Appendix E

RESULTS OF SLOPE STABILITY ANALYSES
Revised August 2013
Revised November 2013

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APPENDIX E
RESULTS OF SLOPE STABILITY ANALYSES
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APPENDIX E
RESULTS OF SLOPE STABILITY ANALYSES
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Table E-1
Ameren Missouri Labadie UWL
SOIL & MATERIAL PROPERTIES USED IN STABILITY ANALYSES

Material Description		Undrained Properties			Effective or Drained Prop.			C-U (EQ) Properties			Liquefied Properties		
		Unit Weight γ, pcf	Shear Strength c, psf	Friction Angle Ø, deg.	Unit Weight γ, pcf	Shear Strength c', psf	Friction Angle Ø', deg.	Unit Weight γ, pcf	Shear Strength c, psf	Friction Angle Ø, deg.	Unit Weight γ, pcf	Residual Strength, psf	
												Seed & Harder, el al	Idris & Boulanger
Upper, Nominal Compacted CCP		112	1	35	112	1	35	112	300	22			
Lower, Nominal Compacted CCP		90	1	35	90	1	35	90	300	22			
General Berm Fill		120	1000	0	120	1	30						
Compacted Clay Liner	Berm - Circle	115	600	0	115	1	25	115	1	25			
	Base - Circle	115	600	0	115	1	25	115	1	21			
"Compacted Clay Liner" (failure along interface)	Berm - Block				120	1	15						
	Base - Block				120	1	15						
Leachate Collection Layer (Clean gravel)		120	1	28	120	1	28						
Intermediate Cover					120	80	28.4						
Natural Strata													
Silty Clay (CL-ML)	Section A-A'	116	1100	0	116	150	24	116	100	17			
	Section E-E'	115	900	0	115	25	23	115	400	11			
Fine Sand w/ Silt (SM)	Section B-B'	118	1	23	118	1	23				118	210	210
Sandy Silt/Silty Sand (SM-ML)	Section D-D'	125	1100	0	125	300	22	125	300	13			
Clay (CL)	Section B-B'	117	1200	0	117	200	24	117	200	15			
Med. Plastic Clay (CL-CH)	Section C-C'	116	1000	0	116	450	18	116	490	11			
	Section D-D'	116	900	0	116	400	18	116	400	11			
	Section E-E'	114	900	0	114	75	16	114	400	11			
Clay, Silt & Sand (CL-ML-SM)	Section C-C'	126	800	0	126	300	22	126	300	13			
Sand with Silt (SP-SM)	Section A-A'	124	1	30	124	1	30				116	280	280
	Section B-B'	124	1	31	124	1	31				124	870	530
	Section C-C'	124	1	30	124	1	30				124	420	310
	Section D-D'	124	1	30	124	1	30				125	210	210
	Section E-E'	124	1	31	124	1	31				124	1100	730
Poorly Graded Sand (SP)	Sec. A-A', B-B'	126	1	35	126	1	35				124	870	530
	Section C-C'	126	1	35	126	1	35				120	980	630
	Section D-D'	126	1	35	126	1	35				126	1100	730
	Section E-E'	125	1	33	125	1	33						
Sand & Silt (SP-ML)	Section E-E'	122	1	27	122	1	27				122	500	300

Table E-1
Ameren Missouri Labadie UWL
SOIL & MATERIAL PROPERTIES USED IN STABILITY ANALYSES

Material Description		Undrained Properties			Effective or Drained Prop.			C-U (EQ) Properties			Liquefied Properties		
		Unit Weight γ, pcf	Shear Strength c, psf	Friction Angle Ø, deg.	Unit Weight γ, pcf	Shear Strength c', psf	Friction Angle Ø', deg.	Unit Weight γ, pcf	Shear Strength c, psf	Friction Angle Ø, deg.	Unit Weight γ, pcf	Residual Strength, psf	
												Seed & Harder, el al	Idris & Boulanger
Sand w/ Gravel (SP/SP-GP)	All	127	1	37	127	1	37						
Lower Sand & Gravel (SP-GP)	All but E-E'	127	1	39	127	1	39						
	Section E-E'	130	1	28	130	1	28						
Lower Gravel with Sand (GP-SP)	Section E-E'	135	1	35	135	1	35						

Notes:
1. Shear strength properties of natural soil strata based upon laboratory tests (for near-surface soils) and *in-situ* tests (Standard Penetration Tests of static cone penetrometer tests (CPT). Tests results are presented in *Detailed Site Investigation (DSI) Report* - Appendix 2.
2. A nominal cohesion (c') of 1 psf is used for cohesionless soils to prevent the random search routine from creating superficial failure surfaces.
3. Consolidated-undrained (C-U) shear strength properties are used for fine-grain soils in seismic (EQ) analyses to account for rapid, undrained loading.
4. Properties of natural soil strata vary from section to section based upon closest *in-situ* tests or available laboratory tests.
5. "Upper, nominal compacted CCP" refers to non-ponded CCP which may be used for later filling of the landfill, which may be placed at a higher unit weight (112 pcf) compared to the ponded CCP (90 or 93 pcf). A higher unit weight was used after the initial filling of the cell with ponded CCP, but the much greater shear strengths of the cemented, non-ponded CCP that were measured in the lab were not used; therefore, the analyses are conservative.
6. The residual shear strengths of liquefied soils were estimated using two methods. The first method (Case I) used data from case histories by Stark and Mesri (1992) and Seed and Harder (1990). The second method (Case II) used the residual shear strengths by Idriss and Boulanger (2008) with a correction for fines per Seed (1987).

Table E-2
Ameren Missouri Labadie UWL
RESULTS OF SLOPE STABILITY ANALYSES

Minimum Factors of Safety (FS) for Permanent Berms

Type of Failure	Height of CCP Fill	Shear Strength Properties	Sections (see Figure E-1)					Suggested Minimum
			A-A'	B-B'	C-C'	D-D'	E-E'	
Global, circular	Initial	Undrained	3.19	2.69	2.39	2.95	2.44	1.5
		Drained	2.07	2.39	2.14	2.70	1.47	1.5
Global, circular with liquefaction		Undrained	1.76	1.90	1.98	1.86	2.09	See note
Global, circular, with probable unit weight of non-ponded CCP	Full	Drained	2.07	2.15	2.14	2.27	1.46	1.5
Global, circular, Liquifed Soils (I)		Undrained	1.48	1.13*	1.32	1.35	1.72	See note
Global, circular, Liquifed Soils (II)		Undrained	1.81	1.53	1.50	1.73	1.79	See note
Global, circular, with max. unit weight of non-ponded CCP		Drained	2.07	2.11	2.14	2.23	1.46	1.5

* Missouri Solid Waste regulations do not specify a minimum factor safety for either static or seismic loading. Draft guidance by MDNR-SWMP and Stark (1998) recommends a minimum of 1.2 to 1.3 for analyses with liquefaction. Standard engineering practice uses a minimum of 1.0.

Yield Acceleration for Seismic (Pseudo-Static) FS = 1 for Permanent Berms

Type of Failure	Height of CCP Fill	Shear Strength Properties	Sections (see Figure E-1)				
			A-A'	B-B'	C-C'	D-D'	E-E'
Global, circular	Initial	Consolidated - Undrained	0.22	0.21	0.28	0.27	0.27
	Full		0.17	0.13	0.15	0.15	0.16

Analyses of Slope Failure Along Composite Clay Interface for Permanent Berms

Type of Failure	Height of CCP Fill	Shear Strength Properties	Minimum FS	Yield Acceleration
Sliding Block Along Clay Liner	Full	Drained	1.76	0.13g

Analyses of Slope Failure for Temporary CCP Berm

Type of Failure	Height of CCP Fill	Shear Strength Properties	Minimum FS	Yield Acceleration
Global, circular	Full	Drained	1.91	—
Sliding Block Along Clay Liner			1.59	0.06

