Boundary

0.000	-27.000
215.000	-27.000
265.000	-27.000
550.000	-27.000
550.000	13.000
550.000	23.000
550.000	31.000
550.000	116.000
490.000	116.000
430.000	110.000
360.000	100.000
300.000	82.000
265.000	54.000
245.000	54.000
215.000	34.000
200.000	31.000
185.000	31.000
0.000	29.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000


Concept C
Proposed Section A-A
Su = 1,000 psf
1.1
W
250
200
150
100
50
0
150
200
250
300
350
400
450
500

Slide Analysis Information

Document Name

File Name: 1000_AA_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay 1000 psf
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1000 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.150990
Center: 262.370, 199.434
Radius: 226.189
Left Slip Surface Endpoint: 111.716, 30.719
Right Slip Surface Endpoint: 472.550, 115.852
Resisting Moment=9.85718e+007 lb-ft
Driving Moment=8.56407e+007 lb-ft

Method: spencer
FS: 1.136770
Center: 262.370, 199.434
Radius: 226.189
Left Slip Surface Endpoint: 111.716, 30.719
Right Slip Surface Endpoint: 472.550, 115.852
Resisting Moment=9.73536e+007 lb-ft
Driving Moment=8.56407e+007 lb-ft
Resisting Horizontal Force=364501 lb
Driving Horizontal Force=320646 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6635
Number of Invalid Surfaces: 3936
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -112 reported for 339 surfaces

Method: spencer
Number of Valid Surfaces: 6358
Number of Invalid Surfaces: 4213
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -108 reported for 142 surfaces
Error Code -111 reported for 111 surfaces
Error Code -112 reported for 363 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.

-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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

200.000	23.000
200.000	31.000

Material Boundary

200.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

265.000	54.000
300.000	82.000
332.759	91.828
360.000	100.000
430.000	110.000
490.000	116.000
550.000	116.000

