US EPA ARCHIVE DOCUMENT

ATTACHMENT 6

Shaw®

Shaw® Shaw Environmental, Inc.

Client:	Clinton Landfill, Inc.		
Project:	Clinton Landfill No. 3 Chemical Waste Unit		
Proj. #:	128017		
Calculated By:	JWP	Date:	1/23/09
Checked By:	JPV	Date:	1/30/09

TITLE: SLOPE STABILITY ANALYSES

Problem Statement

Determine the factor of safety against slope failure for the final landform, excavation slopes and west detention basin under static and seismic loading conditions when the Berry Clay and Radnor Till soils are modeled as separate layers.

Given

- Hydrogeologic and Design Drawings contained in the October, 2007 application.
- Appendix H.1 "Summary of Geotechnical Design Parameters" contained in the October, 2007 application.
- USGS National Seismic Hazard Mapping Project found on the internet/online at *http://earthquake.usgs.gov/research/hazmaps/design/*. (Value of 0.0981 for horizontal acceleration — please refer to attached pages in Appexdix H.1 of the October, 2007 application).
- Computer model SLIDE - 2D Limit Equilibrium Slope Stability Analysis, version 5.0, developed by Rocscience, Inc. was used for the stability analyses.
- Figures 1 and 2, showing locations of the critical cross sections. (Please refer to attached pages).
- Geotechnical Testing Results

Assumptions

Critical Cross Section

Cross Sections A-A' and B-B', shown on the attached figures, were determined to be the most critical cross sections for the global mass stability for the Clinton Landfill No. 3 Chemical Waste Unit. Specifically, Cross Section A-A' was determined to be the most critical cross section prior to MSW placement; and Cross Section B-B' was determined to be the most critical cross section for the final landform. The liner design calls for the following liner systems on the base and sideslopes:

Base Liner System

- 60-mil HDPE textured geomembrane
- Geosynthetic clay liner
- 60-mil HDPE textured geomembrane
- Geocomposite

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- 60-mil HDPE textured geomembrane
- 3-foot low permeability compacted cohesive earth liner ($k \leq 1\times10^{-7}$ cm/sec).
- Compacted clay fill replacing Roxana Silt / Robein Member beneath compacted cohesive earth liner (thickness varies)

Sideslope Liner System

- 18-inch select fill
- Geocomposite
- 60-mil HDPE textured geomembrane
- Geocomposite
- 60-mil HDPE textured geomembrane
- 3-foot low permeability compacted cohesive earth liner ($k \leq 1\times10^{-7}$ cm/sec).

The cross sections were modeled assuming a maximum excavation depth of approximately 662 ft MSL with the excavation slope of 3H:1V. The final landform was modeled through the peak of the Chemical Waste Unit at a maximum waste height of 812 ft MSL with a final cover slope ranging between 4H:1V and 20H:1V.

Two truck loadings of 250 pounds per square foot (psf) over a length of 20 feet is applied to all final cover failure conditions.

Modes of Failure

Only one mode of failure will be modeled for this scenario, due to the focus on the Berry Clay layer. The only mode of failure affecting this layer is a failure of the foundation stability.

- Foundation Stability - Circular failure surfaces extending through the waste mass and into the bottom liner system and foundation soils were automatically generated and evaluated by SLIDE.

SLIDE generates failure surfaces through the foundation soils and calculates the factor of safety. For both long and short term, SLIDE located the failure surface of minimum factor of safety.

Failure Conditions

The Foundation Stability failure mode was analyzed under the following four failure conditions.

- Short Term (undrained), Static Conditions
- Short Term (undrained), Seismic Conditions

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- ❑ Long Term (drained) Static Conditions
- ❑ Long Term (drained) Seismic Conditions

Material Properties

Appendix H.1 of the October, 2007 application explains all geotechnical parameters used in the slope stability report. Table 1 summarizes the material properties and strength parameters.

TABLE 1
SUMMARY OF MATERIAL PROPERTIES

Layer No.	Layer	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)	Short-Term Conditions[1]		Long-Term Conditions[2]	
				Cohesion (psf)	Friction Angle (deg.)	Cohesion (psf)	Friction Angle (deg.)
1	Tiskilwa Formation: Brown and Gray Silty Clay (CL), with localized sand strata	135	140	3,500	0	600	26
2	Roxana Silt / Robein Member: Dark Brown Organic Silt (OL) and Peat (Pt)	100	110	1,400	0	1,500	19
3	Berry Clay: Gray Clay (CL)	130	138	(see Table 4)	(see Table 4)	(see Table 4)	(see Table 4)
4	Radnor Till: Gray Clay (CL)	150	158	8310	0	7200	17.7
5	Mahomet Sand Member: Sand and Gravel (SP/GP)	135	140	0	35	0	35
6	Final Cover	128	134	1,350	0	1,300	22
7	MSW	75	75	500	30	500	30
8	Chemical Waste	90	90	900	0	240	45
				840	17.4		
9	Leachate Drainage Layer	126	130	0	30	0	30
10	Critical interface between geosynthetics on sideslopes[3]	135	140	0	24 or 19	0	24 or 19
11	Critical interface between geosynthetics on bottom liner system[3]	135	140	0	24 or 19	0	24 or 19
12	Compacted Fill / Sub-base	135	140	3,000	0	700	21
13	Compacted Select Fill on Sideslopes	128	134	1,350	0	1,300	22

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Notes:

1. Short Term Shear Strength values for soils reflect the total shear strength values from unconsolidated undrained triaxial shear strength testing performed on representative soil samples. Short Term Shear Strength values for the Chemical Waste:

- cohesion = 900 psf, and friction angle = 0 deg., reflect the total shear strength values from unconsolidated undrained triaxial shear strength testing performed on representative samples of the chemical waste to represent short term active waste fill conditions; and
- cohesion = 840 psf, and friction angle 17.4 = 0 deg., reflect the total shear strength values from consolidated undrained triaxial shear testing performed on representative samples of the chemical waste to represent interim waste fill conditions (i.e., under maximum loading - maximum waste height / consolidated conditions). Refer to Appendix H.1.

2. Long Term Shear Strength values for soils reflect the effective shear strength values from consolidated undrained triaxial shear strength testing performed on representative soil samples. Long Term Shear Strength values for the Chemical Waste reflect the effective shear strength values from consolidated undrained triaxial shear strength testing performed on representative samples of he chemical waste to represent long term waste fill conditions. Refer to Appendix H.1.

3. Both the sideslope and bottom liner system consists of a series of geosynthetics placed on top of each other. The CQA plan will require that the friction angles listed above are achieved between each geosynthetic interface. For static conditions, the minimum friction angle was assumed to represent residual secant friction angle, for seismic conditions the minimum friction angle was assumed to represent the peak secant friction angle as discussed in the CQA program.

Modeling and Sensitivity Analyses

The revised slope stability model was developed from the previous slope stability models, changing the Radnor/Berry layer to two separate layers with strength parameters representative of the Berry Clay and the Radnor Till. The strength parameters for the two soils were distinguished from each other using geotechnical testing data included in the October, 2007 USEPA application. Table 2 provides a summary of the soil density results for both the Berry Clay and Radnor Till. Short term (undrained) conditions were determined from unconsolidated-undrained shear strength tests performed on both the Berry Clay and Radnor Till. Table 3 summarizes these results.

Long term (drained) conditions were determined from triaxial shear tests performed on both the Berry Clay and Radnor Till. The test results are attached.

A sensitivity analysis was run to determine factors of safety against slope failure if the Berry clay was represented using minimum measured strength parameters for short term conditions. The values used for cohesion and friction angle for the Berry clay in each analysis are summarized in Table 4.

Table 2
Summary of Soil Densities

Soil Type	Boring	Depth/Elevation (ft)	Dry Density	Moisture Content (%)	Total Density (pcf)
Berry Clay	EX-6	32	114.6	18.4	136
Berry Clay	EX-6	49	110.6	19.7	133

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Berry Clay	EX-7	32	118.4	17.6	139
Berry Clay	EX-13	62	109.1	18.7	130
Berry Clay	E-19	59	113.6	16.2	132
Berry Clay	EX-21	39	112.9	16.8	132
		Average (Berry Clay)	113.2	17.9	133
Radnor Till	EX-4	64	135.1	12.6	152
Radnor Till	EX-4	79	139.0	8.4	151
Radnor Till	EX-5	69	135.8	12.1	152
Radnor Till	EX-5	79	144.7	7.8	156
Radnor Till	EX-5	90.5	142.9	7.9	154
Radnor Till	EX-7	47	146.7	6.2	156
Radnor Till	EX-16	72	147.6	6.6	157
Radnor Till	EX-19	69	127.5	11.8	143
Radnor Till	EX-24	76	112.6	17.9	133
		Average (Radnor Till)	136.9	10.1	151

To be conservative:
Use total unit weight = 130 pcf (Berry Clay)
Use total unit weight = 150 pcf (Radnor Till)

Table 3
Summary of Triaxial Shear Strength (Unconsolidated-Undrained) Test Results

Soil Type	Boring	Depth/Elevation (ft)	Deviator Stress (Shear Strength) (tsf)
Berry Clay	EX-13	64	3.56
Berry Clay	EX-19	59	2.52
Berry Clay	EX-21	39	2.73
		Average (Berry Clay)	2.94 tsf
Radnor Till	EX-16	72	2.41

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Radnor Till	EX-19	69	19.97
Radnor Till	EX-23	60	6.15
Radnor Till	EX-24	76	4.71
		Average (Radnor Till)	8.31 tsf

Cohesion Conversion
$\phi = 0$ (assumed)
C= Shear Strength/2

C=2940 psf (Berry Clay)
C=8310 psf (Radnor Till)

TABLE 4
Strength Parameters for Berry Clay

Model Run	Short Term Conditions		Long Term Conditions	
	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
Baseline Model	2940	0	1100	18.2
Sensitivity Analysis	2520	0	1100	18.2

Calculations

Refer to attached SLIDE output files.

Results

Results of all the scenarios run by SLIDE are summarized in the table below. The following summary table demonstrates that the Clinton Landfill No. 3 Chemical Waste Unit meets and exceeds all the required safety factors as required by 35 Ill. Admin. Code Section 811.304 (d).

TABLE 5
FACTORS OF SAFETY

Model Run	Short Term Conditions		Long Term Conditions	
	Static	Seismic	Static	Seismic
Section A-A'				

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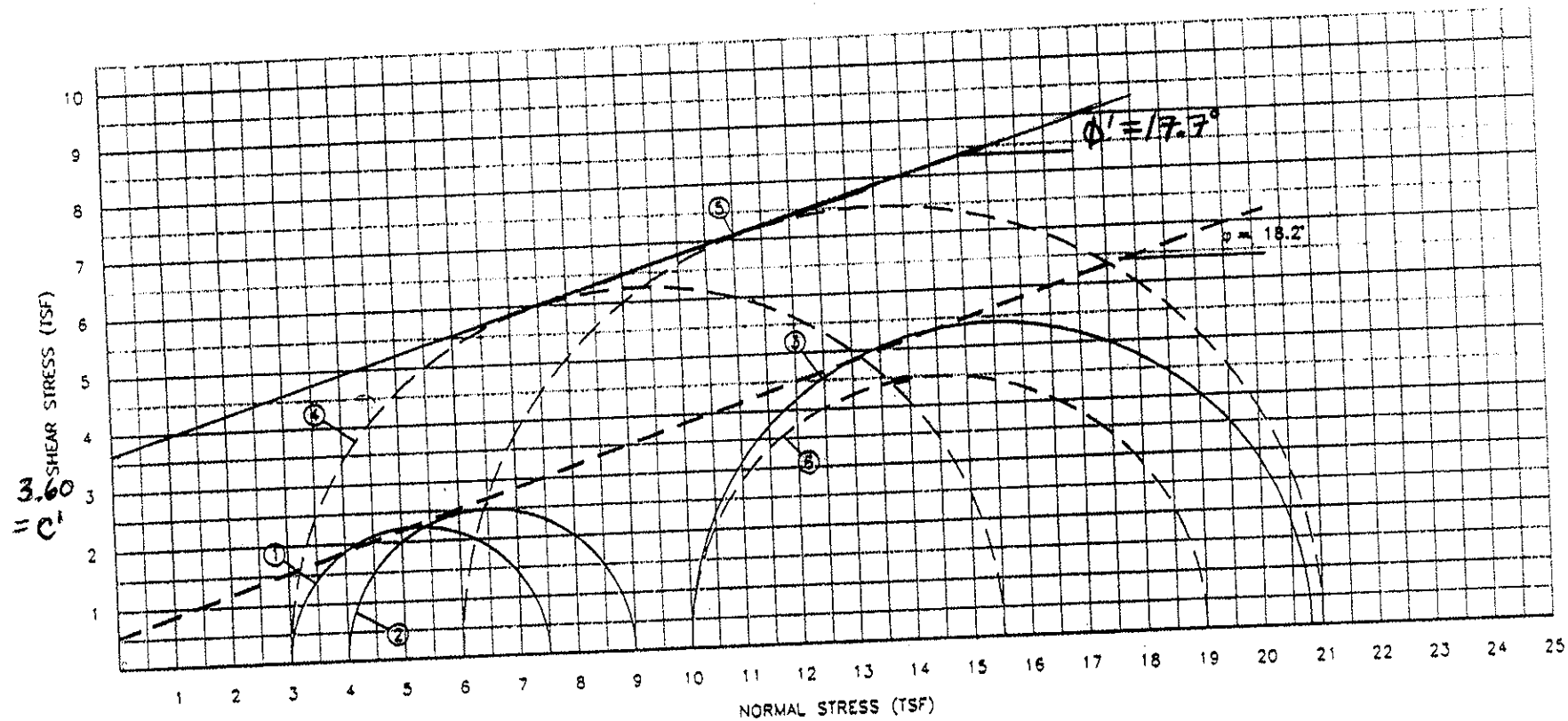
Baseline Model	1.87	1.37	2.64	1.90
Sensitivity Analysis	1.81	1.32	N/A	N/A
Section B-B'				
Baseline Model	2.16	1.64	3.51	2.37
Sensitivity Analysis	2.10	1.60	N/A	N/A

For both the baseline and the sensitivity analysis, the slope stability under short term conditions of the excavation and active face demonstrates a factor of safety against failure greater than 1.5 under static loading and 1.3 under seismic loading.
For long term/final conditions, the stability analyses demonstrate a factor of safety against failure greater than 1.5 under static loading and 1.3 under seismic loading.

During construction of the landfill liner system, on-site testing will be required to demonstrate a friction angle greater than or equal to the required friction angles as discussed in the CQA Program.