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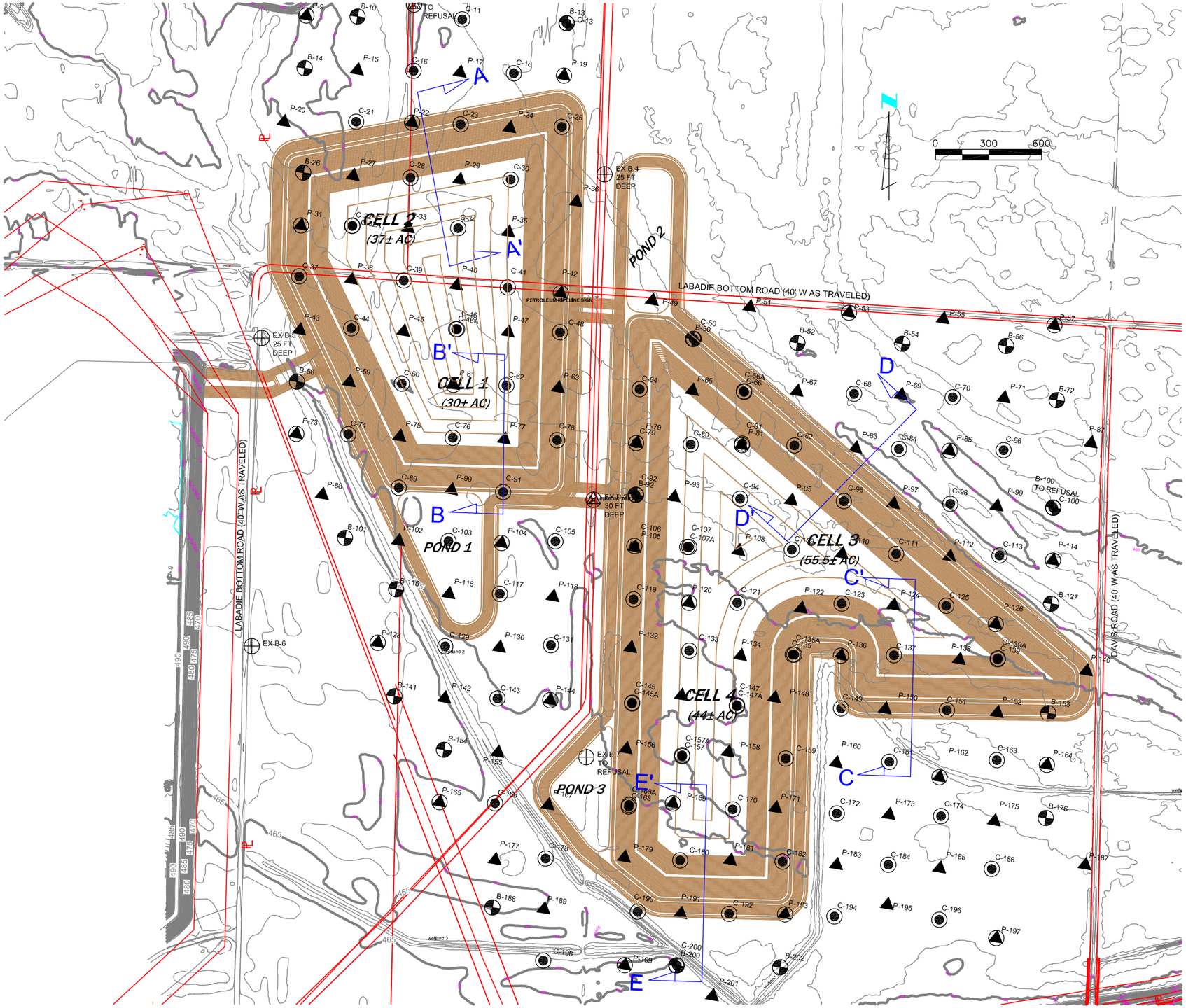

Ameren Missouri Labadie UWL
LOCATIONS OF CROSS-SECTIONS FOR
STABILITY ANALYSES

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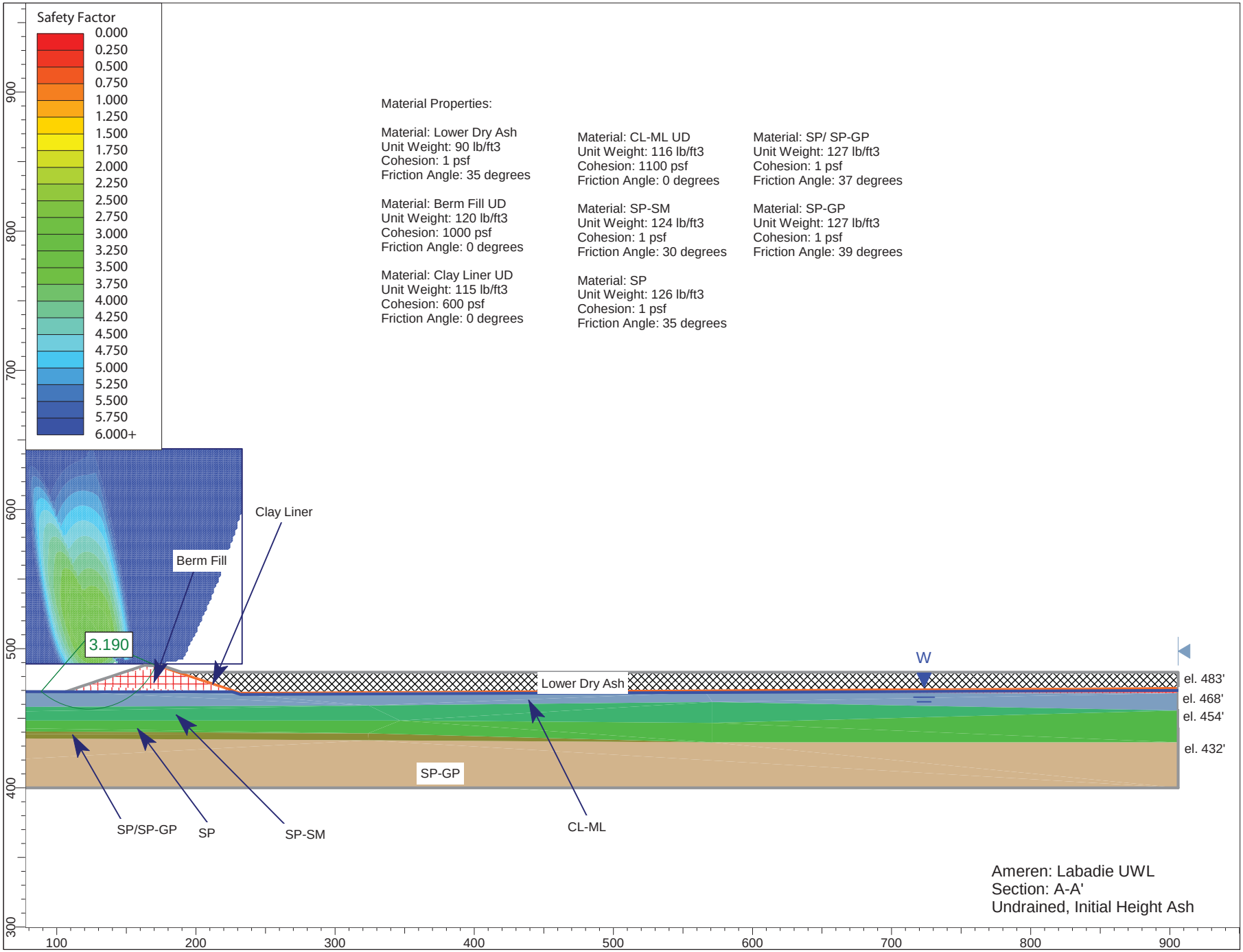
Figure E-1
SCHEDULE CJG-ST1



REITZ & JENS, INC.