Material Boundary

195.000	32.000
195.000	31.000

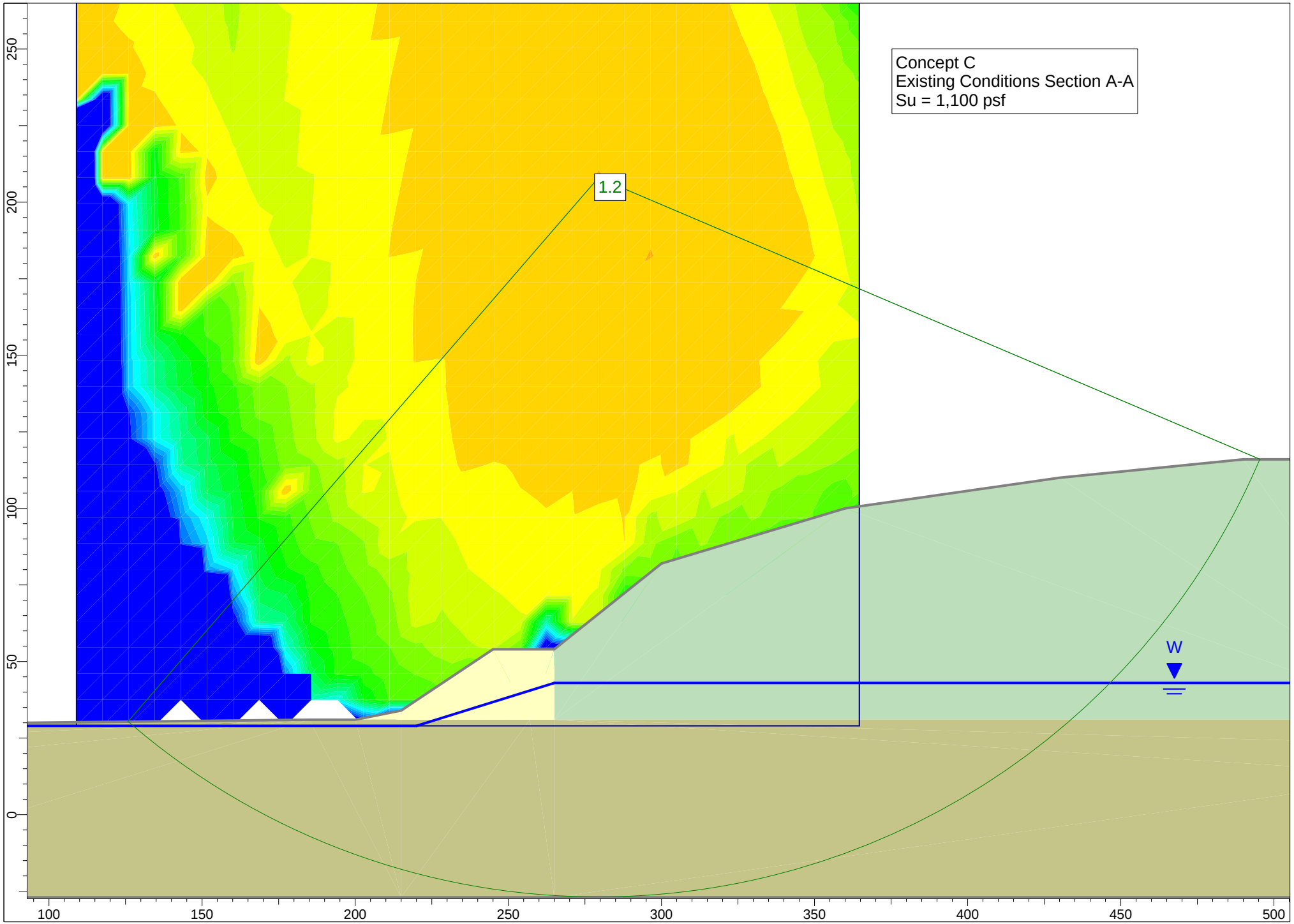
200.000 31.000

Material Boundary
195.000 32.000
212.000 34.000
245.000 54.000
265.000 54.000

Material Boundary
265.000 31.000
265.000 54.000

External Boundary
0.000 -27.000
200.000 -27.000
265.000 -27.000
550.000 -27.000
550.000 13.000
550.000 23.000
550.000 31.000
550.000 116.000
550.000 118.000
490.000 118.000
425.000 110.000
350.000 100.000
305.000 86.500
195.000 32.000
0.000 29.000
0.000 23.000
0.000 13.000

Water Table
0.000 29.000
220.000 29.000
265.000 43.000
550.000 43.000


Concept C
Existing Conditions Section A-A
Su = 1,100 psf
1.2
W
250
200
150
100
50
0
100
150
200
250
300
350
400
450
500

Slide Analysis Information

Document Name

File Name: 1100_AA_Existing.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay 1100psf
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1100 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.243290
Center: 279.413, 207.956
Radius: 234.833
Left Slip Surface Endpoint: 125.771, 30.360
Right Slip Surface Endpoint: 495.493, 116.000
Resisting Moment=1.13111e+008 lb-ft
Driving Moment=9.0977e+007 lb-ft

Method: spencer
FS: 1.226590
Center: 296.457, 182.391
Radius: 209.318
Left Slip Surface Endpoint: 152.277, 30.646
Right Slip Surface Endpoint: 494.967, 116.000
Resisting Moment=9.36991e+007 lb-ft
Driving Moment=7.63897e+007 lb-ft
Resisting Horizontal Force=375644 lb
Driving Horizontal Force=306250 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6669
Number of Invalid Surfaces: 3902
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -112 reported for 280 surfaces

Method: spencer
Number of Valid Surfaces: 6394
Number of Invalid Surfaces: 4177
Error Codes:
Error Code -103 reported for 3618 surfaces
Error Code -106 reported for 1 surface
Error Code -107 reported for 3 surfaces
Error Code -108 reported for 143 surfaces
Error Code -111 reported for 99 surfaces
Error Code -112 reported for 313 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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