MOHR-COULOMB FIGURE
DRAINED-CONSOLIDATED STRENGTH
(LONG-TERM CONDITIONS)



BERRY CLAY
CONSOLIDATED DRAINED
RESIDUAL STRENGTH
(Long-Term Behavior)

SAMPLE SOURCE

1. EX-21 @39'
2. EX-19 @59'
3. EX-13 @62'

RADNOR TILL
CONSOLIDATED DRAINED
RESIDUAL STRENGTH
(Long-Term Behavior)

SAMPLE SOURCE

4. EX-16 @72'
5. EX-19 @69'
6. EX-24 @76'

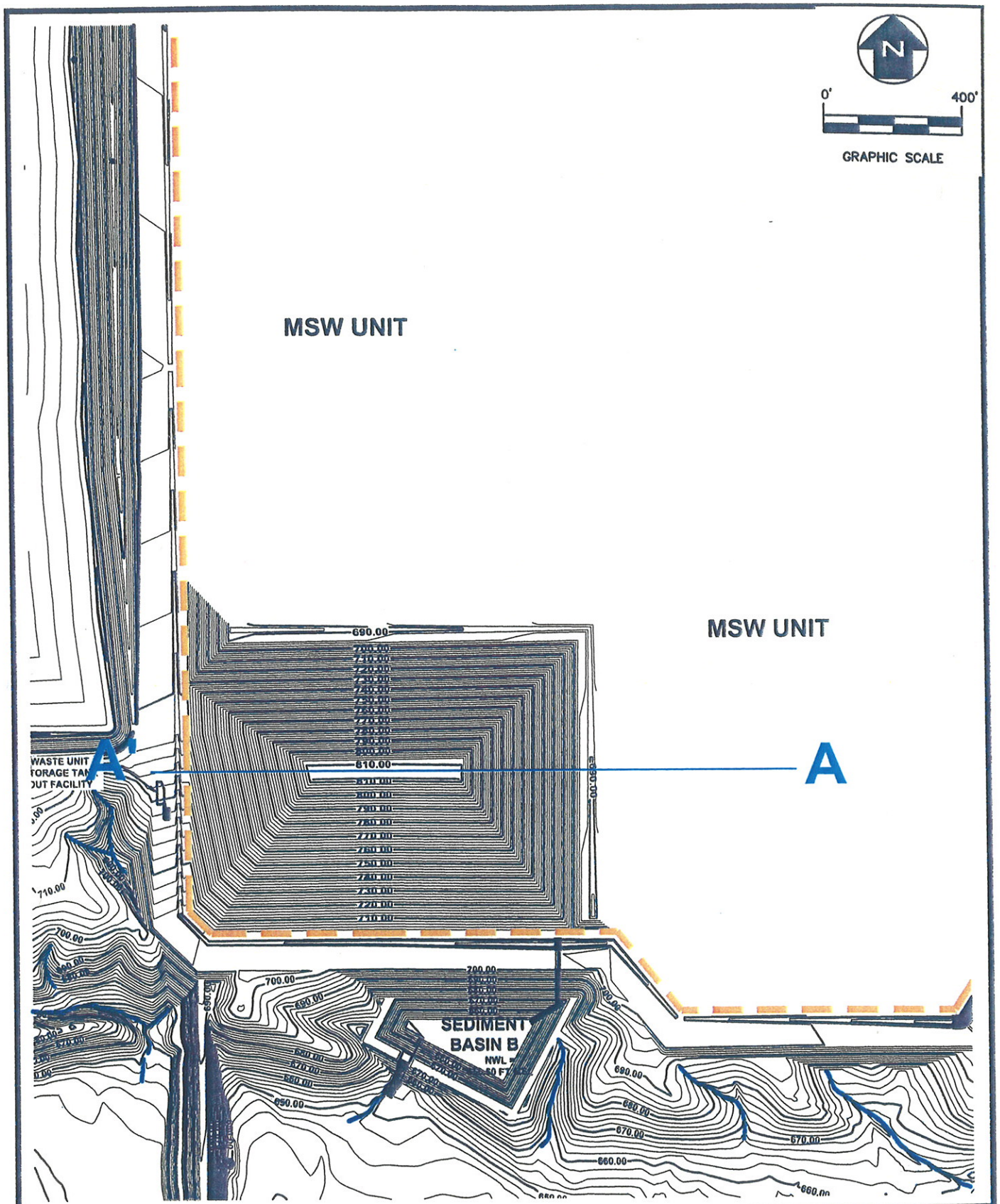
Radnor Till
$$c' = 3.60$$
$$\tan\phi' = \frac{6.0-3.6}{7.5-0}$$
$$\phi' = 17.7^\circ$$

Berry Clay
$$c = 0.55$$
$$\tan\phi = \frac{4.5-.55}{12-0}$$
$$\phi = 18.2^\circ$$

Illinois Licensed Professional Design Firm 184-001145

PDC Technical Services, Inc.
Peoria, Illinois

FIGURE 3
SHEAR TEST DATA
CLINTON LANDFILL NO. 3
CLINTON, ILLINOIS
PROJECT NO. 91-118



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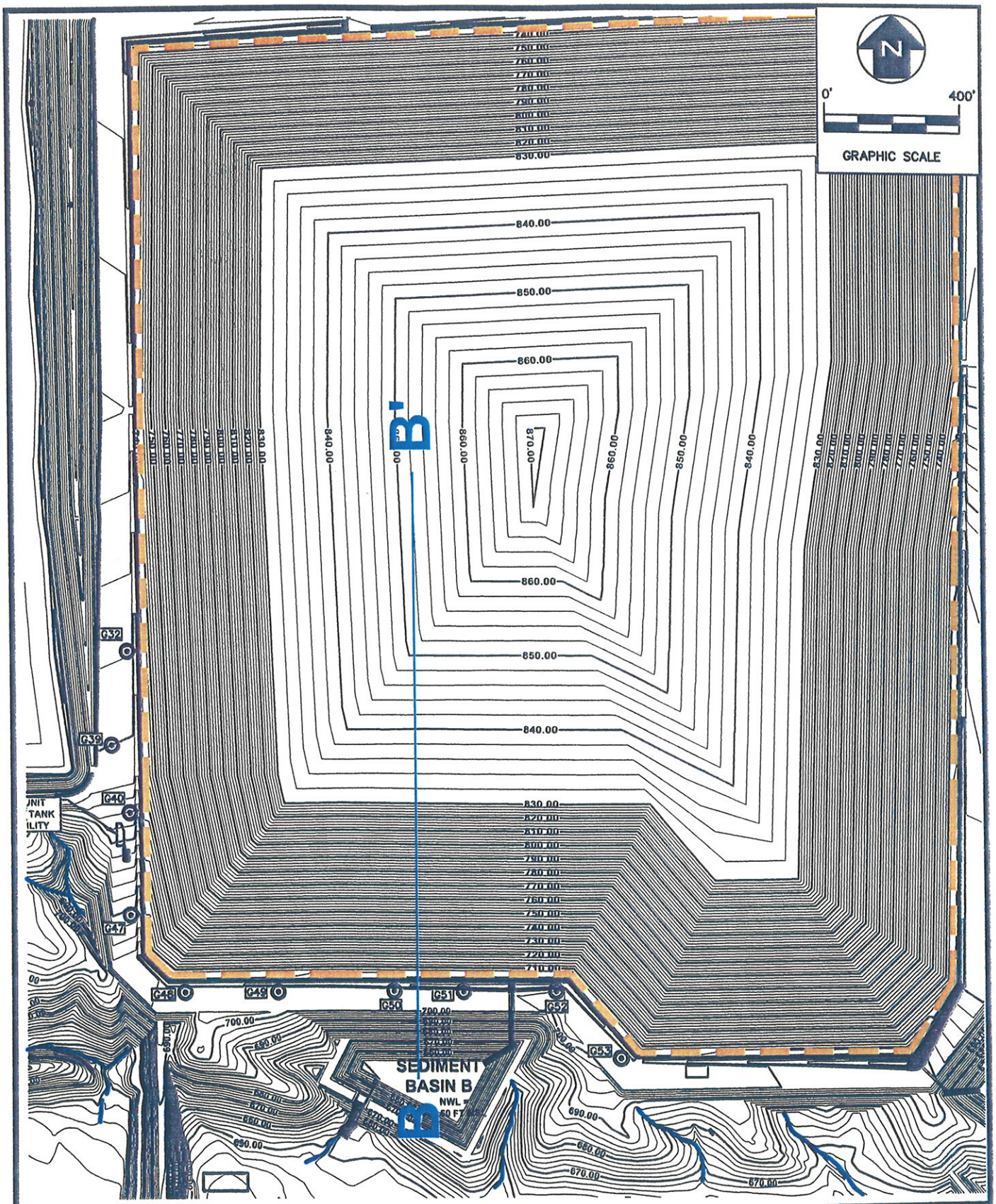
CLINTON LF. NO. 3 CHEMICAL WASTE UNIT
DEWITT COUNTY, ILLINIOS

FIGURE1
SLOPE STABILITY ANALYSIS
SECTION A-A'

APPROVED BY: DAM	PROJ. NO.: 128017	DATE: SEPT. 2007



CLINTON LF. NO. 3 CHEMICAL WASTE UNIT
DEWITT COUNTY, ILLINOIS

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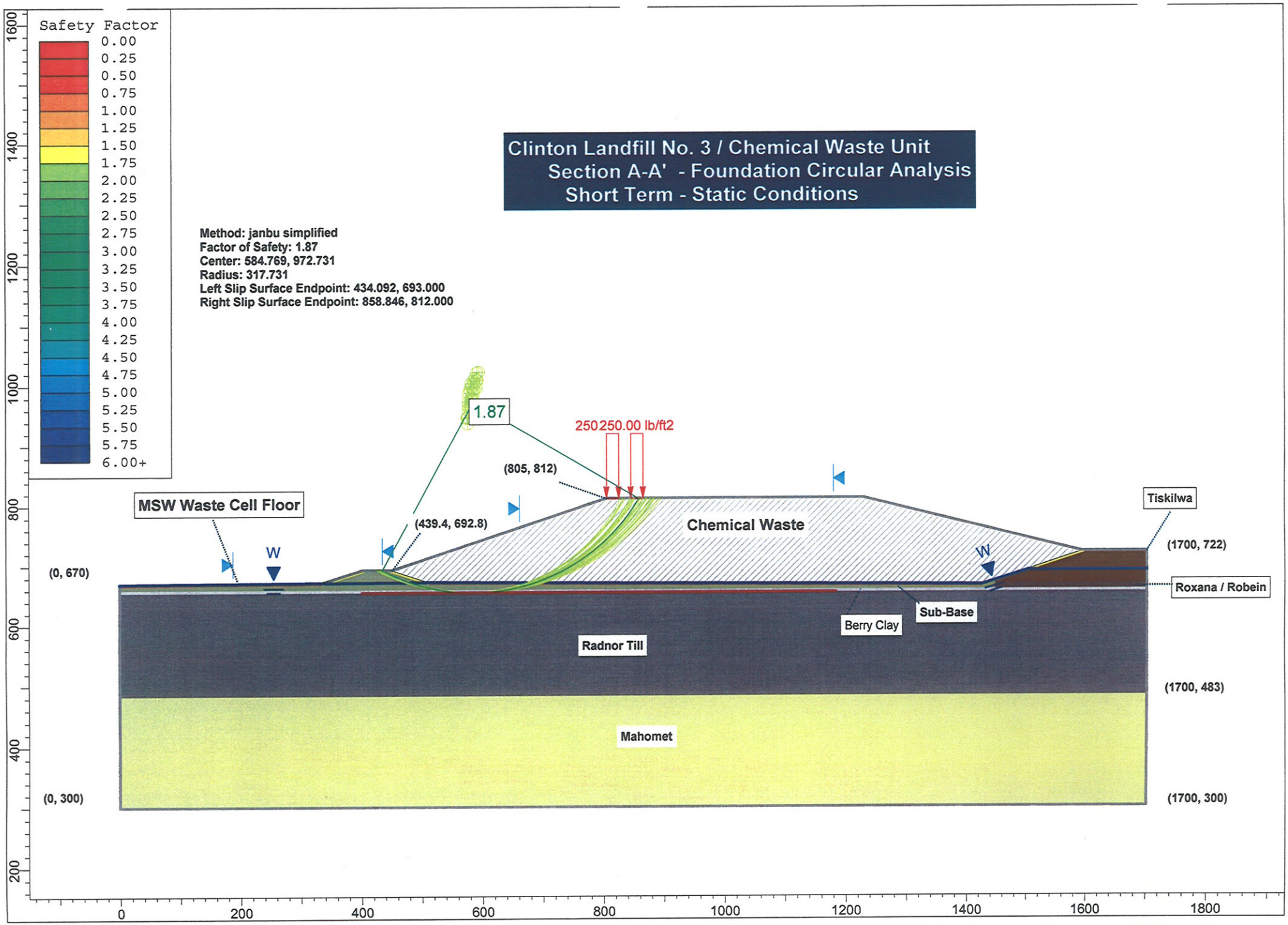
FIGURE2
SLOPE STABILITY ANALYSIS
SECTION B-B'

APPROVED BY: DAM	PROJ. NO.: 128017	DATE: SEPT. 2007

CROSS SECTION A-A'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / STATIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section A-A' - Foundation Circular Analysis
Short Term - Static Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 1.87
Center: 584.769, 972.731
Radius: 317.731
Left Slip Surface Endpoint: 434.092, 693.000
Right Slip Surface Endpoint: 858.846, 812.000
1.87
250250.00 lb/ft2
(805, 812)
(439.4, 692.8)
MSW Waste Cell Floor
W
Chemical Waste
Tiskilwa
(1700, 722)
Roxana / Robein
(0, 670)
Sub-Base
Berry Clay
Radnor Till
(1700, 483)
Mahomet
(0, 300)
(1700, 300)
0
200
400
600
800
1000
1200
1400
1600
1800

Slide Analysis Information

Document Name

File Name: A-A'_SSTAT_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3 / Chemical Waste Landfill, A-A', FOUNDATION CIRCULAR, INTERIM/SEISMIC
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Maximum
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 6000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: 660
Minimum Depth: 1

Loading

2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3

Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2940 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.867240
Center: 584.769, 972.731
Radius: 317.731
Left Slip Surface Endpoint: 434.092, 693.000
Right Slip Surface Endpoint: 858.846, 812.000
Resisting Horizontal Force=1.21355e+006 lb
Driving Horizontal Force=649915 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 6000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

0.000	669.000
335.000	671.000

Material Boundary

0.000	666.000
335.000	668.000

Material Boundary

335.000	668.000
413.000	693.000

Material Boundary

335.000	668.000
511.000	669.000
439.000	693.000

Material Boundary

448.000	693.000
508.000	673.000

Material Boundary

511.000	669.000
1428.000	663.500
1448.000	670.148
1604.000	722.000

Material Boundary

0.000	660.000
335.000	660.000
1448.000	660.000
1700.000	660.000

Material Boundary

451.000	693.000
511.000	673.000
1428.000	667.500
1592.000	722.000

Material Boundary

0.000	483.000
1700.000	483.000

Material Boundary

1448.000	670.148
1700.000	670.000

Material Boundary

335.000	660.000
335.000	668.000

Material Boundary

1448.000	660.000
1448.000	670.148

Material Boundary

1428.000	663.500
1428.000	666.500

Material Boundary

511.000	669.000
511.000	672.000

Material Boundary

335.000	668.000
335.000	671.000

Material Boundary

511.000	673.000
508.000	673.000
511.000	672.000
511.000	673.000

Material Boundary

511.000	672.000
1428.000	666.500

Material Boundary

1428.000	667.500
1431.009	667.500
1428.000	666.500
1428.000	667.500

Material Boundary

1431.009	667.500
1595.000	722.000

Material Boundary

335.000	672.000
338.136	672.000
335.000	671.000
335.000	672.000

Material Boundary

338.136	672.000
404.000	693.000

Material Boundary

0.000	655.000
1700.000	655.000

External Boundary

1700.000	300.000
1700.000	483.000
1700.000	655.000
1700.000	660.000
1700.000	670.000
1700.000	722.000
1604.000	722.000
1595.000	722.000
1592.000	722.000
1239.000	810.000
1231.000	812.000
805.000	812.000
799.000	810.000
451.000	693.000
448.000	693.000
439.000	693.000
413.000	693.000
404.000	693.000
401.000	693.000
335.000	672.000
0.000	670.000
0.000	669.000
0.000	666.000
0.000	660.000
0.000	655.000
0.000	483.000
0.000	300.000

Water Table

0.000	670.000

335.000	672.000
511.000	673.000
1428.000	667.500
1503.200	691.400
1700.000	691.400