Figure E-2

SCHEDULE CJG-ST1

Slide Analysis Information

Document Name

File Name: Section AA Partial Undrained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-310.816	456.500
324.184	459.061
571.184	461.561

906.000 455.500

Material Boundary
346.669 448.252
571.184 446.561
906.000 455.500

Material Boundary
-310.816 442.454
323.787 439.064
571.184 432.561

Material Boundary
-310.816 437.454
324.184 434.061

Material Boundary
324.184 434.061
571.184 432.561

Material Boundary
190.000 483.000
232.000 469.000
566.246 468.488
906.000 467.967

Material Boundary
106.184 469.061
225.991 469.003
232.000 469.000

Material Boundary
-310.816 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

Material Boundary
232.000 469.000
906.000 472.524

Material Boundary
175.000 488.000
175.000 486.000
225.991 469.003
232.000 467.000
566.246 468.488
906.000 470.000

External Boundary
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196.315 483.000
190.000 483.000
187.789 483.737
184.000 485.000

178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
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-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	455.500
906.000	467.967
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906.000	472.524
906.000	483.000

Water Table

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106.184	469.061
225.991	469.003
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906.000	470.000

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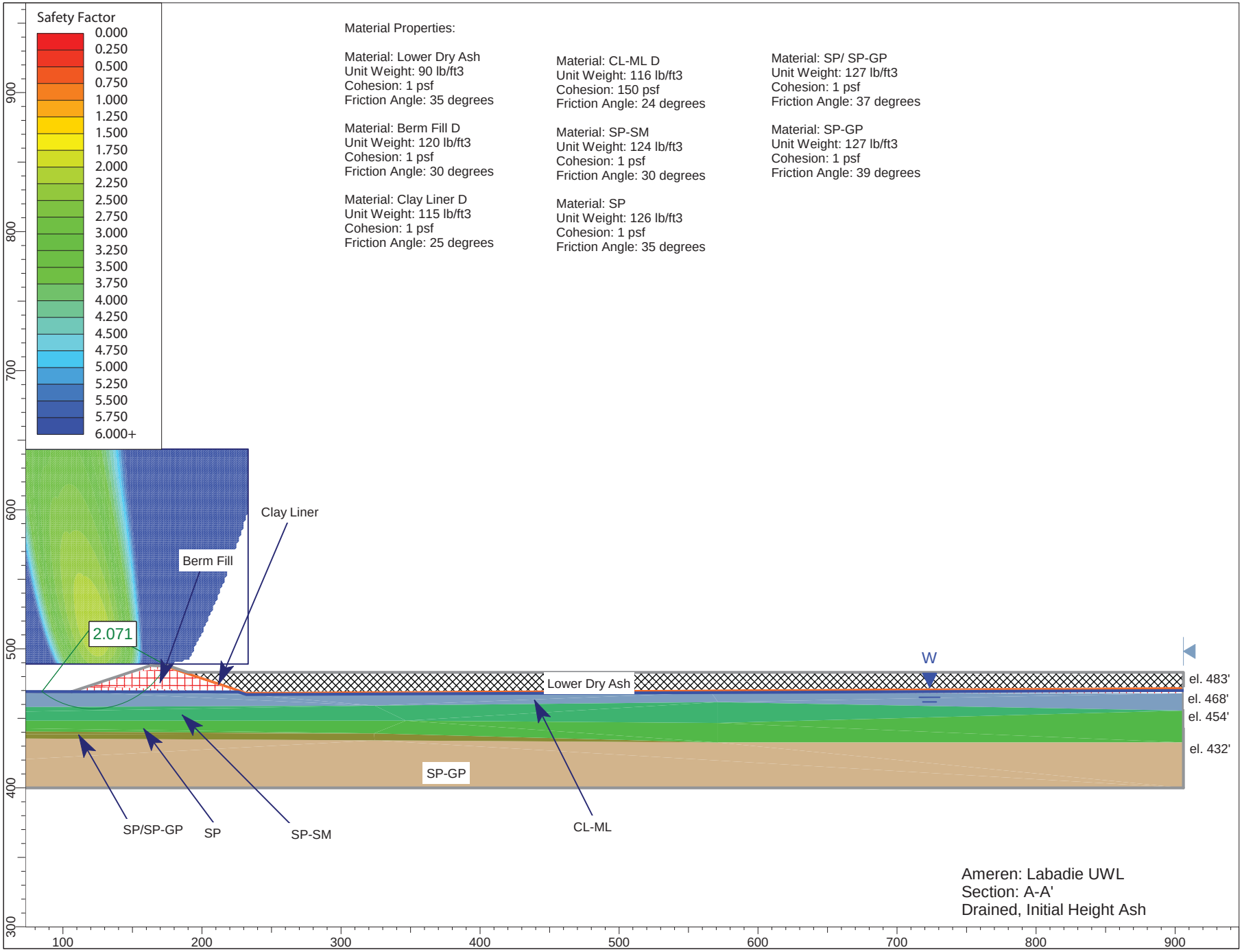

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Figure E-3

SCHEDULE CJG-ST1

Slide Analysis Information

Document Name

File Name: Section AA Partial Drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 150 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-310.816	456.500
324.184	459.061
571.184	461.561

906.000 455.500

Material Boundary
346.669 448.252
571.184 446.561
906.000 455.500

Material Boundary
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Material Boundary
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Material Boundary
324.184 434.061
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Material Boundary
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Material Boundary
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Material Boundary
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Material Boundary
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Material Boundary
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232.000 467.000
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906.000 470.000

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906.000	483.000

Water Table

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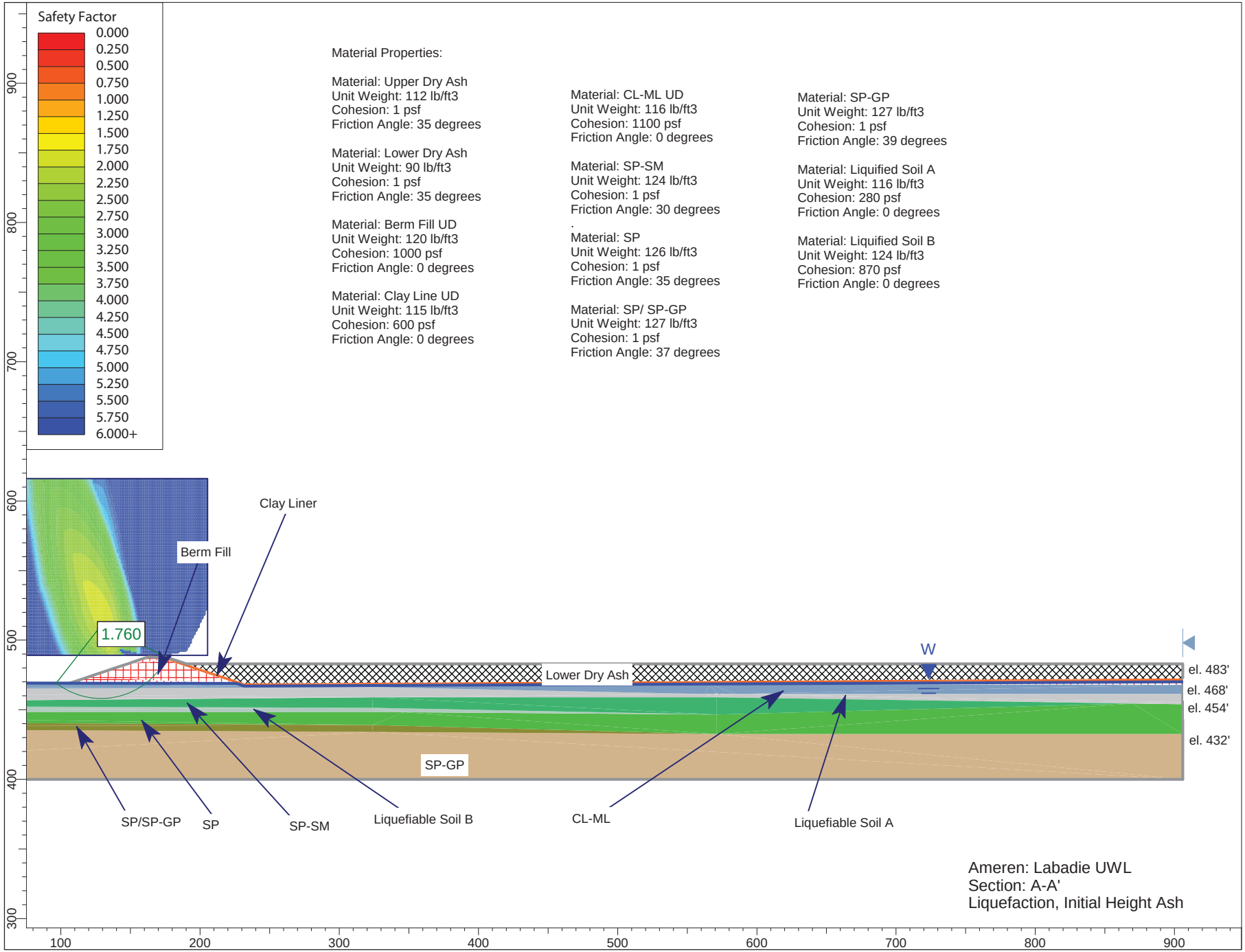
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3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-ML UD
Unit Weight: 116 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
.
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: Liquified Soil A
Unit Weight: 116 lb/ft3
Cohesion: 280 psf
Friction Angle: 0 degrees
Material: Liquified Soil B
Unit Weight: 124 lb/ft3
Cohesion: 870 psf
Friction Angle: 0 degrees
Clay Liner
Berm Fill
1.760
W
Lower Dry Ash
el. 483'
el. 468'
el. 454'
el. 432'
SP-GP
SP/SP-GP
SP
SP-SM
Liquefiable Soil B
CL-ML
Liquefiable Soil A
Ameren: Labadie UWL
Section: A-A'
Liquefaction, Initial Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section AA Partial Liquefaction.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquified Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 280 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquified Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 870 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-310.816	456.500
324.184	459.061
562.692	461.315
571.184	461.561
584.957	461.312
906.000	455.500