200.000	31.000
215.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

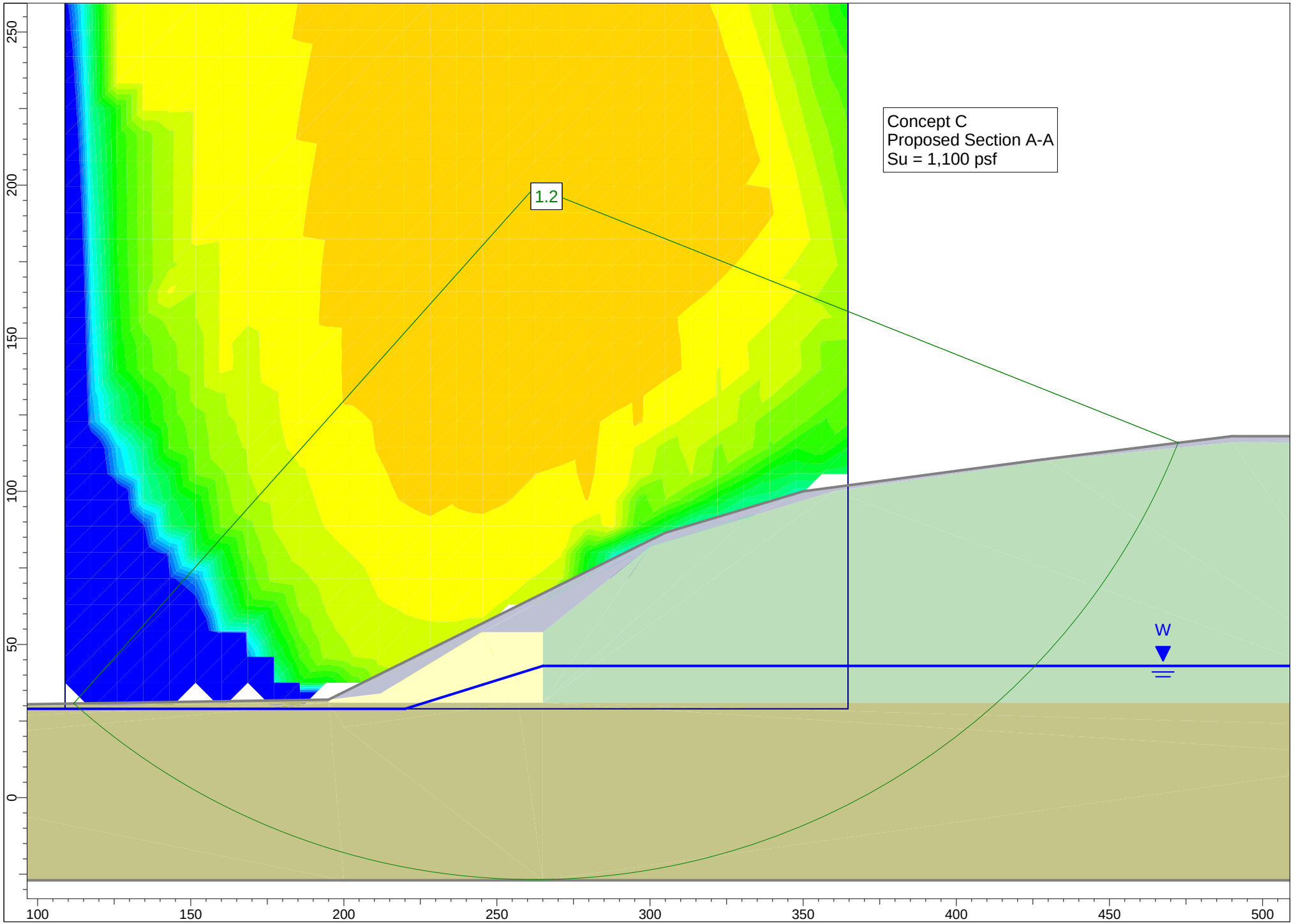
265.000	31.000
265.000	54.000

External Boundary

0.000	-27.000
215.000	-27.000
265.000	-27.000
550.000	-27.000
550.000	13.000
550.000	23.000
550.000	31.000
550.000	116.000
490.000	116.000
430.000	110.000
360.000	100.000
300.000	82.000
265.000	54.000
245.000	54.000
215.000	34.000
200.000	31.000
185.000	31.000
0.000	29.000
0.000	23.000
0.000	13.000

Water Table

0.000	29.000
220.000	29.000
265.000	43.000
550.000	43.000


Concept C
Proposed Section A-A
Su = 1,100 psf
1.2
W
250
200
150
100
50
0
100
150
200
250
300
350
400
450
500

Slide Analysis Information

Document Name

File Name: 1100_AA_Proposed.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

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

Material Properties

Material: Existing Berm
Strength Type: Mohr-Coulomb
Unit Weight: 118.5 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Landfill Waste
Strength Type: Mohr-Coulomb
Unit Weight: 70 lb/ft3
Cohesion: 200 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Structural Fill
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 40 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay 1100 psf
Strength Type: Undrained
Unit Weight: 115 lb/ft3
Cohesion Type: Constant
Cohesion: 1100 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.245550