Distributed Load

825.000	812.000
805.000	812.000

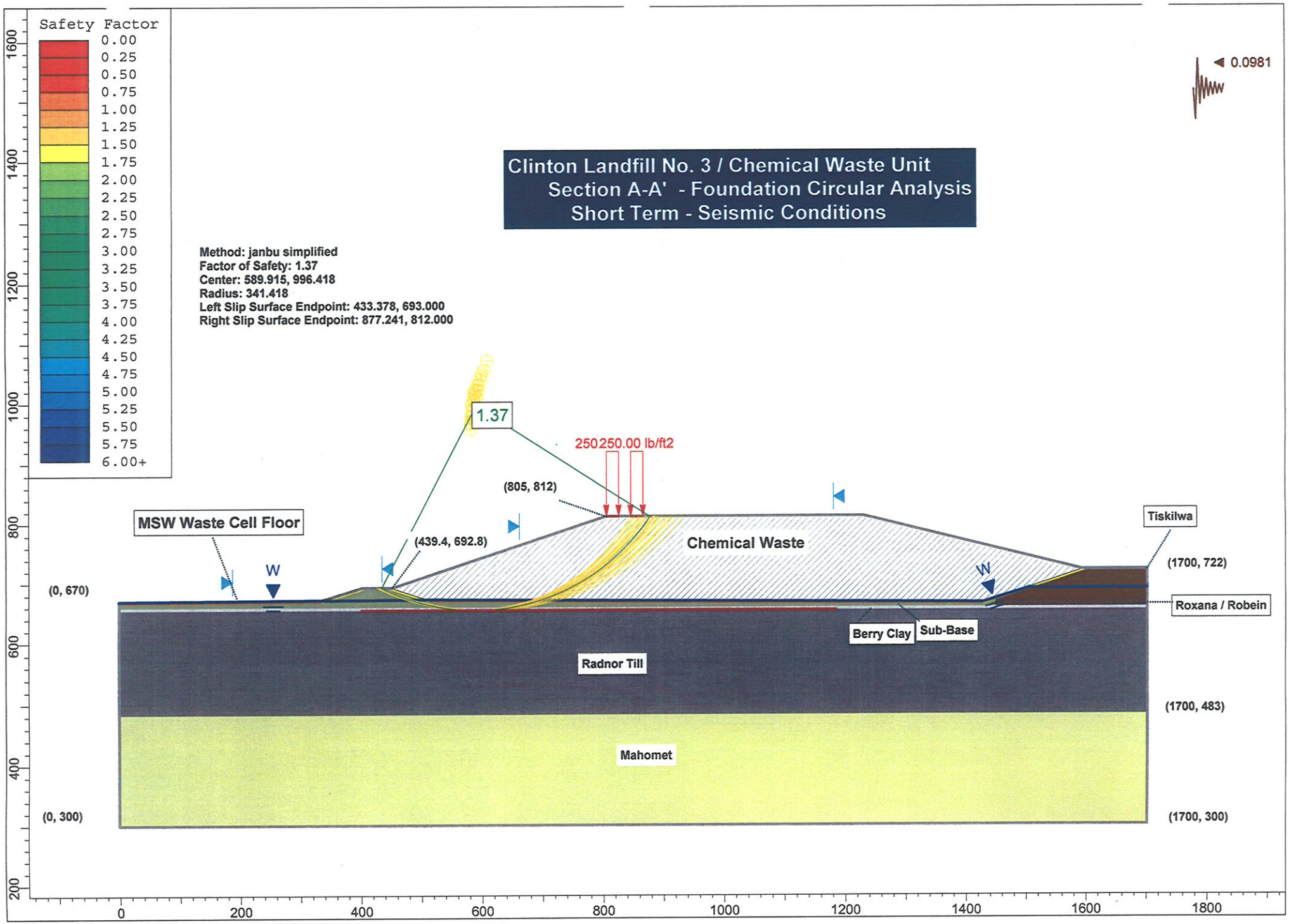
Distributed Load

865.000	812.000
845.000	812.000

Focus/Block Search Line

400.355	655.000
1184.175	655.000

CROSS SECTION A-A'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / SEISMIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section A-A' - Foundation Circular Analysis
Short Term - Seismic Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 1.37
Center: 589.915, 996.418
Radius: 341.418
Left Slip Surface Endpoint: 433.378, 693.000
Right Slip Surface Endpoint: 877.241, 812.000
0.0981
1.37
250250.00 lb/ft2
(805, 812)
(439.4, 692.8)
MSW Waste Cell Floor
W
W
Chemical Waste
Tiskilwa
(1700, 722)
(0, 670)
Roxana / Robein
Berry Clay
Sub-Base
Radnor Till
(1700, 483)
Mahomet
(0, 300)
(1700, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200
400
600
800
1000
1200
1400
1600

Slide Analysis Information

Document Name

File Name: A-A'_SSEIS_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3 / Chemical Waste Landfill, A-A', FOUNDATION CIRCULAR, INTERIM/SEISMIC
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Maximum
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 6000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: 660
Minimum Depth: 1

Loading

Seismic Load Coefficient (Horizontal): 0.0981
2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250

lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3

Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2940 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.371510
Center: 589.915, 996.418
Radius: 341.418
Left Slip Surface Endpoint: 433.378, 693.000
Right Slip Surface Endpoint: 877.241, 812.000
Resisting Horizontal Force=1.26357e+006 lb
Driving Horizontal Force=921303 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 6000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

0.000	669.000
335.000	671.000

Material Boundary

0.000	666.000
335.000	668.000

Material Boundary

335.000	668.000
413.000	693.000

Material Boundary

335.000	668.000
511.000	669.000
439.000	693.000

Material Boundary

448.000	693.000
508.000	673.000

Material Boundary

511.000	669.000
1428.000	663.500
1448.000	670.148
1604.000	722.000

Material Boundary

0.000	660.000
335.000	660.000
1448.000	660.000

1700.000	660.000

Material Boundary

451.000	693.000
511.000	673.000
1428.000	667.500
1592.000	722.000

Material Boundary

0.000	483.000
1700.000	483.000

Material Boundary

1448.000	670.148
1700.000	670.000

Material Boundary

335.000	660.000
335.000	668.000

Material Boundary

1448.000	660.000
1448.000	670.148

Material Boundary

1428.000	663.500
1428.000	666.500

Material Boundary

511.000	669.000
511.000	672.000

Material Boundary

335.000	668.000
335.000	671.000

Material Boundary

511.000	673.000
508.000	673.000
511.000	672.000
511.000	673.000

Material Boundary

511.000	672.000
1428.000	666.500

Material Boundary

1428.000	667.500
1431.009	667.500
1428.000	666.500

1428.000	667.500

Material Boundary

1431.009	667.500
1595.000	722.000

Material Boundary

335.000	672.000
338.136	672.000
335.000	671.000
335.000	672.000

Material Boundary

338.136	672.000
404.000	693.000

Material Boundary

0.000	655.000
1700.000	655.000

External Boundary

1700.000	300.000
1700.000	483.000
1700.000	655.000
1700.000	660.000
1700.000	670.000
1700.000	722.000
1604.000	722.000
1595.000	722.000
1592.000	722.000
1239.000	810.000
1231.000	812.000
805.000	812.000
799.000	810.000
451.000	693.000
448.000	693.000
439.000	693.000
413.000	693.000
404.000	693.000
401.000	693.000
335.000	672.000
0.000	670.000
0.000	669.000
0.000	666.000
0.000	660.000
0.000	655.000
0.000	483.000
0.000	300.000

Water Table

0.000	670.000
335.000	672.000
511.000	673.000
1428.000	667.500
1503.200	691.400
1700.000	691.400

Distributed Load

825.000	812.000
805.000	812.000

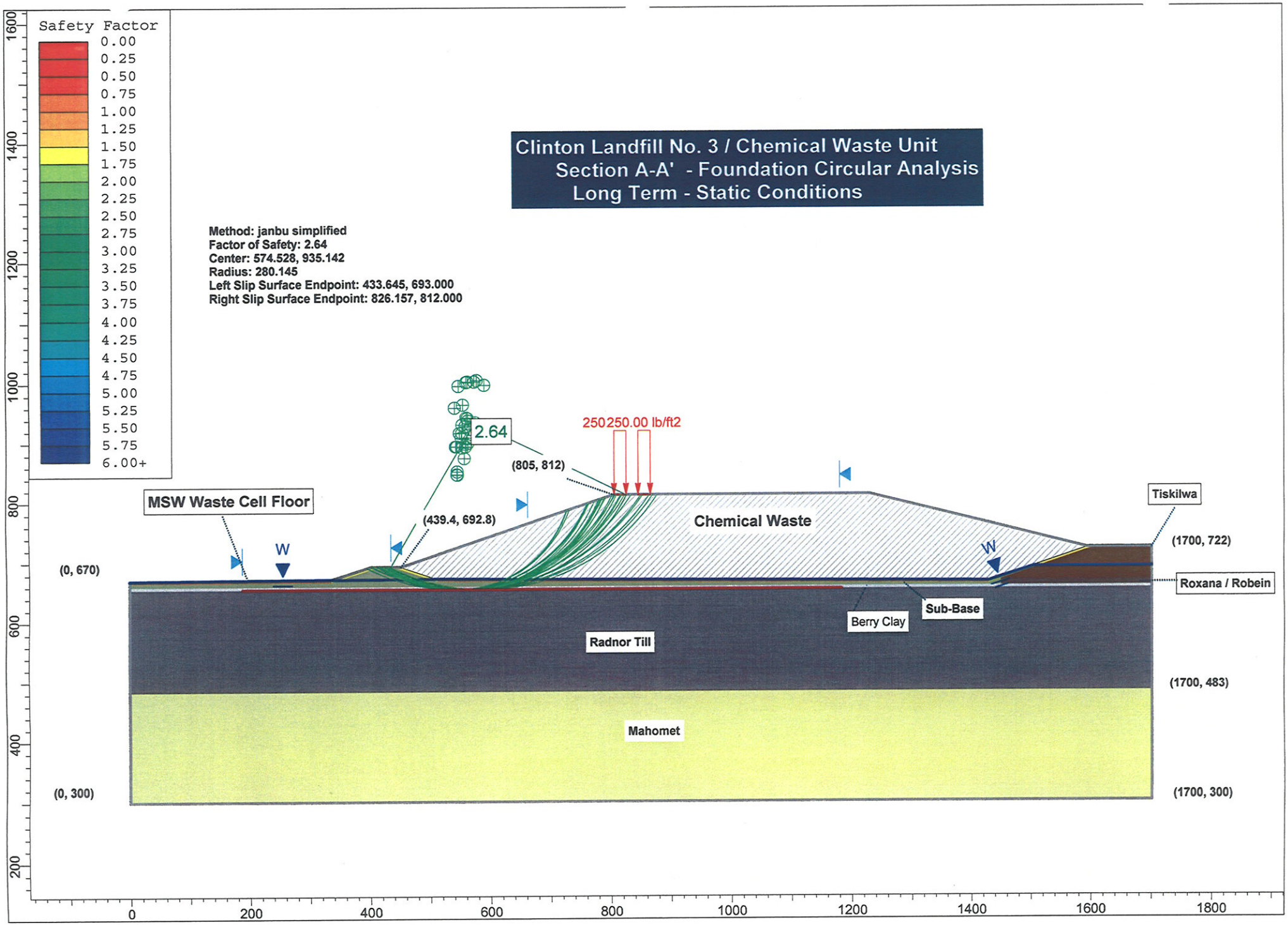
Distributed Load

865.000	812.000
845.000	812.000

Focus/Block Search Line

400.355	655.000
1184.175	655.000

CROSS SECTION A-A'
FOUNDATION CIRCULAR FAILURE
LONG TERM / STATIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section A-A' - Foundation Circular Analysis
Long Term - Static Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 2.64
Center: 574.528, 935.142
Radius: 280.145
Left Slip Surface Endpoint: 433.645, 693.000
Right Slip Surface Endpoint: 826.157, 812.000
2.64
250250.00 lb/ft2
(805, 812)
(439.4, 692.8)
MSW Waste Cell Floor
W
W
Chemical Waste
Tiskilwa
(1700, 722)
Roxana / Robein
(0, 670)
Sub-Base
Berry Clay
Radnor Till
(1700, 483)
Mahomet
(0, 300)
(1700, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200
400
600
800
1000
1200
1400
1600

Slide Analysis Information

Document Name

File Name: A-A'_LSTAT_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3 / Chemical Waste Landfill, A-A', FOUNDATION CIRCULAR, INTERIM/SEISMIC
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Maximum
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 6000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: 650
Minimum Depth: 1

Loading

2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 600 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1500 psf
Friction Angle: 19 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 7200 psf
Friction Angle: 17.7 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 240 psf
Friction Angle: 45 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3

Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 700 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3
Cohesion: 1300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 1100 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 2.641150
Center: 574.528, 935.142
Radius: 280.145
Left Slip Surface Endpoint: 433.645, 693.000
Right Slip Surface Endpoint: 826.157, 812.000
Resisting Horizontal Force=1.46254e+006 lb
Driving Horizontal Force=553752 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 6000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

0.000	669.000
335.000	671.000

Material Boundary

0.000	666.000
335.000	668.000

Material Boundary

335.000	668.000
413.000	693.000

Material Boundary

335.000	668.000
511.000	669.000
439.000	693.000

Material Boundary

448.000	693.000
508.000	673.000

Material Boundary

511.000	669.000
1428.000	663.500
1448.000	670.148
1604.000	722.000

Material Boundary

0.000	660.000
335.000	660.000
1448.000	660.000
1700.000	660.000

Material Boundary

451.000	693.000
511.000	673.000
1428.000	667.500
1592.000	722.000

Material Boundary

0.000	483.000
1700.000	483.000

Material Boundary

1448.000	670.148
1700.000	670.000

Material Boundary

335.000	660.000
335.000	668.000

Material Boundary

1448.000	660.000
1448.000	670.148

Material Boundary

1428.000	663.500
1428.000	666.500

Material Boundary

511.000	669.000
511.000	672.000

Material Boundary

335.000	668.000
335.000	671.000

Material Boundary

511.000	673.000
508.000	673.000
511.000	672.000
511.000	673.000

Material Boundary

511.000	672.000
1428.000	666.500

Material Boundary

1428.000	667.500
1431.009	667.500
1428.000	666.500
1428.000	667.500

Material Boundary

1431.009	667.500
1595.000	722.000

Material Boundary

335.000	672.000
338.136	672.000
335.000	671.000
335.000	672.000

Material Boundary

338.136	672.000
404.000	693.000

Material Boundary

0.000	655.000
1700.000	655.000

External Boundary

1700.000	300.000
1700.000	483.000
1700.000	655.000
1700.000	660.000
1700.000	670.000
1700.000	722.000
1604.000	722.000
1595.000	722.000
1592.000	722.000
1239.000	810.000
1231.000	812.000
805.000	812.000
799.000	810.000
451.000	693.000
448.000	693.000
439.000	693.000
413.000	693.000
404.000	693.000
401.000	693.000
335.000	672.000
0.000	670.000
0.000	669.000
0.000	666.000
0.000	660.000
0.000	655.000
0.000	483.000
0.000	300.000

Water Table

0.000	670.000

335.000	672.000
511.000	673.000
1428.000	667.500
1503.200	691.400
1700.000	691.400