Material Boundary

346.669	448.252
571.184	446.561
869.969	454.538
906.000	455.500

Material Boundary

-310.816	442.454
323.787	439.064
571.184	432.561

Material Boundary

-310.816	437.454
324.184	434.061

Material Boundary

324.184	434.061
571.184	432.561

Material Boundary

190.000	483.000
232.000	469.000
566.246	468.488
906.000	467.967

Material Boundary

106.184	469.061
225.991	469.003

232.000 469.000

Material Boundary
-310.816 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

Material Boundary
232.000 469.000
906.000 472.524

Material Boundary
175.000 488.000
175.000 486.000
225.991 469.003
232.000 467.000
566.246 468.488
906.000 470.000

Material Boundary
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324.184 466.253
562.692 461.315
571.184 461.315
584.957 461.312
906.000 461.253

Material Boundary
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323.787 451.500
571.184 446.561

Material Boundary
-310.816 453.708
324.184 459.000
571.184 459.000
869.969 454.538
906.000 454.000

External Boundary
200.000 483.000
196.315 483.000
190.000 483.000
187.789 483.737
184.000 485.000
178.316 486.895
175.000 488.000
170.579 487.765
169.000 487.681
166.789 487.798
163.000 488.000
157.316 486.105
154.000 485.000

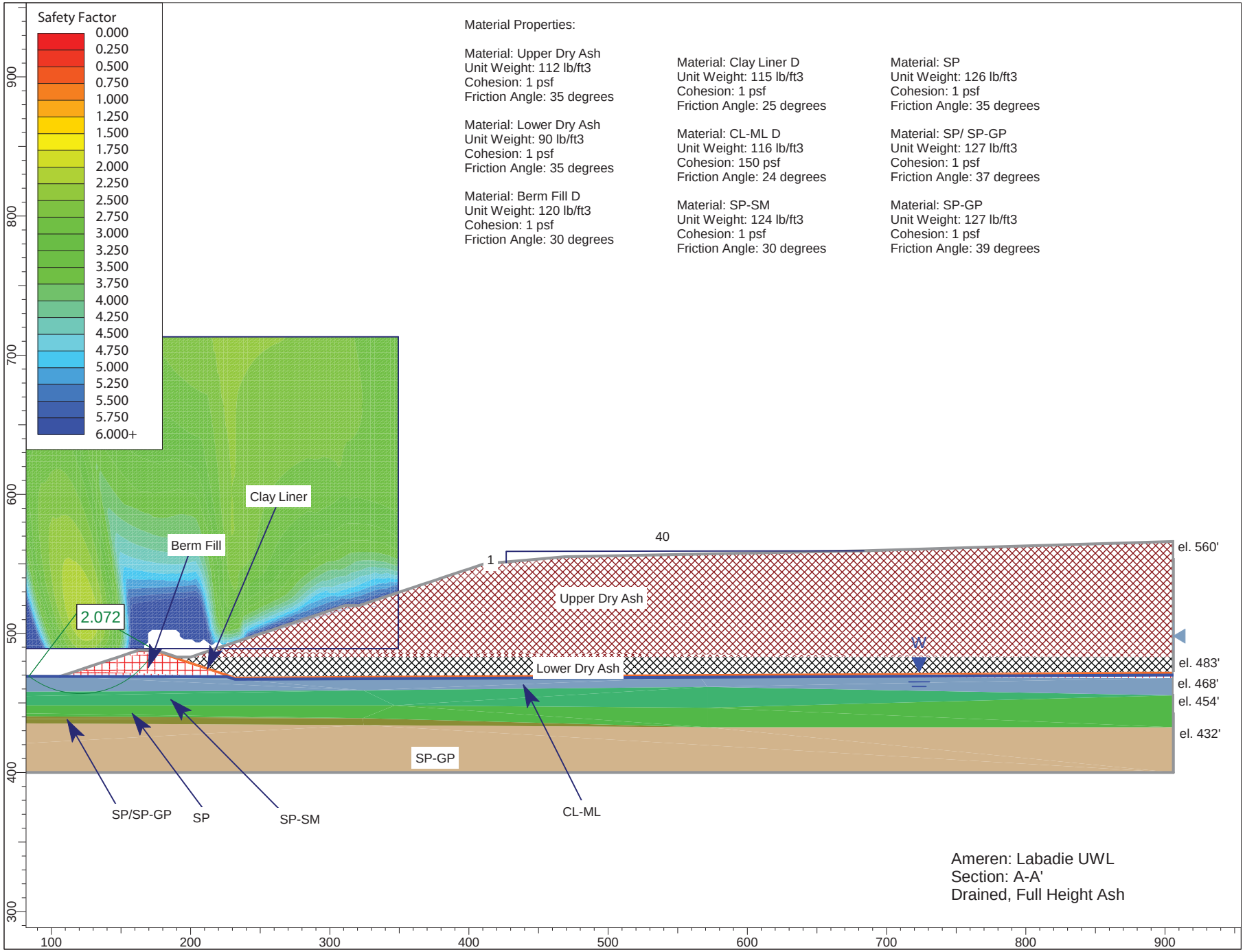
148.473	483.158
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	463.753
-310.816	456.500
-310.816	453.708
-310.816	453.702
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	454.000
906.000	455.500
906.000	461.253
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000

Search Grid

63.910	489.052
205.437	489.052
205.437	616.049
63.910	616.049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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-ML D
Unit Weight: 116 lb/ft3
Cohesion: 150 psf
Friction Angle: 24 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Clay Liner
Berm Fill
2.072
40
1
Upper Dry Ash
Lower Dry Ash
SP-GP
el. 560'
el. 483'
el. 468'
el. 454'
el. 432'
SP/SP-GP
SP
SP-SM
CL-ML
Ameren: Labadie UWL
Section: A-A'
Drained, Full Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section AA Full Drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 150 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
-310.816 456.500
324.184 459.061
571.184 461.561
906.000 455.500

Material Boundary
346.669 448.252
571.184 446.561
906.000 455.500

Material Boundary
-310.816 442.454
323.787 439.064
571.184 432.561

Material Boundary
-310.816 437.454
324.184 434.061

Material Boundary
324.184 434.061
571.184 432.561

Material Boundary
190.000 483.000
232.000 469.000
566.246 468.488
906.000 467.967