Center: 262.370, 199.434
Radius: 226.189
Left Slip Surface Endpoint: 111.716, 30.719
Right Slip Surface Endpoint: 472.550, 115.852
Resisting Moment=1.0667e+008 lb-ft
Driving Moment=8.56407e+007 lb-ft

Method: spencer
FS: 1.229800
Center: 262.370, 199.434
Radius: 226.189
Left Slip Surface Endpoint: 111.716, 30.719
Right Slip Surface Endpoint: 472.550, 115.852
Resisting Moment=1.05321e+008 lb-ft
Driving Moment=8.56407e+007 lb-ft
Resisting Horizontal Force=395972 lb
Driving Horizontal Force=321980 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 6643
Number of Invalid Surfaces: 3928
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -112 reported for 331 surfaces

Method: spencer
Number of Valid Surfaces: 6372
Number of Invalid Surfaces: 4199
Error Codes:
Error Code -103 reported for 3597 surfaces
Error Code -108 reported for 142 surfaces
Error Code -111 reported for 106 surfaces
Error Code -112 reported for 354 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.

-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.

List of All Coordinates

Search Grid

108.979	29.000
364.630	29.000
364.630	284.651
108.979	284.651

Material Boundary

200.000	23.000
200.000	31.000

Material Boundary

200.000	31.000
257.000	31.000
265.000	31.000
550.000	31.000

Material Boundary

265.000	54.000
300.000	82.000
332.759	91.828
360.000	100.000
430.000	110.000
490.000	116.000
550.000	116.000