Distributed Load

825.000	812.000
805.000	812.000

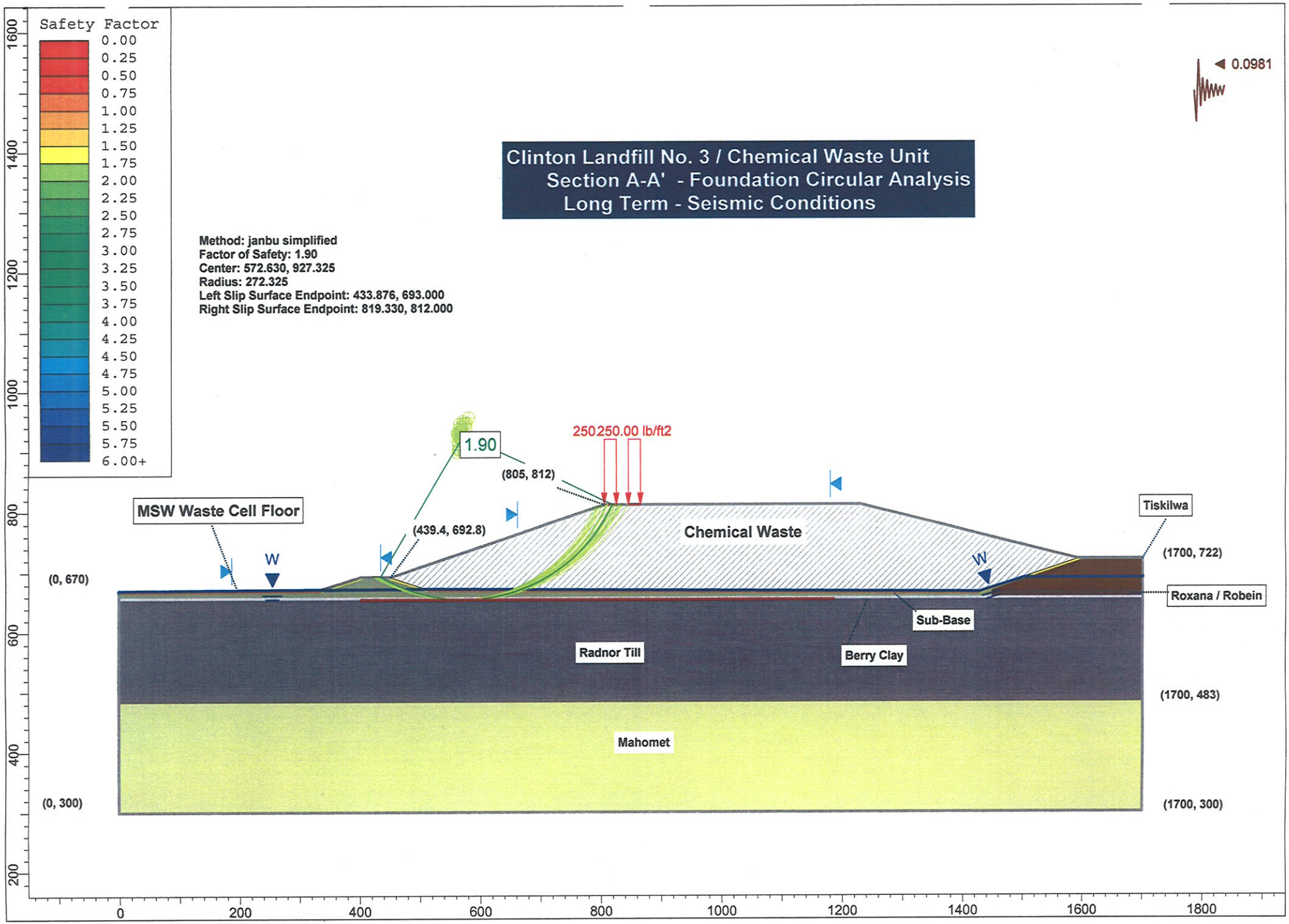
Distributed Load

865.000	812.000
845.000	812.000

Focus/Block Search Line

187.795	655.000
1182.684	655.000

CROSS SECTION A-A'
FOUNDATION CIRCULAR FAILURE
LONG TERM / SEISMIC ANALYSIS


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
0.0981
Clinton Landfill No. 3 / Chemical Waste Unit
Section A-A' - Foundation Circular Analysis
Long Term - Seismic Conditions
Method: janbu simplified
Factor of Safety: 1.90
Center: 572.630, 927.325
Radius: 272.325
Left Slip Surface Endpoint: 433.876, 693.000
Right Slip Surface Endpoint: 819.330, 812.000
1.90
250250.00 lb/ft2
(805, 812)
(439.4, 692.8)
MSW Waste Cell Floor
W
W
Chemical Waste
Tiskilwa
(1700, 722)
(0, 670)
Roxana / Robein
Sub-Base
Radnor Till
Berry Clay
(1700, 483)
Mahomet
(0, 300)
(1700, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200
400
600
800
1000
1200
1400
1600

Slide Analysis Information

Document Name

File Name: A-A'_LSEIS_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3 / Chemical Waste Landfill, A-A', FOUNDATION CIRCULAR, INTERIM/SEISMIC
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Maximum
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 6000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: 660
Minimum Depth: 1

Loading

Seismic Load Coefficient (Horizontal): 0.0981
2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250

lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 600 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1500 psf
Friction Angle: 19 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 7200 psf
Friction Angle: 17.7 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 240 psf
Friction Angle: 45 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3

Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 700 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3
Cohesion: 1300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 1100 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.900350
Center: 572.630, 927.325
Radius: 272.325
Left Slip Surface Endpoint: 433.876, 693.000
Right Slip Surface Endpoint: 819.330, 812.000
Resisting Horizontal Force=1.35949e+006 lb
Driving Horizontal Force=715390 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 6000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

0.000	669.000
335.000	671.000

Material Boundary

0.000	666.000
335.000	668.000

Material Boundary

335.000	668.000
413.000	693.000

Material Boundary

335.000	668.000
511.000	669.000
439.000	693.000

Material Boundary

448.000	693.000
508.000	673.000

Material Boundary

511.000	669.000
1428.000	663.500
1448.000	670.148
1604.000	722.000

Material Boundary

0.000	660.000
335.000	660.000
1448.000	660.000

1700.000	660.000

Material Boundary

451.000	693.000
511.000	673.000
1428.000	667.500
1592.000	722.000

Material Boundary

0.000	483.000
1700.000	483.000

Material Boundary

1448.000	670.148
1700.000	670.000

Material Boundary

335.000	660.000
335.000	668.000

Material Boundary

1448.000	660.000
1448.000	670.148

Material Boundary

1428.000	663.500
1428.000	666.500

Material Boundary

511.000	669.000
511.000	672.000

Material Boundary

335.000	668.000
335.000	671.000

Material Boundary

511.000	673.000
508.000	673.000
511.000	672.000
511.000	673.000

Material Boundary

511.000	672.000
1428.000	666.500

Material Boundary

1428.000	667.500
1431.009	667.500
1428.000	666.500

1428.000	667.500

Material Boundary

1431.009	667.500
1595.000	722.000

Material Boundary

335.000	672.000
338.136	672.000
335.000	671.000
335.000	672.000

Material Boundary

338.136	672.000
404.000	693.000

Material Boundary

0.000	655.000
1700.000	655.000

External Boundary

1700.000	300.000
1700.000	483.000
1700.000	655.000
1700.000	660.000
1700.000	670.000
1700.000	722.000
1604.000	722.000
1595.000	722.000
1592.000	722.000
1239.000	810.000
1231.000	812.000
805.000	812.000
799.000	810.000
451.000	693.000
448.000	693.000
439.000	693.000
413.000	693.000
404.000	693.000
401.000	693.000
335.000	672.000
0.000	670.000
0.000	669.000
0.000	666.000
0.000	660.000
0.000	655.000
0.000	483.000
0.000	300.000

Water Table

0.000	670.000
335.000	672.000
511.000	673.000
1428.000	667.500
1503.200	691.400
1700.000	691.400

Distributed Load

825.000	812.000
805.000	812.000

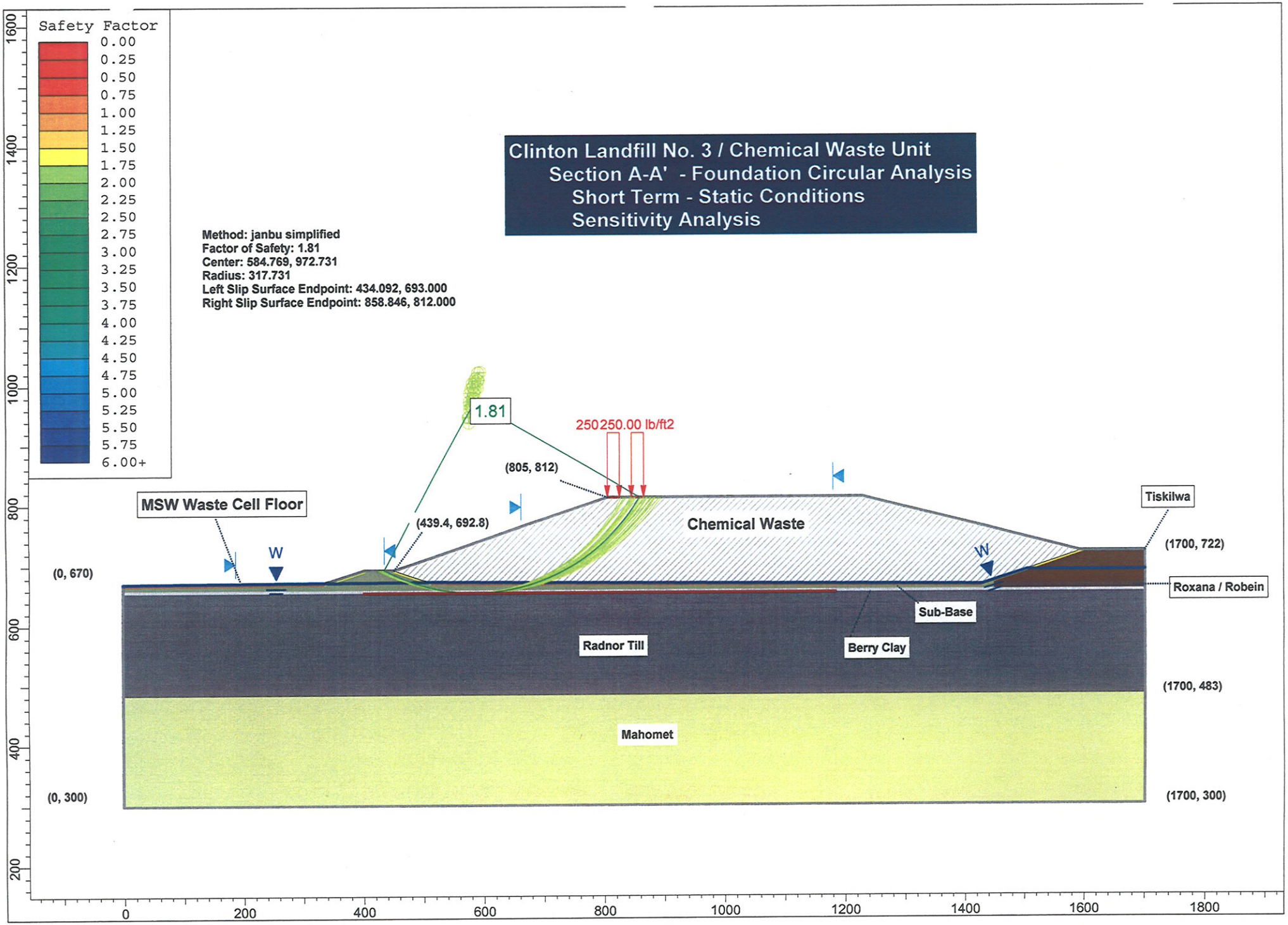
Distributed Load

865.000	812.000
845.000	812.000

Focus/Block Search Line

401.374	655.000
1185.194	655.000

CROSS SECTION A-A'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / STATIC ANALYSIS
SENSITIVITY ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section A-A' - Foundation Circular Analysis
Short Term - Static Conditions
Sensitivity Analysis
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 1.81
Center: 584.769, 972.731
Radius: 317.731
Left Slip Surface Endpoint: 434.092, 693.000
Right Slip Surface Endpoint: 858.846, 812.000
1.81
250250.00 lb/ft2
(805, 812)
(439.4, 692.8)
MSW Waste Cell Floor
W
W
Chemical Waste
Tiskilwa
(1700, 722)
Roxana / Robein
(0, 670)
Sub-Base
Radnor Till
Berry Clay
(1700, 483)
Mahomet
(0, 300)
(1700, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200
400
600
800
1000
1200
1400
1600

Slide Analysis Information

Document Name

File Name: A-A'_SSTAT_FC(sens1).sli

Project Settings

Project Title: Clinton Landfill No. 3 / Chemical Waste Landfill, A-A', FOUNDATION CIRCULAR, INTERIM/SEISMIC
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Maximum
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 6000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: 660
Minimum Depth: 1

Loading

2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3

Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2520 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.805540
Center: 584.769, 972.731
Radius: 317.731
Left Slip Surface Endpoint: 434.092, 693.000
Right Slip Surface Endpoint: 858.846, 812.000
Resisting Horizontal Force=1.16465e+006 lb
Driving Horizontal Force=645045 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 6000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

0.000	669.000
335.000	671.000

Material Boundary

0.000	666.000
335.000	668.000

Material Boundary

335.000	668.000
413.000	693.000

Material Boundary

335.000	668.000
511.000	669.000
439.000	693.000

Material Boundary

448.000	693.000
508.000	673.000

Material Boundary

511.000	669.000
1428.000	663.500
1448.000	670.148
1604.000	722.000

Material Boundary

0.000	660.000
335.000	660.000
1448.000	660.000
1700.000	660.000

Material Boundary

451.000	693.000
511.000	673.000
1428.000	667.500
1592.000	722.000

Material Boundary

0.000	483.000
1700.000	483.000

Material Boundary

1448.000	670.148
1700.000	670.000

Material Boundary

335.000	660.000
335.000	668.000

Material Boundary

1448.000	660.000
1448.000	670.148

Material Boundary

1428.000	663.500
1428.000	666.500

Material Boundary

511.000	669.000
511.000	672.000

Material Boundary

335.000	668.000
335.000	671.000

Material Boundary

511.000	673.000
508.000	673.000
511.000	672.000
511.000	673.000

Material Boundary

511.000	672.000
1428.000	666.500

Material Boundary

1428.000	667.500
1431.009	667.500
1428.000	666.500
1428.000	667.500

Material Boundary

1431.009	667.500
1595.000	722.000

Material Boundary

335.000	672.000
338.136	672.000
335.000	671.000
335.000	672.000

Material Boundary

338.136	672.000
404.000	693.000

Material Boundary

0.000	655.000
1700.000	655.000

External Boundary

1700.000	300.000
1700.000	483.000
1700.000	655.000
1700.000	660.000
1700.000	670.000
1700.000	722.000
1604.000	722.000
1595.000	722.000
1592.000	722.000
1239.000	810.000
1231.000	812.000
805.000	812.000
799.000	810.000
451.000	693.000
448.000	693.000
439.000	693.000
413.000	693.000
404.000	693.000
401.000	693.000
335.000	672.000
0.000	670.000
0.000	669.000
0.000	666.000
0.000	660.000
0.000	655.000
0.000	483.000
0.000	300.000

Water Table

0.000	670.000

335.000	672.000
511.000	673.000
1428.000	667.500
1503.200	691.400
1700.000	691.400