Material Boundary
106.184 469.061
225.991 469.003
232.000 469.000

Material Boundary
200.000 483.000
906.000 483.000

Material Boundary
-310.816 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

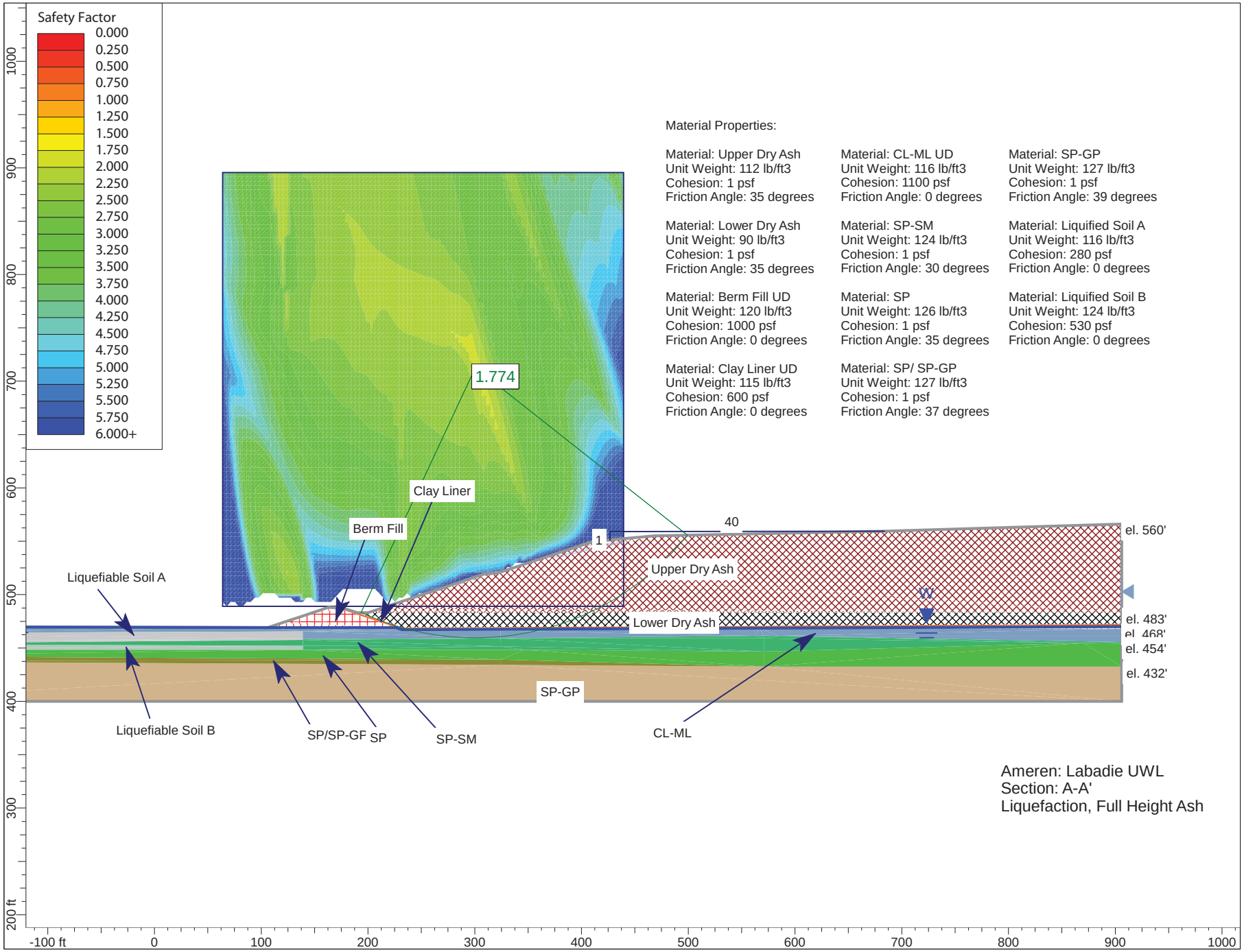
Material Boundary
232.000 469.000
906.000 472.524

Material Boundary

175.000	488.000
175.000	486.000
225.991	469.003
232.000	467.000
566.246	468.488
906.000	470.000

External Boundary

906.000	566.071
683.709	559.305
468.434	555.000
440.357	552.556
411.000	550.000
398.805	545.935
396.000	545.000
391.110	543.370
381.000	540.000
375.110	538.037
366.000	535.000
359.899	532.966
351.000	530.000
344.696	527.899
336.000	525.000
321.203	520.068
321.000	520.000
320.919	520.000
311.000	520.000
310.751	519.917
296.000	515.000
294.928	514.643
281.000	510.000
271.864	506.955
266.000	505.000
256.681	501.894
251.000	500.000
241.544	496.848
236.000	495.000
226.527	491.842
221.000	490.000
211.527	486.842
206.000	485.000
203.789	484.263
200.000	483.000
196.315	483.000
190.000	483.000
187.789	483.737
184.000	485.000
178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: CL-ML UD
Unit Weight: 116 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Liquified Soil A
Unit Weight: 116 lb/ft3
Cohesion: 280 psf
Friction Angle: 0 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Liquified Soil B
Unit Weight: 124 lb/ft3
Cohesion: 530 psf
Friction Angle: 0 degrees
Material: Clay Liner UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
1.774
Clay Liner
Berm Fill
40
1
el. 560'
Upper Dry Ash
Liquefiable Soil A
W
Lower Dry Ash
el. 483'
el. 468'
el. 454'
el. 432'
SP-GP
Liquefiable Soil B
SP/SP-GP
SP
SP-SM
CL-ML
Ameren: Labadie UWL
Section: A-A'
Liquefaction, Full Height Ash
1000
900
800
700
600
500
400
300
200 ft
-100 ft
0
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section AA Full Liquefaction trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquified Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 280 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquified Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 530 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.811420
Center: 300.529, 712.645
Radius: 253.398
Left Slip Surface Endpoint: 193.412, 483.000
Right Slip Surface Endpoint: 499.410, 555.620
Resisting Moment=1.55445e+008 lb-ft
Driving Moment=8.58143e+007 lb-ft

Method: spencer
FS: 1.773810
Center: 300.529, 712.645
Radius: 253.398
Left Slip Surface Endpoint: 193.412, 483.000
Right Slip Surface Endpoint: 499.410, 555.620
Resisting Moment=1.52218e+008 lb-ft
Driving Moment=8.58143e+007 lb-ft
Resisting Horizontal Force=541013 lb
Driving Horizontal Force=305001 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 32432
Number of Invalid Surfaces: 79779
Error Codes:
Error Code -103 reported for 78856 surfaces
Error Code -107 reported for 51 surfaces
Error Code -109 reported for 1 surface
Error Code -112 reported for 871 surfaces

Method: spencer
Number of Valid Surfaces: 32149
Number of Invalid Surfaces: 80062
Error Codes:
Error Code -103 reported for 78856 surfaces

Error Code -107 reported for 51 surfaces
Error Code -108 reported for 103 surfaces
Error Code -109 reported for 1 surface
Error Code -111 reported for 68 surfaces
Error Code -112 reported for 983 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-109 = Soiltype for slice base not
located. This error should occur very rarely,
if at all. It may occur if a very low number of
slices is combined with certain soil geometries,
such that the midpoint of a slice base is
actually outside the soil region,even though
the slip surface is wholly within the soil region.

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

63.910	489.052
439.495	489.052
439.495	895.584
63.910	895.584

Material Boundary

-310.816	456.500

139.040 458.315
324.184 459.061
562.692 461.315
571.184 461.561
584.957 461.312
906.000 455.500

Material Boundary
346.669 448.252
571.184 446.561
869.969 454.538
906.000 455.500

Material Boundary
-310.816 442.454
323.787 439.064
571.184 432.561

Material Boundary
-310.816 437.454
324.184 434.061

Material Boundary
324.184 434.061
571.184 432.561

Material Boundary
190.000 483.000
232.000 469.000
566.246 468.488
906.000 467.967

Material Boundary
106.184 469.061
225.991 469.003
232.000 469.000

Material Boundary
200.000 483.000
906.000 483.000

Material Boundary
-310.816 448.252
139.066 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

Material Boundary
232.000 469.000
906.000 472.524

Material Boundary
175.000 488.000

175.000	486.000
225.991	469.003
232.000	467.000
566.246	468.488
906.000	470.000

Material Boundary

-310.816	463.753
139.040	465.524
324.184	466.253
562.692	461.315
571.184	461.315
584.957	461.312
906.000	461.253

Material Boundary

-310.816	453.702
139.066	452.141
323.787	451.500
571.184	446.561

Material Boundary

-310.816	453.708
139.040	457.457
324.184	459.000
571.184	459.000
869.969	454.538
906.000	454.000

Material Boundary

139.040	457.457
139.040	458.315
139.040	465.524

Material Boundary

139.066	448.252
139.066	452.141

External Boundary

906.000	566.071
683.709	559.305
468.434	555.000
440.357	552.556
411.000	550.000
398.805	545.935
396.000	545.000
391.110	543.370
381.000	540.000
375.110	538.037
366.000	535.000
359.899	532.966
351.000	530.000
344.696	527.899
336.000	525.000
321.203	520.068
321.000	520.000

320.919	520.000
311.000	520.000
310.751	519.917
296.000	515.000
294.928	514.643
281.000	510.000
271.864	506.955
266.000	505.000
256.681	501.894
251.000	500.000
241.544	496.848
236.000	495.000
226.527	491.842
221.000	490.000
211.527	486.842
206.000	485.000
203.789	484.263
200.000	483.000
196.315	483.000
190.000	483.000
187.789	483.737
184.000	485.000
178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	463.753
-310.816	456.500
-310.816	453.708
-310.816	453.702
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	454.000
906.000	455.500
906.000	461.253
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000