Material Boundary

195.000	32.000
195.000	31.000

200.000 31.000

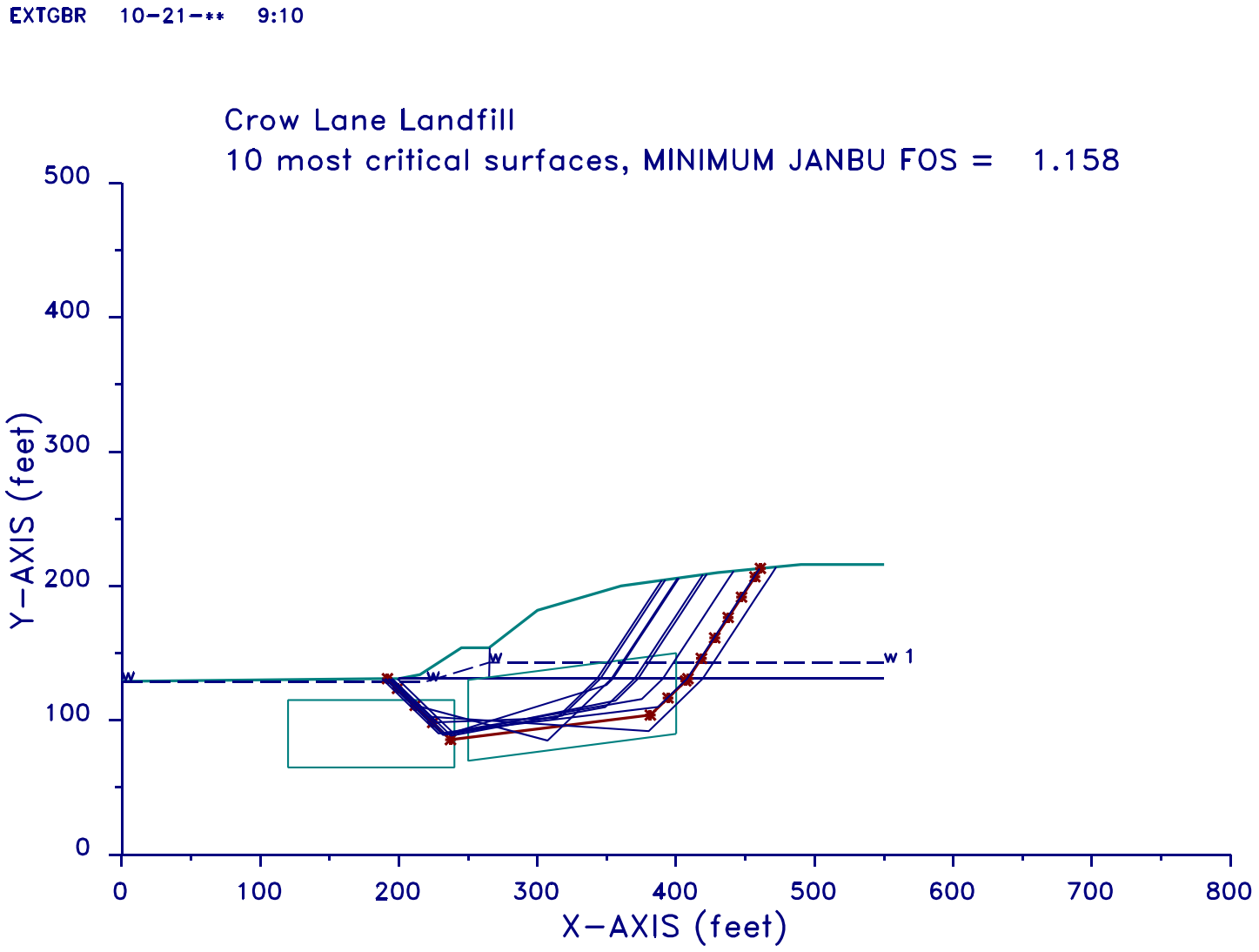
Material Boundary
195.000 32.000
212.000 34.000
245.000 54.000
265.000 54.000

Material Boundary
265.000 31.000
265.000 54.000

External Boundary
0.000 -27.000
200.000 -27.000
265.000 -27.000
550.000 -27.000
550.000 13.000
550.000 23.000
550.000 31.000
550.000 116.000
550.000 118.000
490.000 118.000
425.000 110.000
350.000 100.000
305.000 86.500
195.000 32.000
0.000 29.000
0.000 23.000
0.000 13.000