Distributed Load

825.000	812.000
805.000	812.000

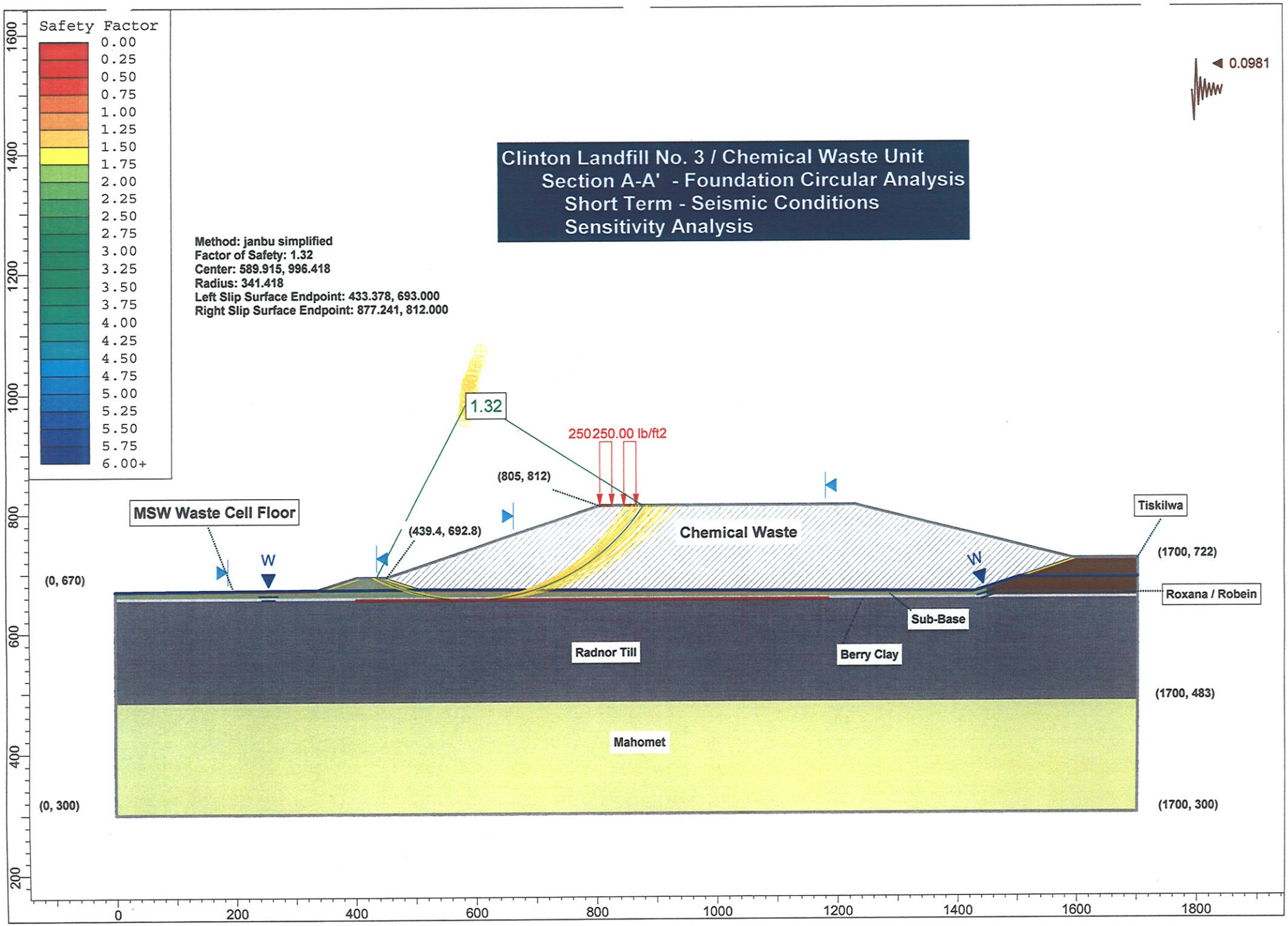
Distributed Load

865.000	812.000
845.000	812.000

Focus/Block Search Line

400.355	655.000
1184.175	655.000

CROSS SECTION A-A'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / SEISMIC ANALYSIS
SENSITIVITY ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section A-A' - Foundation Circular Analysis
Short Term - Seismic Conditions
Sensitivity Analysis
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 1.32
Center: 589.915, 996.418
Radius: 341.418
Left Slip Surface Endpoint: 433.378, 693.000
Right Slip Surface Endpoint: 877.241, 812.000
0.0981
1.32
250250.00 lb/ft2
(805, 812)
(439.4, 692.8)
MSW Waste Cell Floor
W
W
Chemical Waste
Tiskilwa
(1700, 722)
(0, 670)
Roxana / Robein
Sub-Base
Radnor Till
Berry Clay
(1700, 483)
Mahomet
(0, 300)
(1700, 300)
0
200
400
600
800
1000
1200
1400
1600
1800

Slide Analysis Information

Document Name

File Name: A-A'_SSEIS_FC(sens1).sli

Project Settings

Project Title: Clinton Landfill No. 3 / Chemical Waste Landfill, A-A', FOUNDATION CIRCULAR, INTERIM/SEISMIC
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Maximum
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 6000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: 660
Minimum Depth: 1

Loading

Seismic Load Coefficient (Horizontal): 0.0981
2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250

lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3

Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2520 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.324770
Center: 589.915, 996.418
Radius: 341.418
Left Slip Surface Endpoint: 433.378, 693.000
Right Slip Surface Endpoint: 877.241, 812.000
Resisting Horizontal Force=1.21234e+006 lb
Driving Horizontal Force=915135 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 6000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

0.000	669.000
335.000	671.000

Material Boundary

0.000	666.000
335.000	668.000

Material Boundary

335.000	668.000
413.000	693.000

Material Boundary

335.000	668.000
511.000	669.000
439.000	693.000

Material Boundary

448.000	693.000
508.000	673.000

Material Boundary

511.000	669.000
1428.000	663.500
1448.000	670.148
1604.000	722.000

Material Boundary

0.000	660.000
335.000	660.000
1448.000	660.000

1700.000	660.000

Material Boundary

451.000	693.000
511.000	673.000
1428.000	667.500
1592.000	722.000

Material Boundary

0.000	483.000
1700.000	483.000

Material Boundary

1448.000	670.148
1700.000	670.000

Material Boundary

335.000	660.000
335.000	668.000

Material Boundary

1448.000	660.000
1448.000	670.148

Material Boundary

1428.000	663.500
1428.000	666.500

Material Boundary

511.000	669.000
511.000	672.000

Material Boundary

335.000	668.000
335.000	671.000

Material Boundary

511.000	673.000
508.000	673.000
511.000	672.000
511.000	673.000

Material Boundary

511.000	672.000
1428.000	666.500

Material Boundary

1428.000	667.500
1431.009	667.500
1428.000	666.500

1428.000	667.500

Material Boundary

1431.009	667.500
1595.000	722.000

Material Boundary

335.000	672.000
338.136	672.000
335.000	671.000
335.000	672.000

Material Boundary

338.136	672.000
404.000	693.000

Material Boundary

0.000	655.000
1700.000	655.000

External Boundary

1700.000	300.000
1700.000	483.000
1700.000	655.000
1700.000	660.000
1700.000	670.000
1700.000	722.000
1604.000	722.000
1595.000	722.000
1592.000	722.000
1239.000	810.000
1231.000	812.000
805.000	812.000
799.000	810.000
451.000	693.000
448.000	693.000
439.000	693.000
413.000	693.000
404.000	693.000
401.000	693.000
335.000	672.000
0.000	670.000
0.000	669.000
0.000	666.000
0.000	660.000
0.000	655.000
0.000	483.000
0.000	300.000

Water Table

0.000	670.000
335.000	672.000
511.000	673.000
1428.000	667.500
1503.200	691.400
1700.000	691.400

Distributed Load

825.000	812.000
805.000	812.000

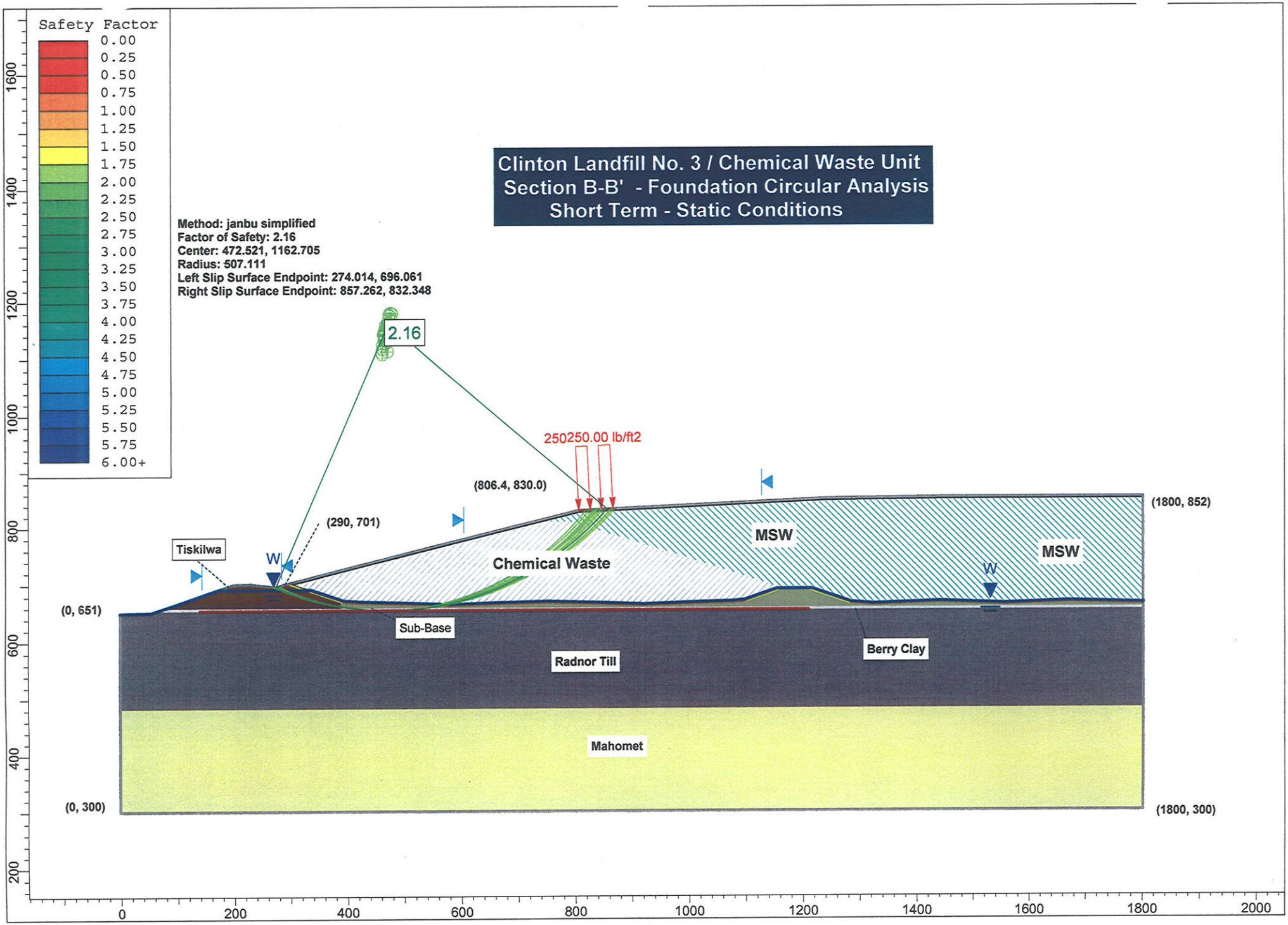
Distributed Load

865.000	812.000
845.000	812.000

Focus/Block Search Line

400.355	655.000
1184.175	655.000

CROSS SECTION B-B'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / STATIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section B-B' - Foundation Circular Analysis
Short Term - Static Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 2.16
Center: 472.521, 1162.705
Radius: 507.111
Left Slip Surface Endpoint: 274.014, 696.061
Right Slip Surface Endpoint: 857.262, 832.348
2.16
250250.00 lb/ft2
(806.4, 830.0)
(290, 701)
(1800, 852)
Tiskilwa
W
Chemical Waste
MSW
MSW
W
(0, 651)
Sub-Base
Radnor Till
Berry Clay
Mahomet
(0, 300)
(1800, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
2000

Slide Analysis Information

Document Name

File Name: B-B'_SSTAT_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3/ Chemical Waste Unit, B-B' FOUNDATION CIRCULAR, SHORT TERM/STATIC
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: 668
Minimum Depth: 1

Loading

2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Final Cover
Strength Type: Mohr-Coulomb
Unit Weight: 128 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: None

Material: MSW
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 75 lb/ft3
Saturated Unit Weight: 75 lb/ft3
Cohesion: 500 psf

Friction Angle: 30 degrees
Water Surface: None

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3

Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2940 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 2.160110
Center: 472.521, 1162.705
Radius: 507.111
Left Slip Surface Endpoint: 274.014, 696.061
Right Slip Surface Endpoint: 857.262, 832.348
Resisting Horizontal Force=1.71396e+006 lb
Driving Horizontal Force=793460 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 5000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

107.600	670.000
387.137	670.000
387.300	670.000
387.300	669.947
387.300	660.000

Material Boundary

290.200	701.000
292.200	701.000
301.900	701.000

Material Boundary

0.000	483.000
1800.000	483.000

Material Boundary

292.200	701.000
387.137	670.000
387.300	669.947
390.200	669.000
420.900	667.000
497.900	665.000
579.600	662.000
661.400	665.000
749.700	667.000
838.500	665.000
920.200	662.000
1001.800	665.000
1079.100	667.000
1099.500	669.000
1160.500	689.000
1209.500	689.000
1282.400	665.000
1324.900	662.000
1449.400	666.000
1555.000	662.000
1670.200	666.000
1800.000	662.600

Material Boundary

77.600	660.000
387.300	660.000
1800.000	660.000

Material Boundary

301.900	701.000
390.800	672.000
421.000	670.000
498.000	668.000
579.600	665.000
661.300	668.000
749.700	670.000
838.600	668.000
920.200	665.000
1001.700	668.000
1078.900	670.000
1098.900	672.000
1103.132	673.385

Material Boundary

1160.000	693.600
1210.000	693.600

Material Boundary

1670.200	669.000
1800.000	665.600

Material Boundary

306.700	701.000
393.000	672.900

Material Boundary

306.700	701.000
526.600	756.100
807.000	826.000
1023.200	836.000
1240.500	846.000
1453.900	848.000
1668.100	848.000
1800.000	848.000

Material Boundary

306.700	701.000
742.900	810.000
795.500	810.000
1139.600	700.000
1160.000	693.600

Material Boundary

1210.000	693.600
1650.800	840.000
1708.000	847.000
1800.000	847.000

Material Boundary

386.900	673.300
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900

Material Boundary

306.700	701.000
301.900	701.000
386.900	673.300

Material Boundary

1285.200	668.800
1325.000	666.000

1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Material Boundary

1210.000	693.600
1285.200	668.800
1279.100	669.300
1210.000	692.000
1210.000	693.600

Material Boundary

1210.000	692.000
1282.982	667.980
1325.000	665.000
1441.400	669.000
1555.000	665.000
1670.200	669.000

Material Boundary

1282.400	665.000
1282.982	667.980

Material Boundary

1209.500	689.000
1210.000	692.000

Material Boundary

1160.000	692.000
1160.500	689.000

Material Boundary

1098.900	672.000
1099.500	669.000

Material Boundary

390.200	669.000
390.800	672.000

Material Boundary

1097.600	672.900
1160.000	693.600
1160.000	692.000
1103.132	673.385
1097.600	672.900

Material Boundary

1160.000	693.600
1160.000	693.700

Material Boundary

62.475	655.000
1800.000	655.000

External Boundary

1800.000	300.000
1800.000	483.000
1800.000	655.000
1800.000	660.000
1800.000	662.600
1800.000	665.600
1800.000	666.600
1800.000	847.000
1800.000	848.000
1800.000	852.000
1668.100	852.000
1453.900	852.000
1240.400	850.000
1023.000	840.000
806.400	830.000
525.600	760.000
318.500	708.000
290.200	701.000
287.400	701.000
285.500	700.000
274.600	696.000
236.100	700.000
231.000	701.000
197.700	700.000
107.600	670.000
77.600	660.000
62.475	655.000
53.400	652.000
0.000	651.000
0.000	483.000
0.000	300.000

Water Table

0.000	651.000
53.400	652.000
77.600	660.000
107.600	670.000
171.813	691.381
336.243	691.381
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000

749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900
1153.374	691.402
1216.665	691.402
1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Distributed Load