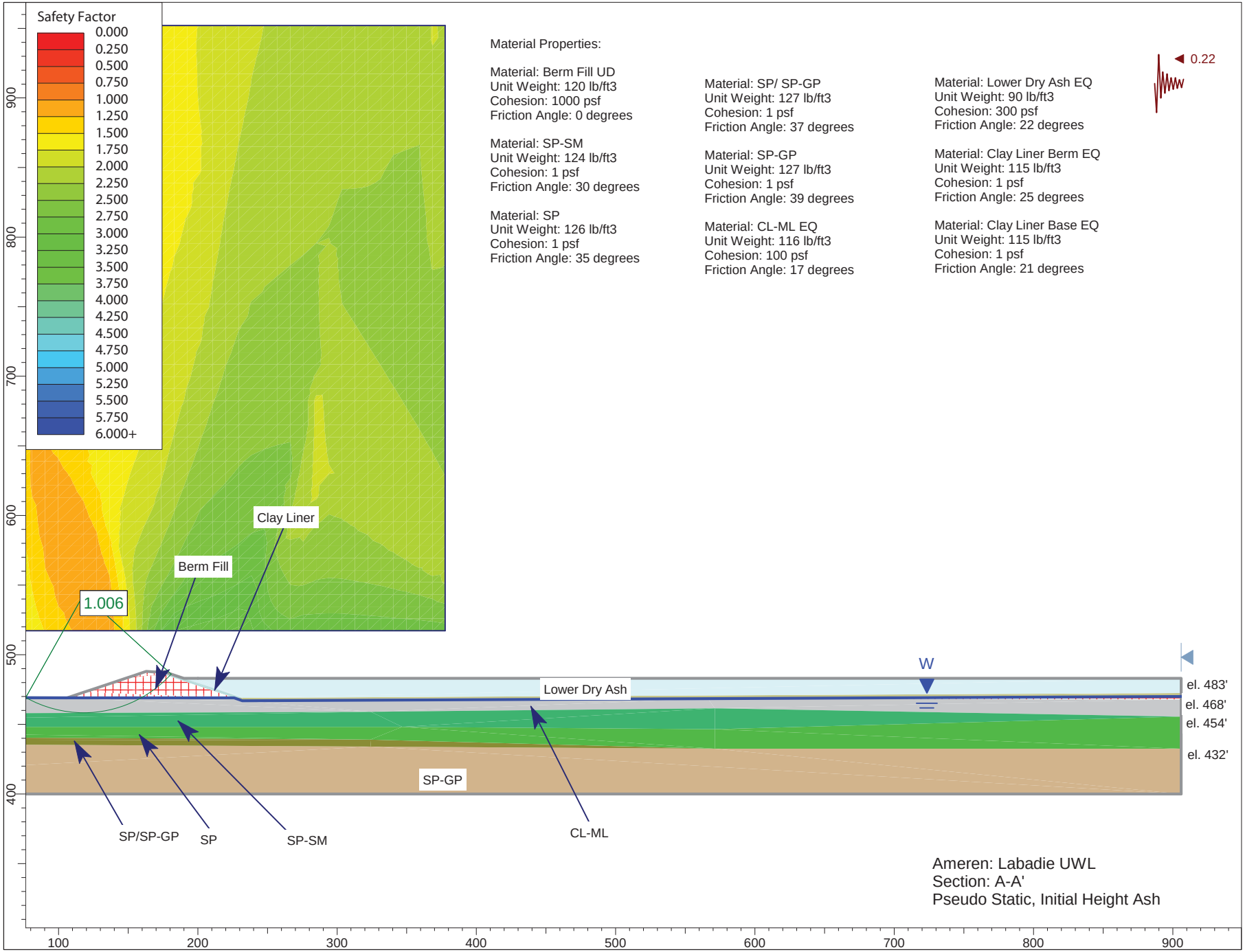
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	456.500
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	455.500
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000

Search Grid

63.910	489.052
349.264	489.052
349.264	713.194
63.910	713.194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0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML EQ
Unit Weight: 116 lb/ft3
Cohesion: 100 psf
Friction Angle: 17 degrees
Material: Lower Dry Ash EQ
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Clay Liner Berm EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Clay Liner Base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
0.22
Clay Liner
Berm Fill
1.006
W
Lower Dry Ash
el. 483'
el. 468'
el. 454'
el. 432'
SP-GP
SP/SP-GP
SP
SP-SM
CL-ML
Ameren: Labadie UWL
Section: A-A'
Pseudo Static, Initial Height Ash
900
800
700
600
500
400
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section AA Partial Psuedo Static.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.22

Material Properties

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM

Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML EQ
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 100 psf
Friction Angle: 17 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash EQ
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3

Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary
-310.816 456.500
324.184 459.061
571.184 461.561
906.000 455.500

Material Boundary
346.669 448.252
571.184 446.561
906.000 455.500

Material Boundary
-310.816 442.454
323.787 439.064
571.184 432.561

Material Boundary
-310.816 437.454
324.184 434.061

Material Boundary
324.184 434.061
571.184 432.561

Material Boundary
190.000 483.000
232.000 469.000
566.246 468.488
906.000 467.967

Material Boundary
106.184 469.061
225.991 469.003
232.000 469.000

Material Boundary
-310.816 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

Material Boundary
232.000 469.000
906.000 472.524

Material Boundary
175.000 488.000
175.000 486.000

225.991	469.003
232.000	467.000
566.246	468.488
906.000	470.000

External Boundary

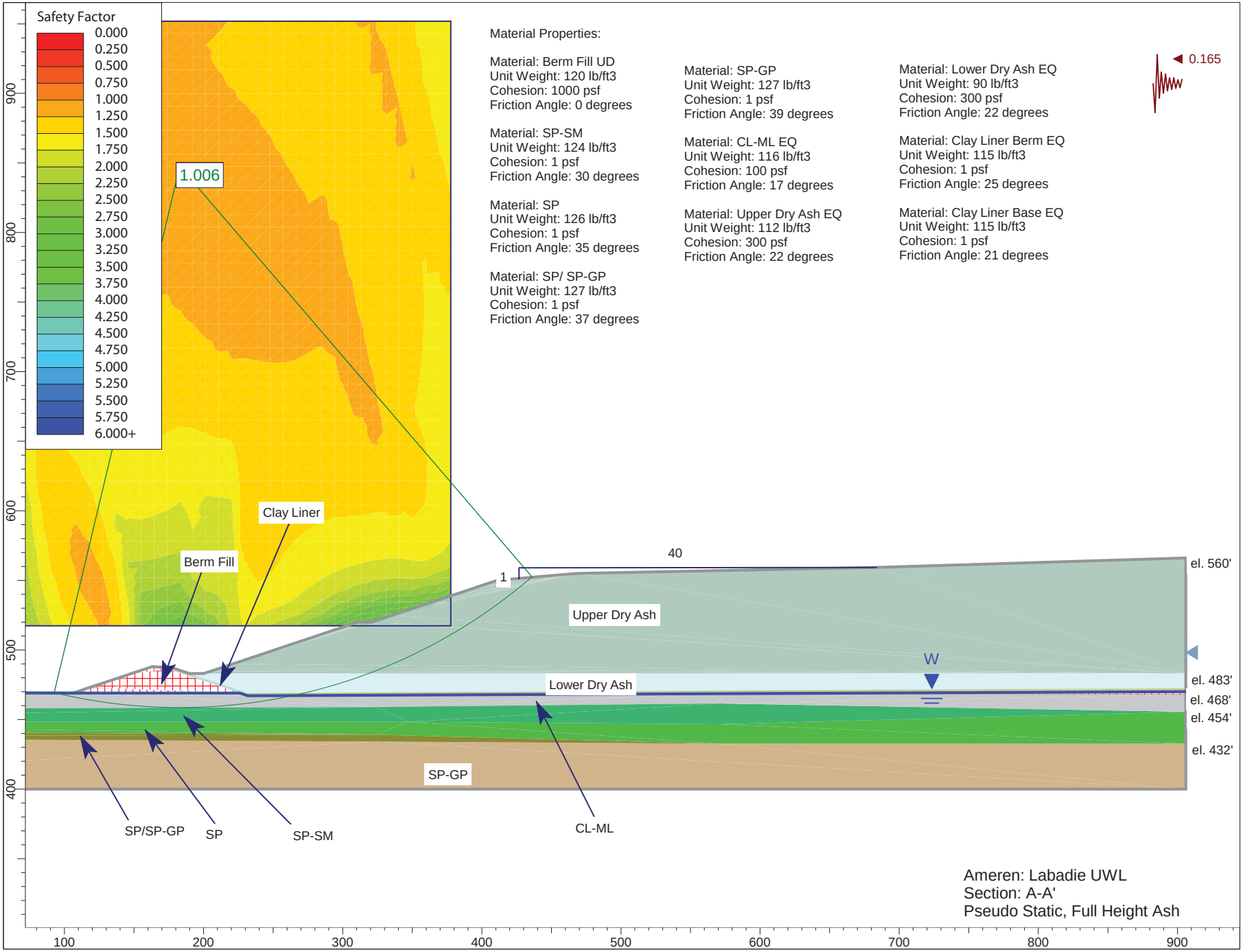
200.000	483.000
196.315	483.000
190.000	483.000
187.789	483.737
184.000	485.000
178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	456.500
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	455.500
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000