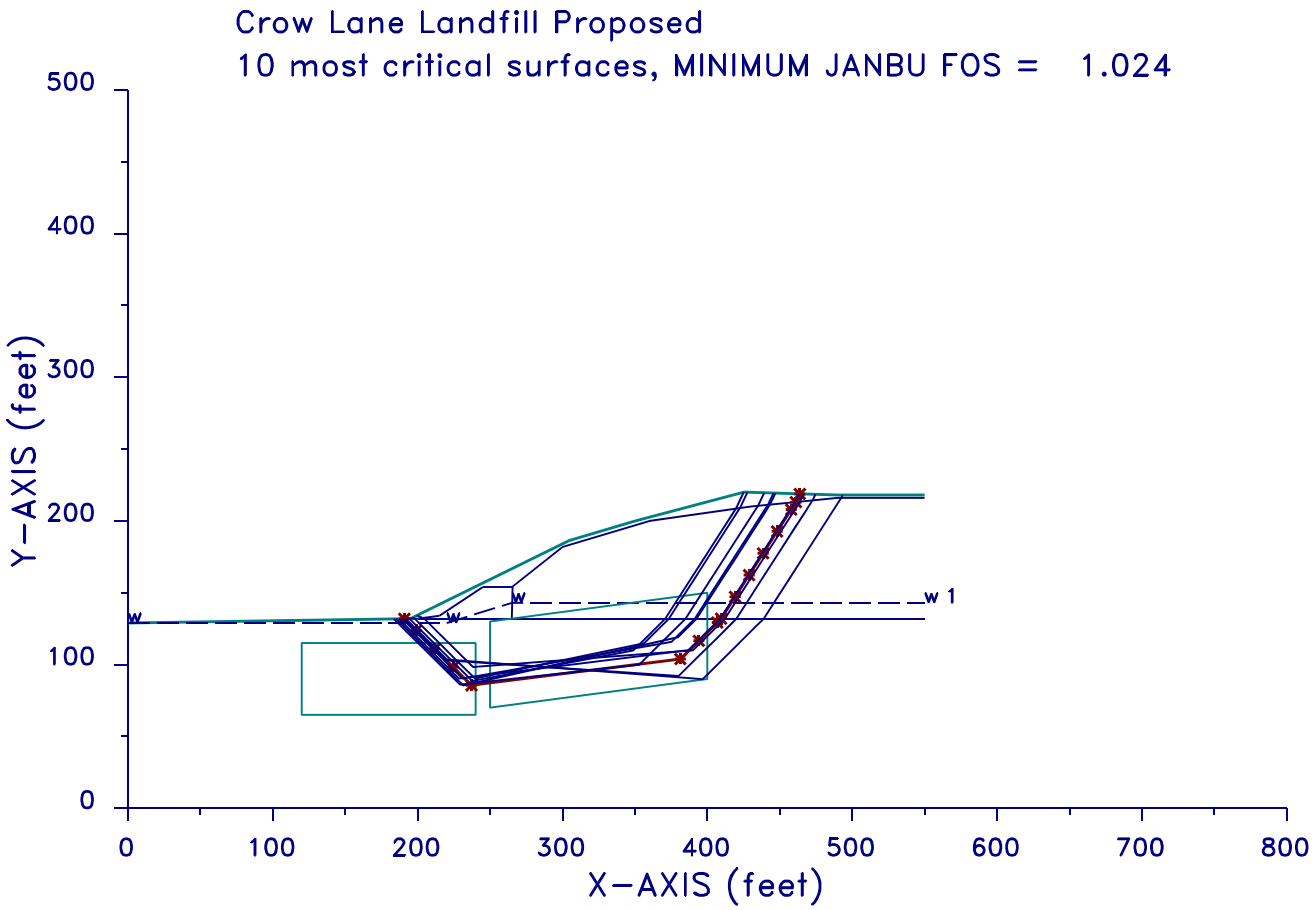
Water Table
0.000 29.000
220.000 29.000
265.000 43.000
550.000 43.000