826.441	830.925
806.400	830.000

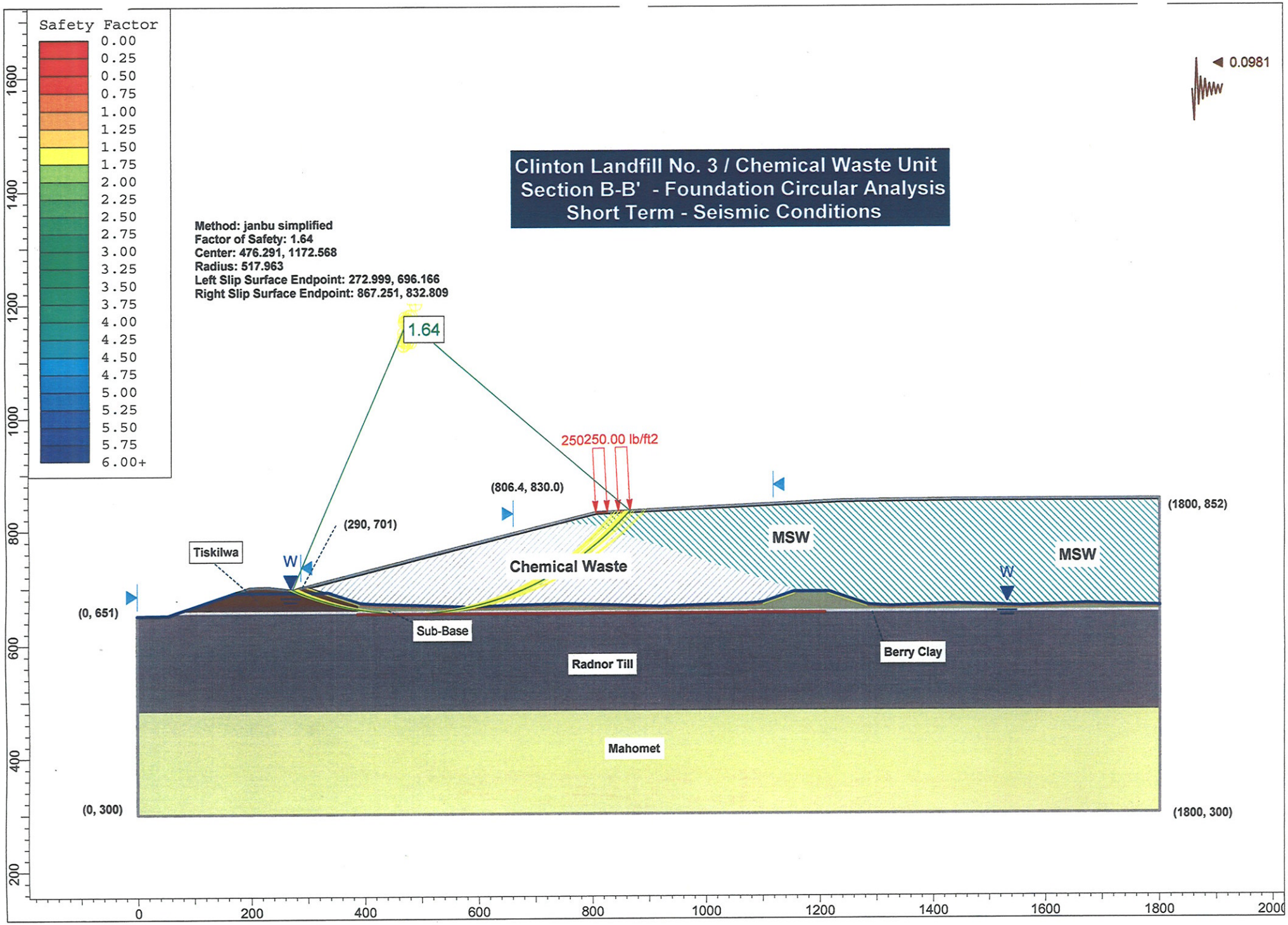
Distributed Load

866.472	832.773
846.043	831.830

Focus/Block Search Line

140.235	655.594
1209.367	655.594

CROSS SECTION B-B'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / SEISMIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section B-B' - Foundation Circular Analysis
Short Term - Seismic Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 1.64
Center: 476.291, 1172.568
Radius: 517.963
Left Slip Surface Endpoint: 272.999, 696.166
Right Slip Surface Endpoint: 867.251, 832.809
1.64
250250.00 lb/ft2
0.0981
(806.4, 830.0)
(290, 701)
(1800, 852)
(0, 651)
(0, 300)
(1800, 300)
Tiskilwa
W
Chemical Waste
MSW
MSW
W
Sub-Base
Radnor Till
Berry Clay
Mahomet
0
200
400
600
800
1000
1200
1400
1600
1800
2000
200
400
600
800
1000
1200
1400
1600

Slide Analysis Information

Document Name

File Name: B-B'_SSEIS_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3/ Chemical Waste Unit, B-B' FOUNDATION CIRCULAR, SHORT TERM/STATIC
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: 668
Minimum Depth: 1

Loading

Seismic Load Coefficient (Horizontal): 0.0981
2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250

lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Final Cover
Strength Type: Mohr-Coulomb
Unit Weight: 128 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: None

Material: MSW
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 75 lb/ft3
Saturated Unit Weight: 75 lb/ft3

Cohesion: 500 psf
Friction Angle: 30 degrees
Water Surface: None

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3

Saturated Unit Weight: 134 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2940 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.635390
Center: 476.291, 1172.568
Radius: 517.963
Left Slip Surface Endpoint: 272.999, 696.166
Right Slip Surface Endpoint: 867.251, 832.809
Resisting Horizontal Force=1.95628e+006 lb
Driving Horizontal Force=1.19621e+006 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 5000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

107.600	670.000
387.137	670.000
387.300	670.000
387.300	669.947
387.300	660.000

Material Boundary

290.200	701.000
292.200	701.000
301.900	701.000

Material Boundary

292.200	701.000
387.137	670.000
387.300	669.947

390.200	669.000
420.900	667.000
497.900	665.000
579.600	662.000
661.400	665.000
749.700	667.000
838.500	665.000
920.200	662.000
1001.800	665.000
1079.100	667.000
1099.500	669.000
1160.500	689.000
1209.500	689.000
1282.400	665.000
1324.900	662.000
1449.400	666.000
1555.000	662.000
1670.200	666.000
1800.000	662.600

Material Boundary

77.600	660.000
387.300	660.000
1800.000	660.000

Material Boundary

301.900	701.000
390.800	672.000
421.000	670.000
498.000	668.000
579.600	665.000
661.300	668.000
749.700	670.000
838.600	668.000
920.200	665.000
1001.700	668.000
1078.900	670.000
1098.900	672.000
1103.132	673.385

Material Boundary

1160.000	693.600
1210.000	693.600

Material Boundary

1670.200	669.000
1800.000	665.600

Material Boundary

306.700	701.000

393.000	672.900

Material Boundary

306.700	701.000
526.600	756.100
807.000	826.000
1023.200	836.000
1240.500	846.000
1453.900	848.000
1668.100	848.000
1800.000	848.000

Material Boundary

306.700	701.000
742.900	810.000
795.500	810.000
1139.600	700.000
1160.000	693.600

Material Boundary

1210.000	693.600
1650.800	840.000
1708.000	847.000
1800.000	847.000

Material Boundary

386.900	673.300
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900

Material Boundary

306.700	701.000
301.900	701.000
386.900	673.300

Material Boundary

1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000

1800.000	666.600

Material Boundary

1210.000	693.600
1285.200	668.800
1279.100	669.300
1210.000	692.000
1210.000	693.600

Material Boundary

1210.000	692.000
1282.982	667.980
1325.000	665.000
1441.400	669.000
1555.000	665.000
1670.200	669.000

Material Boundary

1282.400	665.000
1282.982	667.980

Material Boundary

1209.500	689.000
1210.000	692.000

Material Boundary

1160.000	692.000
1160.500	689.000

Material Boundary

1098.900	672.000
1099.500	669.000

Material Boundary

390.200	669.000
390.800	672.000

Material Boundary

1097.600	672.900
1160.000	693.600
1160.000	692.000
1103.132	673.385
1097.600	672.900

Material Boundary

1160.000	693.600
1160.000	693.700

Material Boundary

62.475	655.000

1800.000	655.000

Material Boundary

0.000	483.000
1800.000	483.000

External Boundary

1800.000	300.000
1800.000	483.000
1800.000	655.000
1800.000	660.000
1800.000	662.600
1800.000	665.600
1800.000	666.600
1800.000	847.000
1800.000	848.000
1800.000	852.000
1668.100	852.000
1453.900	852.000
1240.400	850.000
1023.000	840.000
806.400	830.000
525.600	760.000
318.500	708.000
290.200	701.000
287.400	701.000
285.500	700.000
274.600	696.000
236.100	700.000
231.000	701.000
197.700	700.000
107.600	670.000
77.600	660.000
62.475	655.000
53.400	652.000
0.000	651.000
0.000	483.000
0.000	300.000

Water Table

0.000	651.000
53.400	652.000
77.600	660.000
107.600	670.000
171.813	691.381
336.243	691.381
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000

661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900
1153.374	691.402
1216.665	691.402
1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Distributed Load

826.441	830.925
806.400	830.000

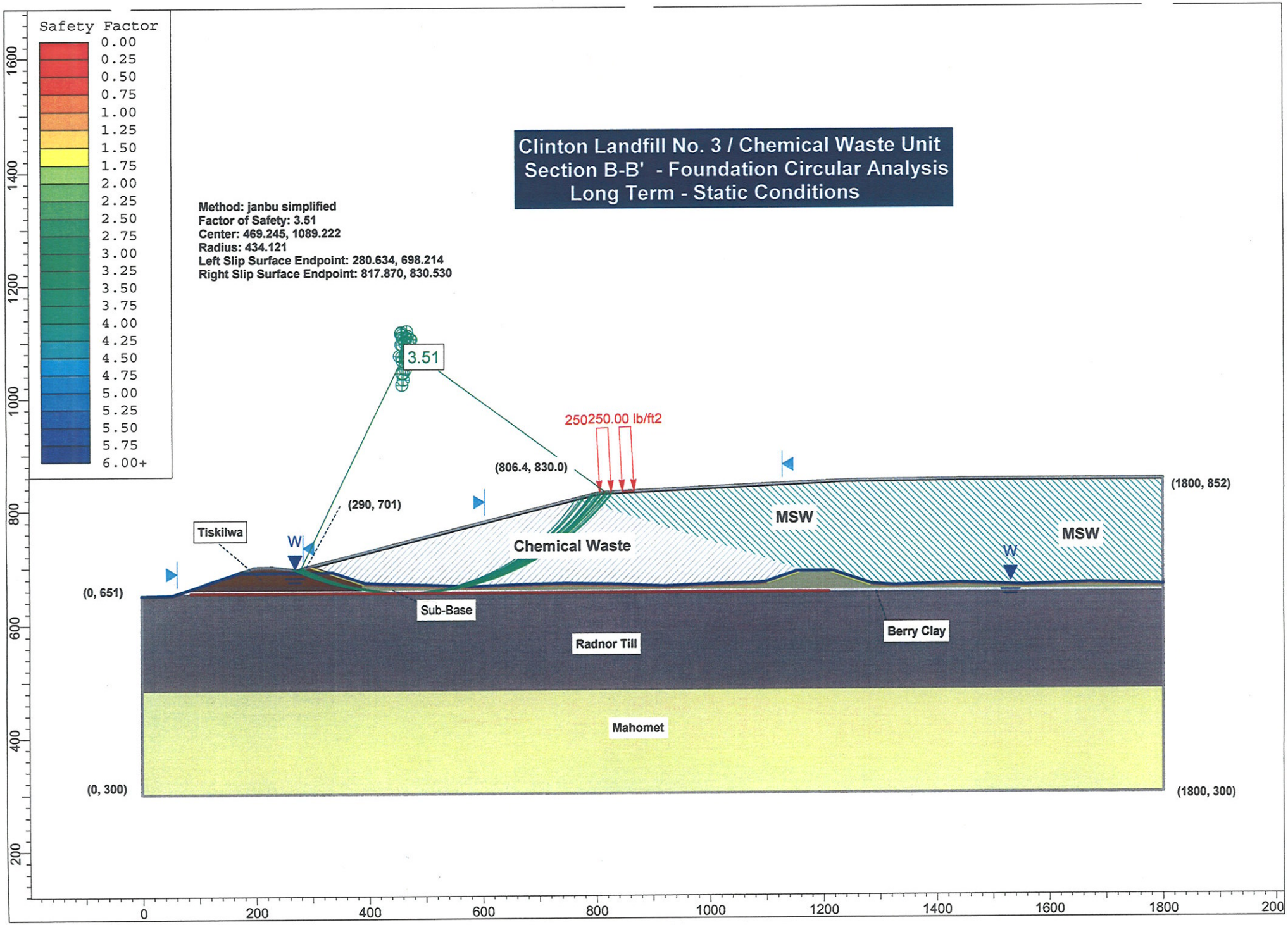
Distributed Load

866.472	832.773
846.043	831.830

Focus/Block Search Line

386.792	654.507
1208.774	655.402

CROSS SECTION B-B'
FOUNDATION CIRCULAR FAILURE
LONG TERM / STATIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section B-B' - Foundation Circular Analysis
Long Term - Static Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 3.51
Center: 469.245, 1089.222
Radius: 434.121
Left Slip Surface Endpoint: 280.634, 698.214
Right Slip Surface Endpoint: 817.870, 830.530
3.51
250250.00 lb/ft2
(806.4, 830.0)
(290, 701)
(1800, 852)
Tiskilwa
W
Chemical Waste
MSW
MSW
W
(0, 651)
Sub-Base
Radnor Till
Berry Clay
Mahomet
(0, 300)
(1800, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200

Slide Analysis Information

Document Name

File Name: B-B'_LSTAT_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3/ Chemical Waste Unit, B-B' FOUNDATION CIRCULAR, LONG TERM/STATIC
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: 668
Minimum Depth: 1

Loading

2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 600 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1500 psf
Friction Angle: 19 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 7200 psf
Friction Angle: 17.7 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Final Cover
Strength Type: Mohr-Coulomb
Unit Weight: 128 lb/ft3
Cohesion: 1300 psf
Friction Angle: 22 degrees
Water Surface: None

Material: MSW
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 75 lb/ft3
Saturated Unit Weight: 75 lb/ft3
Cohesion: 500 psf

Friction Angle: 30 degrees
Water Surface: None

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 240 psf
Friction Angle: 45 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 700 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3

Cohesion: 1300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 1100 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 3.512800
Center: 469.245, 1089.222
Radius: 434.121
Left Slip Surface Endpoint: 280.634, 698.214
Right Slip Surface Endpoint: 817.870, 830.530
Resisting Horizontal Force=2.45433e+006 lb
Driving Horizontal Force=698682 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 5000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

107.600	670.000
387.137	670.000
387.300	670.000
387.300	669.947
387.300	660.000

Material Boundary

290.200	701.000
292.200	701.000
301.900	701.000

Material Boundary

0.000	483.000
1800.000	483.000

Material Boundary

292.200	701.000
387.137	670.000
387.300	669.947
390.200	669.000
420.900	667.000
497.900	665.000
579.600	662.000
661.400	665.000
749.700	667.000
838.500	665.000
920.200	662.000
1001.800	665.000
1079.100	667.000
1099.500	669.000
1160.500	689.000
1209.500	689.000
1282.400	665.000
1324.900	662.000
1449.400	666.000
1555.000	662.000
1670.200	666.000
1800.000	662.600

Material Boundary

77.600	660.000
387.300	660.000
1800.000	660.000

Material Boundary

301.900	701.000
390.800	672.000
421.000	670.000
498.000	668.000
579.600	665.000
661.300	668.000
749.700	670.000
838.600	668.000
920.200	665.000
1001.700	668.000
1078.900	670.000
1098.900	672.000
1103.132	673.385

Material Boundary

1160.000	693.600
1210.000	693.600

Material Boundary

1670.200	669.000
1800.000	665.600

Material Boundary

306.700	701.000
393.000	672.900

Material Boundary

306.700	701.000
526.600	756.100
807.000	826.000
1023.200	836.000
1240.500	846.000
1453.900	848.000
1668.100	848.000
1800.000	848.000

Material Boundary

306.700	701.000
742.900	810.000
795.500	810.000
1139.600	700.000
1160.000	693.600