Search Grid

-85.861	517.280
377.618	517.280
377.618	951.877
-85.861	951.877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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
1.006
Material Properties:
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML EQ
Unit Weight: 116 lb/ft3
Cohesion: 100 psf
Friction Angle: 17 degrees
Material: Upper Dry Ash EQ
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Lower Dry Ash EQ
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Clay Liner Berm EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Clay Liner Base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
0.165
Clay Liner
Berm Fill
40
1
Upper Dry Ash
W
Lower Dry Ash
SP-GP
SP/SP-GP
SP
SP-SM
CL-ML
el. 560'
el. 483'
el. 468'
el. 454'
el. 432'
900
800
700
600
500
400
100
200
300
400
500
600
700
800
900
Ameren: Labadie UWL
Section: A-A'
Pseudo Static, Full Height Ash

Slide Analysis Information

Document Name

File Name: Section AA Full Psuedo Staticsli.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.165

Material Properties

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM

Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML EQ
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 100 psf
Friction Angle: 17 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Upper Dry Ash EQ
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash EQ
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3

Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-310.816	456.500
324.184	459.061
571.184	461.561
906.000	455.500

Material Boundary

346.669	448.252
571.184	446.561
906.000	455.500

Material Boundary

-310.816	442.454
323.787	439.064
571.184	432.561

Material Boundary

-310.816	437.454
324.184	434.061

Material Boundary

324.184	434.061
571.184	432.561

Material Boundary

190.000	483.000
232.000	469.000
566.246	468.488
906.000	467.967

Material Boundary

106.184	469.061
225.991	469.003
232.000	469.000

Material Boundary

200.000	483.000
906.000	483.000

Material Boundary

-310.816	448.252
346.669	448.252

Material Boundary

571.184	432.561
906.000	432.561

Material Boundary

232.000	469.000
906.000	472.524

Material Boundary

175.000	488.000
175.000	486.000
225.991	469.003
232.000	467.000
566.246	468.488
906.000	470.000

External Boundary

906.000	566.071
683.709	559.305
468.434	555.000
440.357	552.556
411.000	550.000
398.805	545.935
396.000	545.000
391.110	543.370
381.000	540.000
375.110	538.037
366.000	535.000
359.899	532.966
351.000	530.000
344.696	527.899
336.000	525.000
321.203	520.068
321.000	520.000
320.919	520.000
311.000	520.000
310.751	519.917
296.000	515.000
294.928	514.643
281.000	510.000
271.864	506.955
266.000	505.000
256.681	501.894
251.000	500.000
241.544	496.848
236.000	495.000
226.527	491.842
221.000	490.000
211.527	486.842
206.000	485.000
203.789	484.263
200.000	483.000
196.315	483.000
190.000	483.000
187.789	483.737
184.000	485.000

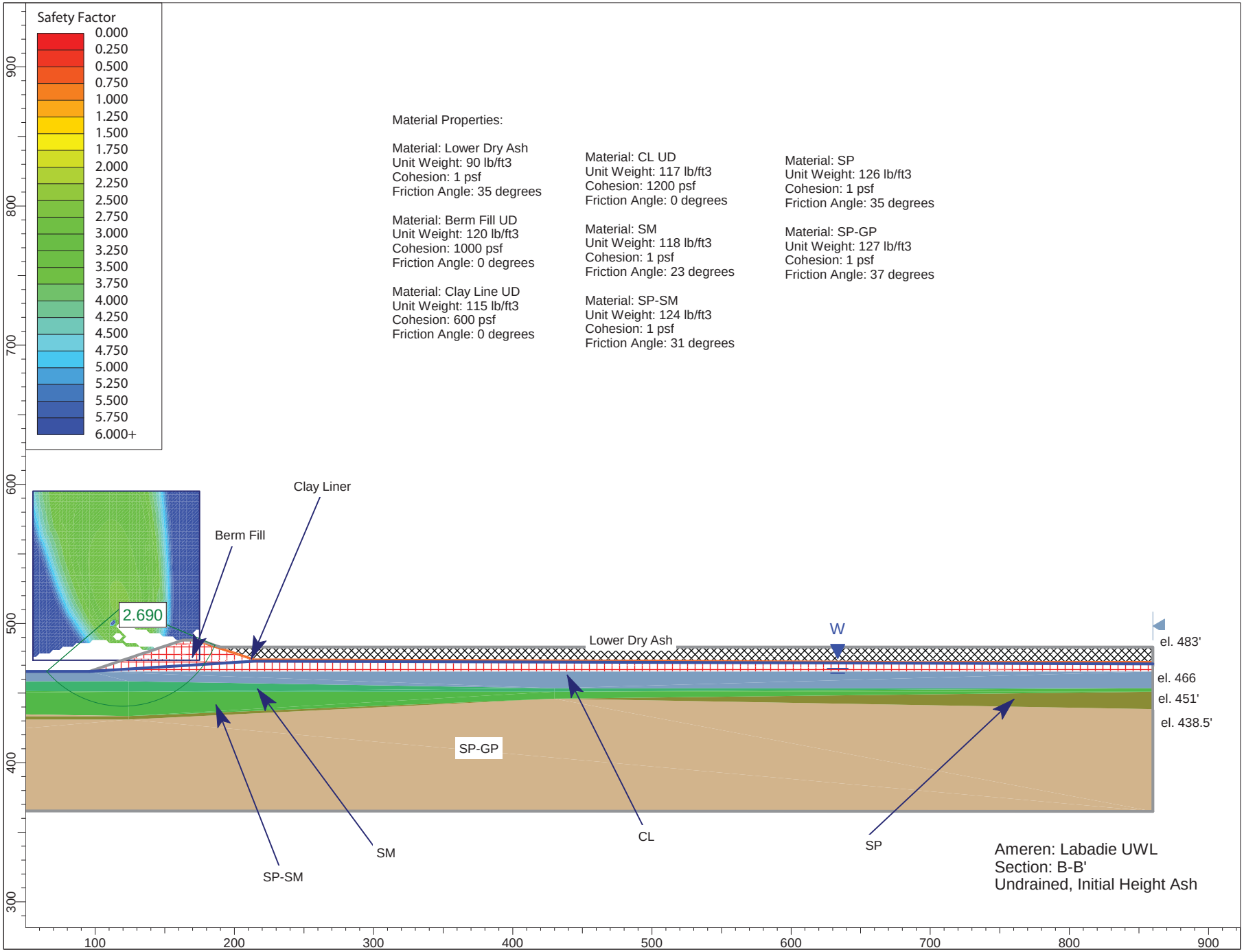
178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	456.500
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	455.500
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000

Search Grid

-85.861	517.280
377.618	517.280
377.618	951.877
-85.861	951.877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0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL UD
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Clay Liner
Berm Fill
2.690
Lower Dry Ash
W
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Undrained, Initial Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Partial UnDrained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL UD
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500

860.010 453.500

Material Boundary
-650.000 456.000
124.000 451.000
430.000 451.000
860.010 453.500

Material Boundary
-650.000 446.000
124.000 433.500
430.000 446.000
860.009 450.998

Material Boundary
-650.000 433.500
124.000 433.500

Material Boundary
-650.000 431.000
124.000 431.000
430.000 446.000
860.008 438.502

Material Boundary
190.000 483.000
214.462 474.846
491.000 474.000
671.000 473.000
860.012 473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000