Concept C
Existing Conditions Section A-A
Su = 900 psf
Wedge Analysis



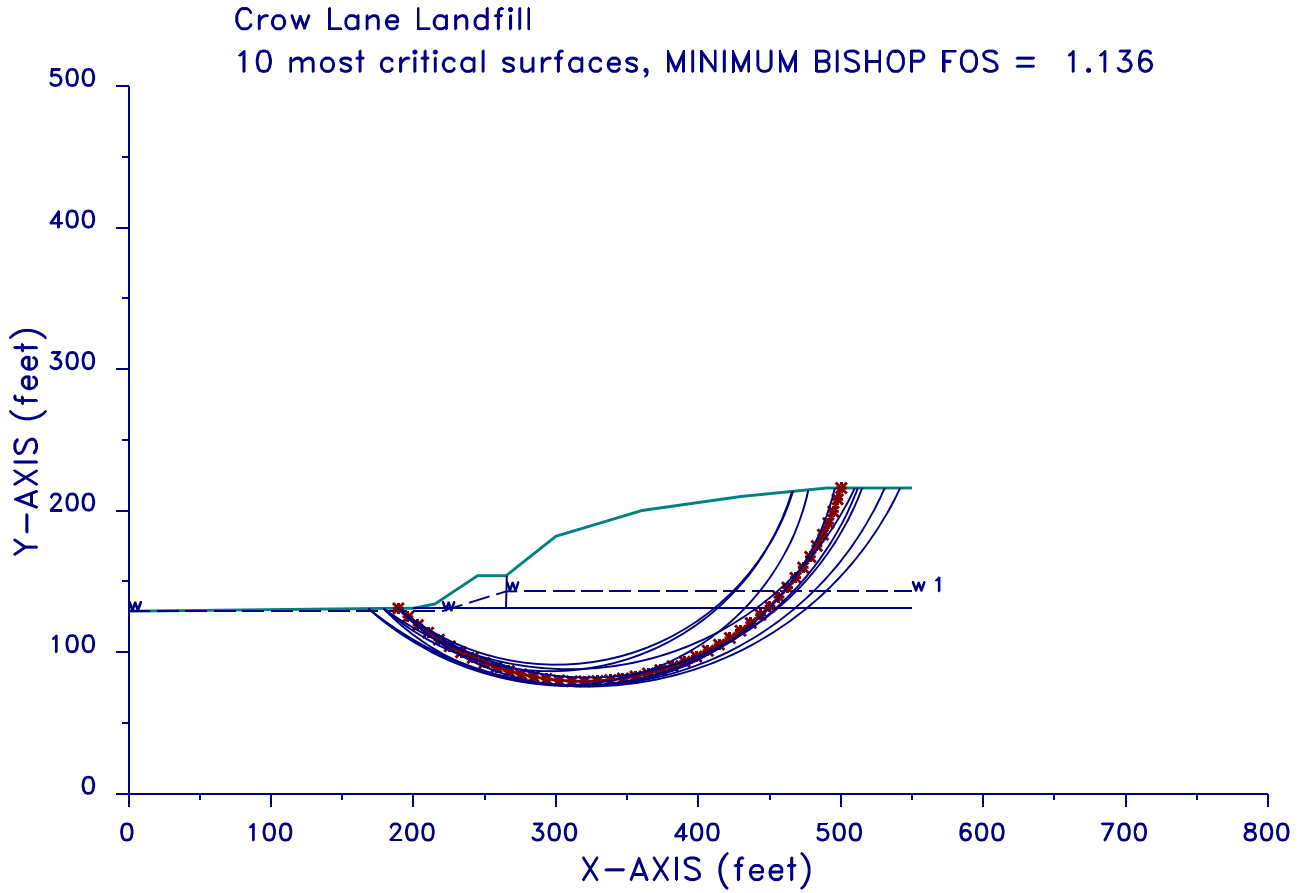
Concept C
Proposed Section A-A
Su = 900 psf
Wedge Analysis

PROPBR 10-21-** 9:11



Concept C
Existing Conditions Section A-A
Su = 900 psf
Bishop Analysis

EXTGC 10-21-** 9:07



Concept C
Proposed Section A-A
Su = 900 psf
Bishop Analysis