Material Boundary

1210.000	693.600
1650.800	840.000
1708.000	847.000
1800.000	847.000

Material Boundary

386.900	673.300
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900

Material Boundary

306.700	701.000
301.900	701.000
386.900	673.300

Material Boundary

1285.200	668.800
1325.000	666.000

1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Material Boundary

1210.000	693.600
1285.200	668.800
1279.100	669.300
1210.000	692.000
1210.000	693.600

Material Boundary

1210.000	692.000
1282.982	667.980
1325.000	665.000
1441.400	669.000
1555.000	665.000
1670.200	669.000

Material Boundary

1282.400	665.000
1282.982	667.980

Material Boundary

1209.500	689.000
1210.000	692.000

Material Boundary

1160.000	692.000
1160.500	689.000

Material Boundary

1098.900	672.000
1099.500	669.000

Material Boundary

390.200	669.000
390.800	672.000

Material Boundary

1097.600	672.900
1160.000	693.600
1160.000	692.000
1103.132	673.385
1097.600	672.900

Material Boundary

1160.000	693.600
1160.000	693.700

Material Boundary

62.475	655.000
1800.000	655.000

External Boundary

1800.000	300.000
1800.000	483.000
1800.000	655.000
1800.000	660.000
1800.000	662.600
1800.000	665.600
1800.000	666.600
1800.000	847.000
1800.000	848.000
1800.000	852.000
1668.100	852.000
1453.900	852.000
1240.400	850.000
1023.000	840.000
806.400	830.000
525.600	760.000
318.500	708.000
290.200	701.000
287.400	701.000
285.500	700.000
274.600	696.000
236.100	700.000
231.000	701.000
197.700	700.000
107.600	670.000
77.600	660.000
62.475	655.000
53.400	652.000
0.000	651.000
0.000	483.000
0.000	300.000

Water Table

0.000	651.000
53.400	652.000
77.600	660.000
107.600	670.000
171.813	691.381
336.243	691.381
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000

749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900
1153.374	691.402
1216.665	691.402
1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Distributed Load

826.441	830.925
806.400	830.000

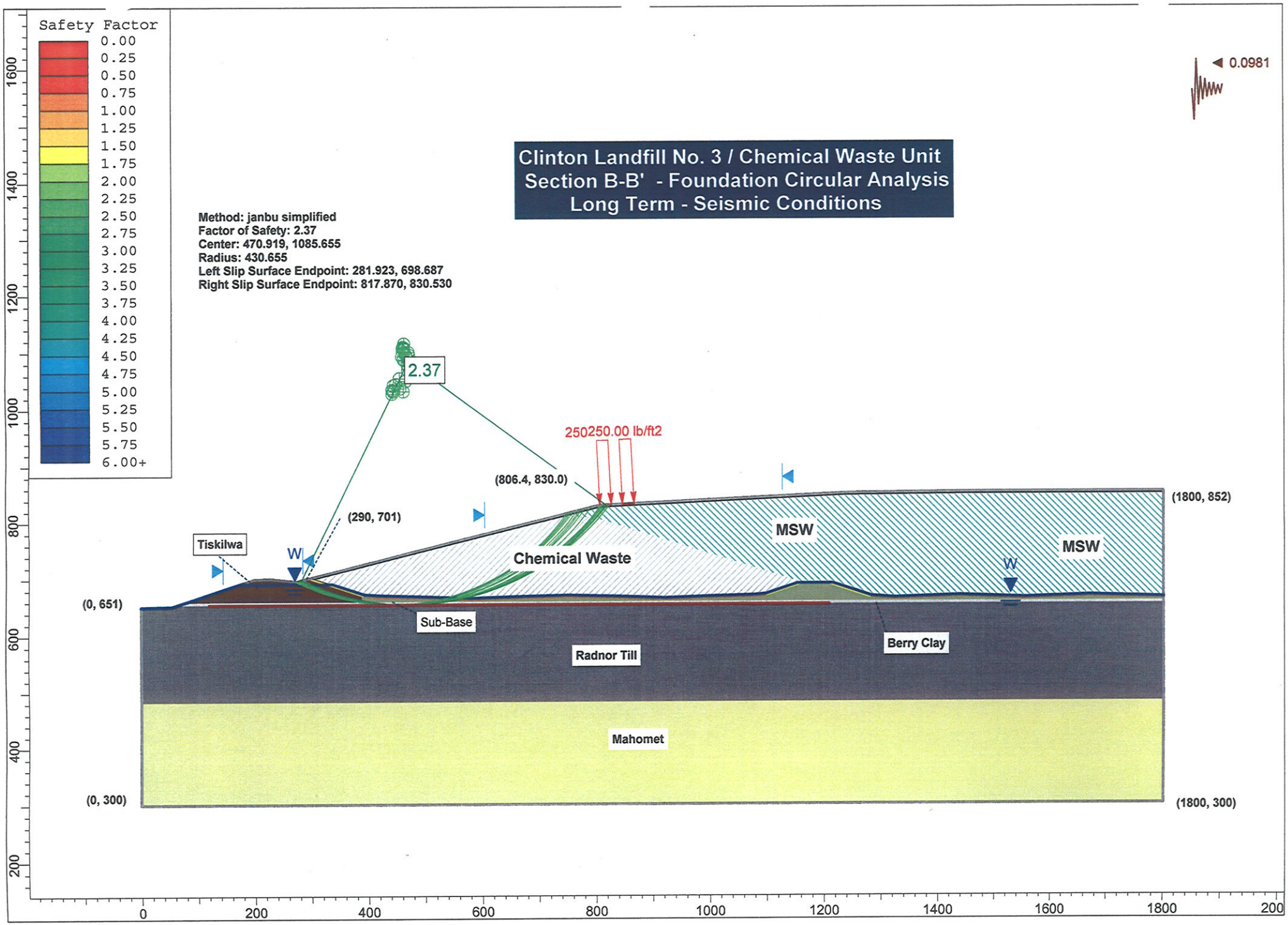
Distributed Load

866.472	832.773
846.043	831.830

Focus/Block Search Line

86.192	655.101
1209.250	655.101

CROSS SECTION B-B'
FOUNDATION CIRCULAR FAILURE
LONG TERM / SEISMIC ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section B-B' - Foundation Circular Analysis
Long Term - Seismic Conditions
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 2.37
Center: 470.919, 1085.655
Radius: 430.655
Left Slip Surface Endpoint: 281.923, 698.687
Right Slip Surface Endpoint: 817.870, 830.530
0.0981
2.37
250250.00 lb/ft2
(806.4, 830.0)
(290, 701)
(1800, 852)
Tiskilwa
W
Chemical Waste
MSW
MSW
W
(0, 651)
Sub-Base
Radnor Till
Berry Clay
Mahomet
(0, 300)
(1800, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200

Slide Analysis Information

Document Name

File Name: B-B'_LSEIS_FC(revised).sli

Project Settings

Project Title: Clinton Landfill No. 3/ Chemical Waste Unit, B-B' FOUNDATION CIRCULAR, LONG TERM/SEISMIC
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: 668
Minimum Depth: 1

Loading

Seismic Load Coefficient (Horizontal): 0.0981
2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250

lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 600 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1500 psf
Friction Angle: 19 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 7200 psf
Friction Angle: 17.7 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Final Cover
Strength Type: Mohr-Coulomb
Unit Weight: 128 lb/ft3
Cohesion: 1300 psf
Friction Angle: 22 degrees
Water Surface: None

Material: MSW
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 75 lb/ft3
Saturated Unit Weight: 75 lb/ft3

Cohesion: 500 psf
Friction Angle: 30 degrees
Water Surface: None

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 240 psf
Friction Angle: 45 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 700 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3

Saturated Unit Weight: 134 lb/ft3
Cohesion: 1300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 1100 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 2.367130
Center: 470.919, 1085.655
Radius: 430.655
Left Slip Surface Endpoint: 281.923, 698.687
Right Slip Surface Endpoint: 817.870, 830.530
Resisting Horizontal Force=2.36623e+006 lb
Driving Horizontal Force=999621 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 5000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

107.600	670.000
387.137	670.000
387.300	670.000
387.300	669.947
387.300	660.000

Material Boundary

290.200	701.000
292.200	701.000
301.900	701.000

Material Boundary

0.000	483.000
1800.000	483.000

Material Boundary

292.200	701.000
387.137	670.000
387.300	669.947
390.200	669.000
420.900	667.000
497.900	665.000
579.600	662.000
661.400	665.000
749.700	667.000
838.500	665.000
920.200	662.000
1001.800	665.000
1079.100	667.000
1099.500	669.000
1160.500	689.000
1209.500	689.000
1282.400	665.000
1324.900	662.000
1449.400	666.000
1555.000	662.000
1670.200	666.000
1800.000	662.600

Material Boundary

77.600	660.000
387.300	660.000
1800.000	660.000

Material Boundary

301.900	701.000
390.800	672.000
421.000	670.000
498.000	668.000
579.600	665.000
661.300	668.000
749.700	670.000
838.600	668.000
920.200	665.000
1001.700	668.000
1078.900	670.000
1098.900	672.000
1103.132	673.385

Material Boundary

1160.000	693.600
1210.000	693.600

Material Boundary

1670.200	669.000

1800.000	665.600

Material Boundary

306.700	701.000
393.000	672.900

Material Boundary

306.700	701.000
526.600	756.100
807.000	826.000
1023.200	836.000
1240.500	846.000
1453.900	848.000
1668.100	848.000
1800.000	848.000

Material Boundary

306.700	701.000
742.900	810.000
795.500	810.000
1139.600	700.000
1160.000	693.600

Material Boundary

1210.000	693.600
1650.800	840.000
1708.000	847.000
1800.000	847.000

Material Boundary

386.900	673.300
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900

Material Boundary

306.700	701.000
301.900	701.000
386.900	673.300

Material Boundary

1285.200	668.800

1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Material Boundary

1210.000	693.600
1285.200	668.800
1279.100	669.300
1210.000	692.000
1210.000	693.600

Material Boundary

1210.000	692.000
1282.982	667.980
1325.000	665.000
1441.400	669.000
1555.000	665.000
1670.200	669.000

Material Boundary

1282.400	665.000
1282.982	667.980

Material Boundary

1209.500	689.000
1210.000	692.000

Material Boundary

1160.000	692.000
1160.500	689.000

Material Boundary

1098.900	672.000
1099.500	669.000

Material Boundary

390.200	669.000
390.800	672.000

Material Boundary

1097.600	672.900
1160.000	693.600
1160.000	692.000
1103.132	673.385
1097.600	672.900

Material Boundary

1160.000	693.600

1160.000	693.700

Material Boundary

62.475	655.000
1800.000	655.000

External Boundary

1800.000	300.000
1800.000	483.000
1800.000	655.000
1800.000	660.000
1800.000	662.600
1800.000	665.600
1800.000	666.600
1800.000	847.000
1800.000	848.000
1800.000	852.000
1668.100	852.000
1453.900	852.000
1240.400	850.000
1023.000	840.000
806.400	830.000
525.600	760.000
318.500	708.000
290.200	701.000
287.400	701.000
285.500	700.000
274.600	696.000
236.100	700.000
231.000	701.000
197.700	700.000
107.600	670.000
77.600	660.000
62.475	655.000
53.400	652.000
0.000	651.000
0.000	483.000
0.000	300.000

Water Table

0.000	651.000
53.400	652.000
77.600	660.000
107.600	670.000
171.813	691.381
336.243	691.381
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000

661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900
1153.374	691.402
1216.665	691.402
1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Distributed Load

826.441	830.925
806.400	830.000

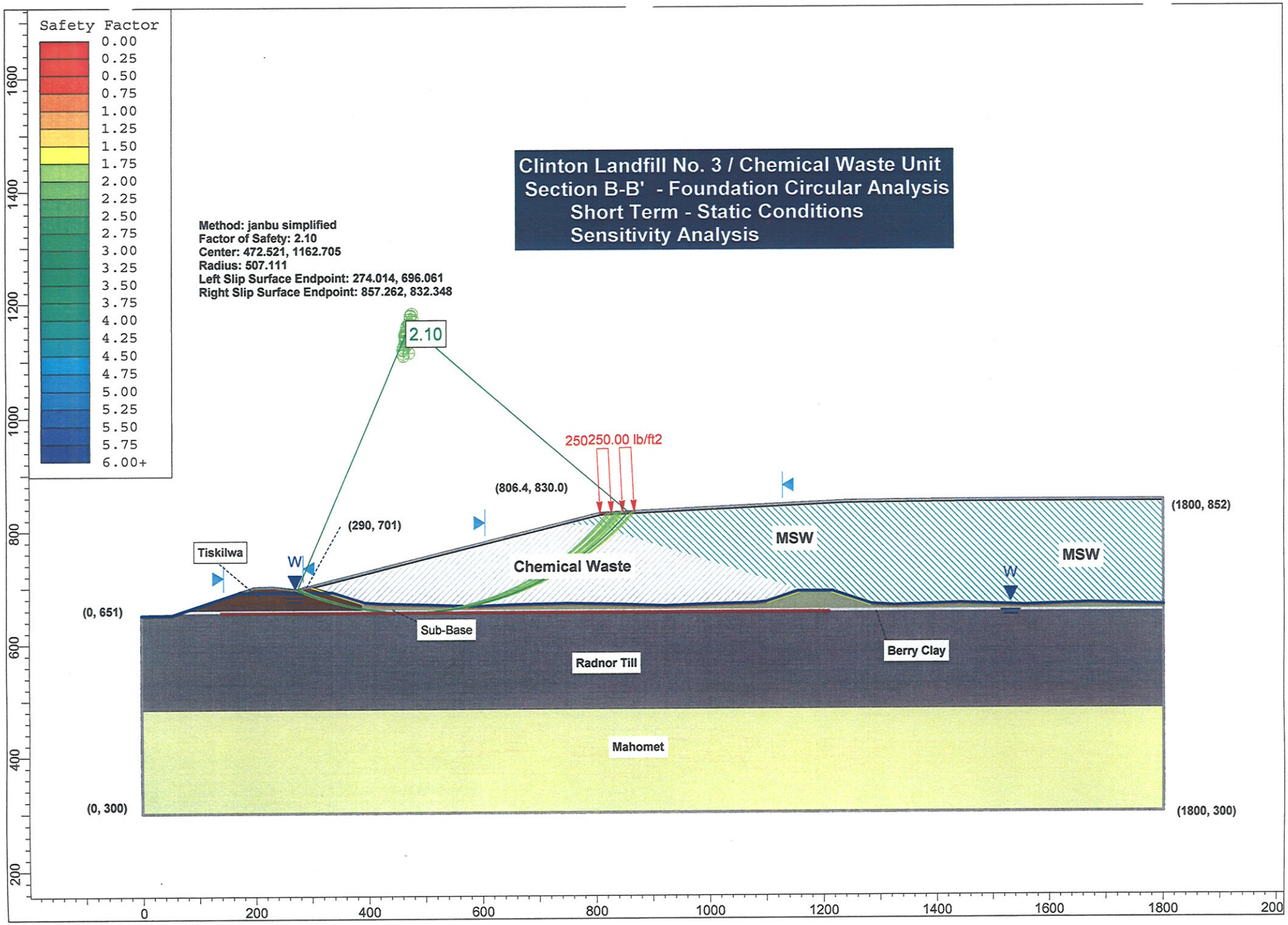
Distributed Load

866.472	832.773
846.043	831.830

Focus/Block Search Line

119.333	655.000
1208.903	655.000

CROSS SECTION B-B'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / STATIC ANALYSIS
SENSITIVITY ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section B-B' - Foundation Circular Analysis
Short Term - Static Conditions
Sensitivity Analysis
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 2.10
Center: 472.521, 1162.705
Radius: 507.111
Left Slip Surface Endpoint: 274.014, 696.061
Right Slip Surface Endpoint: 857.262, 832.348
2.10
250250.00 lb/ft2
(806.4, 830.0)
(290, 701)
(1800, 852)
Tiskilwa
W
Chemical Waste
MSW
MSW
W
(0, 651)
Sub-Base
Radnor Till
Berry Clay
Mahomet
(0, 300)
(1800, 300)
0
200
400
600
800
1000
1200
1400
1600
1800
200

Slide Analysis Information

Document Name

File Name: B-B'_SSTAT_FC(sens1).sli

Project Settings

Project Title: Clinton Landfill No. 3/ Chemical Waste Unit, B-B' FOUNDATION CIRCULAR, SHORT TERM/STATIC
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: 668
Minimum Depth: 1

Loading

2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Final Cover
Strength Type: Mohr-Coulomb
Unit Weight: 128 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: None

Material: MSW
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 75 lb/ft3
Saturated Unit Weight: 75 lb/ft3
Cohesion: 500 psf

Friction Angle: 30 degrees
Water Surface: None

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3
Saturated Unit Weight: 134 lb/ft3

Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2520 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 2.096730
Center: 472.521, 1162.705
Radius: 507.111
Left Slip Surface Endpoint: 274.014, 696.061
Right Slip Surface Endpoint: 857.262, 832.348
Resisting Horizontal Force=1.65612e+006 lb
Driving Horizontal Force=789856 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 5000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

107.600	670.000
387.137	670.000
387.300	670.000
387.300	669.947
387.300	660.000

Material Boundary

290.200	701.000
292.200	701.000
301.900	701.000

Material Boundary

0.000	483.000
1800.000	483.000

Material Boundary

292.200	701.000
387.137	670.000
387.300	669.947
390.200	669.000
420.900	667.000
497.900	665.000
579.600	662.000
661.400	665.000
749.700	667.000
838.500	665.000
920.200	662.000
1001.800	665.000
1079.100	667.000
1099.500	669.000
1160.500	689.000
1209.500	689.000
1282.400	665.000
1324.900	662.000
1449.400	666.000
1555.000	662.000
1670.200	666.000
1800.000	662.600

Material Boundary

77.600	660.000
387.300	660.000
1800.000	660.000

Material Boundary

301.900	701.000
390.800	672.000
421.000	670.000
498.000	668.000
579.600	665.000
661.300	668.000
749.700	670.000
838.600	668.000
920.200	665.000
1001.700	668.000
1078.900	670.000
1098.900	672.000
1103.132	673.385

Material Boundary

1160.000	693.600
1210.000	693.600

Material Boundary

1670.200	669.000
1800.000	665.600

Material Boundary

306.700	701.000
393.000	672.900

Material Boundary

306.700	701.000
526.600	756.100
807.000	826.000
1023.200	836.000
1240.500	846.000
1453.900	848.000
1668.100	848.000
1800.000	848.000

Material Boundary

306.700	701.000
742.900	810.000
795.500	810.000
1139.600	700.000
1160.000	693.600

Material Boundary

1210.000	693.600
1650.800	840.000
1708.000	847.000
1800.000	847.000

Material Boundary

386.900	673.300
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900

Material Boundary

306.700	701.000
301.900	701.000
386.900	673.300

Material Boundary

1285.200	668.800
1325.000	666.000

1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Material Boundary

1210.000	693.600
1285.200	668.800
1279.100	669.300
1210.000	692.000
1210.000	693.600

Material Boundary

1210.000	692.000
1282.982	667.980
1325.000	665.000
1441.400	669.000
1555.000	665.000
1670.200	669.000

Material Boundary

1282.400	665.000
1282.982	667.980

Material Boundary

1209.500	689.000
1210.000	692.000

Material Boundary

1160.000	692.000
1160.500	689.000

Material Boundary

1098.900	672.000
1099.500	669.000

Material Boundary

390.200	669.000
390.800	672.000

Material Boundary

1097.600	672.900
1160.000	693.600
1160.000	692.000
1103.132	673.385
1097.600	672.900

Material Boundary

1160.000	693.600
1160.000	693.700

Material Boundary

62.475	655.000
1800.000	655.000

External Boundary

1800.000	300.000
1800.000	483.000
1800.000	655.000
1800.000	660.000
1800.000	662.600
1800.000	665.600
1800.000	666.600
1800.000	847.000
1800.000	848.000
1800.000	852.000
1668.100	852.000
1453.900	852.000
1240.400	850.000
1023.000	840.000
806.400	830.000
525.600	760.000
318.500	708.000
290.200	701.000
287.400	701.000
285.500	700.000
274.600	696.000
236.100	700.000
231.000	701.000
197.700	700.000
107.600	670.000
77.600	660.000
62.475	655.000
53.400	652.000
0.000	651.000
0.000	483.000
0.000	300.000

Water Table

0.000	651.000
53.400	652.000
77.600	660.000
107.600	670.000
171.813	691.381
336.243	691.381
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000

749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900
1153.374	691.402
1216.665	691.402
1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Distributed Load

826.441	830.925
806.400	830.000

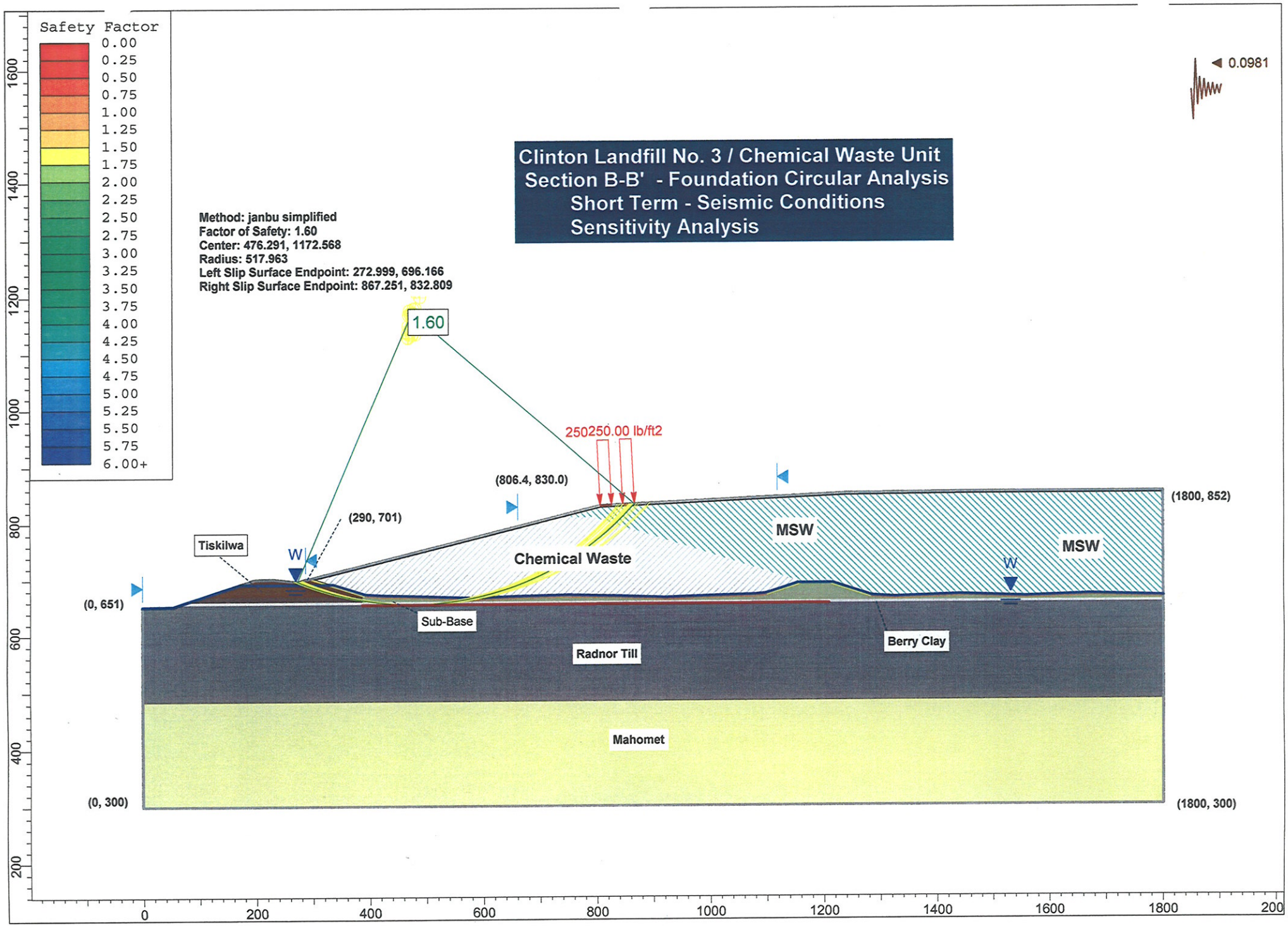
Distributed Load

866.472	832.773
846.043	831.830

Focus/Block Search Line

140.235	655.594
1209.367	655.594

CROSS SECTION B-B'
FOUNDATION CIRCULAR FAILURE
SHORT TERM / SEISMIC ANALYSIS
SENSITIVITY ANALYSIS


Clinton Landfill No. 3 / Chemical Waste Unit
Section B-B' - Foundation Circular Analysis
Short Term - Seismic Conditions
Sensitivity Analysis
Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
Method: janbu simplified
Factor of Safety: 1.60
Center: 476.291, 1172.568
Radius: 517.963
Left Slip Surface Endpoint: 272.999, 696.166
Right Slip Surface Endpoint: 867.251, 832.809
1.60
250250.00 lb/ft2
0.0981
(806.4, 830.0)
(290, 701)
(1800, 852)
(0, 651)
(0, 300)
(1800, 300)
Tiskilwa
W
Chemical Waste
MSW
MSW
W
Sub-Base
Radnor Till
Berry Clay
Mahomet
0
200
400
600
800
1000
1200
1400
1600
1800
200

Slide Analysis Information

Document Name

File Name: B-B'_SSEIS_FC(sens1).sli

Project Settings

Project Title: Clinton Landfill No. 3/ Chemical Waste Unit, B-B' FOUNDATION CIRCULAR, SHORT TERM/STATIC
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:
Janbu simplified

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

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: -45
Lower Angle: -45
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: 668
Minimum Depth: 1

Loading

Seismic Load Coefficient (Horizontal): 0.0981
2 Distributed Loads present:
Distributed Load #1 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2
Distributed Load #2 Constant Distribution, Orientation: Normal to boundary, Magnitude: 250

lb/ft2

Material Properties

Material: Tiskilwa
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Roxana / Robein
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 100 lb/ft3
Saturated Unit Weight: 110 lb/ft3
Cohesion: 1400 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Radnor Till
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 150 lb/ft3
Saturated Unit Weight: 158 lb/ft3
Cohesion: 8310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Mahomet
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Final Cover
Strength Type: Mohr-Coulomb
Unit Weight: 128 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: None

Material: MSW
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 75 lb/ft3
Saturated Unit Weight: 75 lb/ft3

Cohesion: 500 psf
Friction Angle: 30 degrees
Water Surface: None

Material: Chemical Waste
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 90 lb/ft3
Saturated Unit Weight: 90 lb/ft3
Cohesion: 840 psf
Friction Angle: 17.4 degrees
Water Surface: None

Material: LCS
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 126 lb/ft3
Saturated Unit Weight: 130 lb/ft3
Cohesion: 0 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sideslope Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bottom Interface
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 0 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sub-Base
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 135 lb/ft3
Saturated Unit Weight: 140 lb/ft3
Cohesion: 3000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Select Fill on Sideslopes
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 128 lb/ft3

Saturated Unit Weight: 134 lb/ft3
Cohesion: 1350 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berry Clay
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 130 lb/ft3
Saturated Unit Weight: 138 lb/ft3
Cohesion: 2520 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu simplified
FS: 1.600150
Center: 476.291, 1172.568
Radius: 517.963
Left Slip Surface Endpoint: 272.999, 696.166
Right Slip Surface Endpoint: 867.251, 832.809
Resisting Horizontal Force=1.90892e+006 lb
Driving Horizontal Force=1.19297e+006 lb

Valid / Invalid Surfaces

Method: janbu simplified
Number of Valid Surfaces: 5000
Number of Invalid Surfaces: 0

List of All Coordinates

Material Boundary

107.600	670.000
387.137	670.000
387.300	670.000
387.300	669.947
387.300	660.000

Material Boundary

290.200	701.000
292.200	701.000
301.900	701.000

Material Boundary

292.200	701.000
387.137	670.000
387.300	669.947

390.200	669.000
420.900	667.000
497.900	665.000
579.600	662.000
661.400	665.000
749.700	667.000
838.500	665.000
920.200	662.000
1001.800	665.000
1079.100	667.000
1099.500	669.000
1160.500	689.000
1209.500	689.000
1282.400	665.000
1324.900	662.000
1449.400	666.000
1555.000	662.000
1670.200	666.000
1800.000	662.600

Material Boundary

77.600	660.000
387.300	660.000
1800.000	660.000

Material Boundary

301.900	701.000
390.800	672.000
421.000	670.000
498.000	668.000
579.600	665.000
661.300	668.000
749.700	670.000
838.600	668.000
920.200	665.000
1001.700	668.000
1078.900	670.000
1098.900	672.000
1103.132	673.385

Material Boundary

1160.000	693.600
1210.000	693.600

Material Boundary

1670.200	669.000
1800.000	665.600

Material Boundary

306.700	701.000

393.000	672.900

Material Boundary

306.700	701.000
526.600	756.100
807.000	826.000
1023.200	836.000
1240.500	846.000
1453.900	848.000
1668.100	848.000
1800.000	848.000

Material Boundary

306.700	701.000
742.900	810.000
795.500	810.000
1139.600	700.000
1160.000	693.600

Material Boundary

1210.000	693.600
1650.800	840.000
1708.000	847.000
1800.000	847.000

Material Boundary

386.900	673.300
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000
661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900

Material Boundary

306.700	701.000
301.900	701.000
386.900	673.300

Material Boundary

1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000

1800.000	666.600

Material Boundary

1210.000	693.600
1285.200	668.800
1279.100	669.300
1210.000	692.000
1210.000	693.600

Material Boundary

1210.000	692.000
1282.982	667.980
1325.000	665.000
1441.400	669.000
1555.000	665.000
1670.200	669.000

Material Boundary

1282.400	665.000
1282.982	667.980

Material Boundary

1209.500	689.000
1210.000	692.000

Material Boundary

1160.000	692.000
1160.500	689.000

Material Boundary

1098.900	672.000
1099.500	669.000

Material Boundary

390.200	669.000
390.800	672.000

Material Boundary

1097.600	672.900
1160.000	693.600
1160.000	692.000
1103.132	673.385
1097.600	672.900

Material Boundary

1160.000	693.600
1160.000	693.700

Material Boundary

62.475	655.000

1800.000	655.000

Material Boundary

0.000	483.000
1800.000	483.000

External Boundary

1800.000	300.000
1800.000	483.000
1800.000	655.000
1800.000	660.000
1800.000	662.600
1800.000	665.600
1800.000	666.600
1800.000	847.000
1800.000	848.000
1800.000	852.000
1668.100	852.000
1453.900	852.000
1240.400	850.000
1023.000	840.000
806.400	830.000
525.600	760.000
318.500	708.000
290.200	701.000
287.400	701.000
285.500	700.000
274.600	696.000
236.100	700.000
231.000	701.000
197.700	700.000
107.600	670.000
77.600	660.000
62.475	655.000
53.400	652.000
0.000	651.000
0.000	483.000
0.000	300.000

Water Table

0.000	651.000
53.400	652.000
77.600	660.000
107.600	670.000
171.813	691.381
336.243	691.381
393.000	672.900
421.000	671.000
498.000	669.000
579.600	666.000

661.300	669.000
749.700	671.000
838.600	669.000
920.200	666.000
1001.700	669.000
1078.800	671.000
1097.600	672.900
1153.374	691.402
1216.665	691.402
1285.200	668.800
1325.000	666.000
1441.400	670.000
1555.000	666.000
1670.200	670.000
1800.000	666.600

Distributed Load

826.441	830.925
806.400	830.000

Distributed Load

866.472	832.773
846.043	831.830

Focus/Block Search Line

386.792	654.507
1208.774	655.402