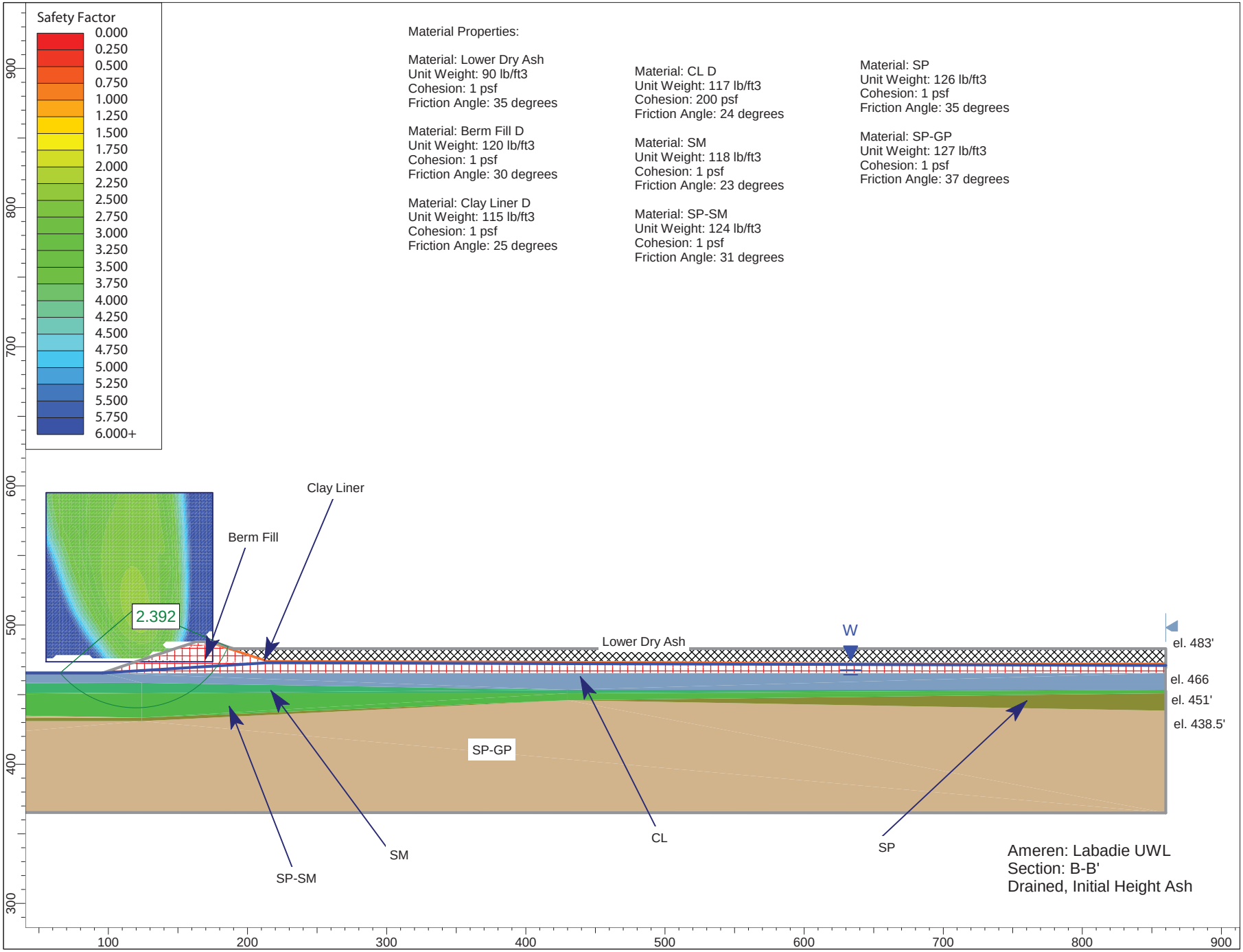
860.012	473.000
860.013	482.998
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Search Grid

55.187	473.638
174.969	473.638
174.969	595.079
55.187	595.079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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL D
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Clay Liner
Berm Fill
2.392
Lower Dry Ash
W
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Drained, Initial Height Ash
300
400
500
600
700
800
900
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Partial Drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL D
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500

860.010 453.500

Material Boundary
-650.000 456.000
124.000 451.000
430.000 451.000
860.010 453.500

Material Boundary
-650.000 446.000
124.000 433.500
430.000 446.000
860.009 450.998

Material Boundary
-650.000 433.500
124.000 433.500

Material Boundary
-650.000 431.000
124.000 431.000
430.000 446.000
860.008 438.502

Material Boundary
190.000 483.000
214.462 474.846
491.000 474.000
671.000 473.000
860.012 473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000

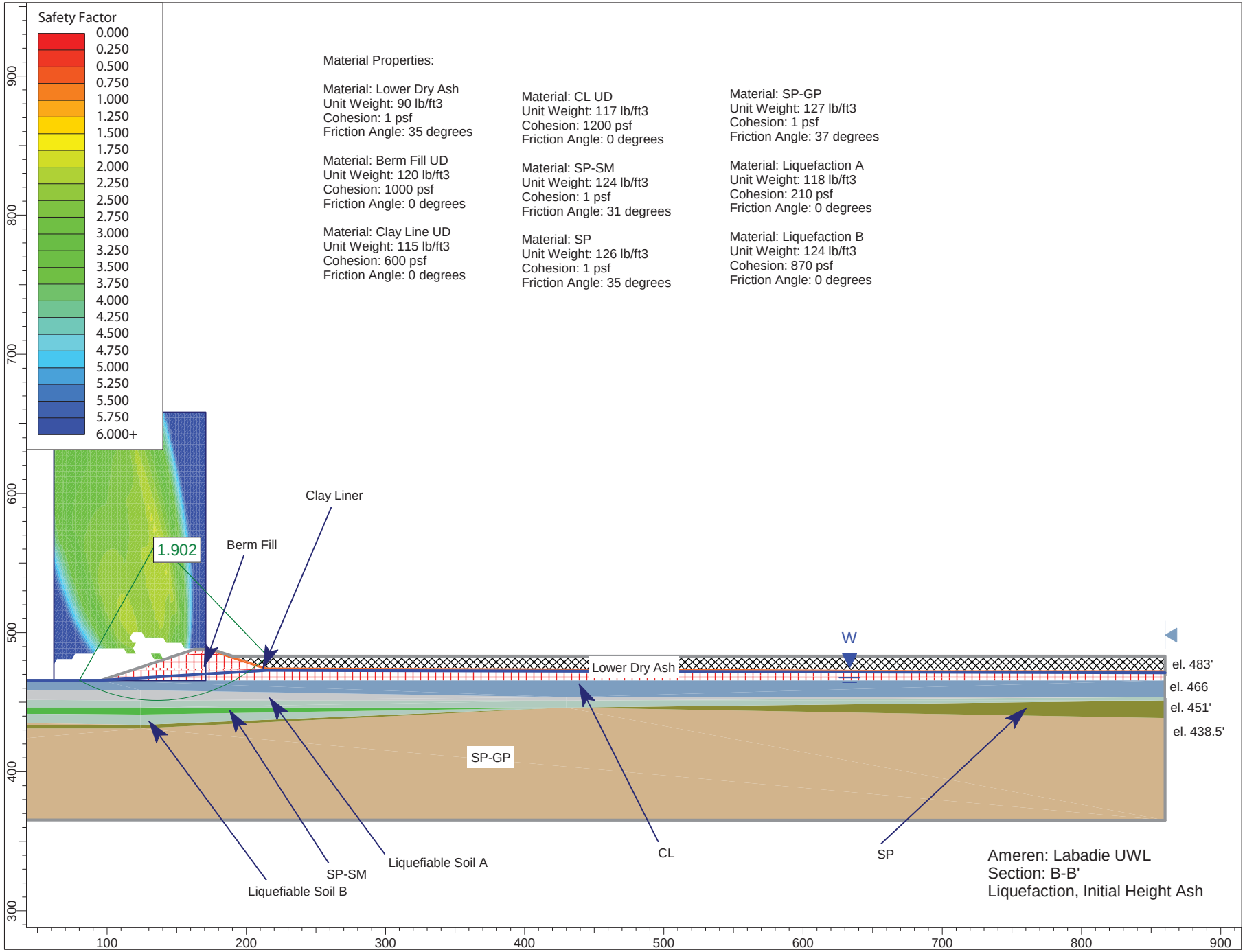
860.012	473.000
860.013	482.998
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Search Grid

55.187	473.638
174.969	473.638
174.969	595.079
55.187	595.079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0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL UD
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Liquefaction A
Unit Weight: 118 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Material: Liquefaction B
Unit Weight: 124 lb/ft3
Cohesion: 870 psf
Friction Angle: 0 degrees
1.902
Clay Liner
Berm Fill
W
Lower Dry Ash
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
Liquefiable Soil B
SP-SM
Liquefiable Soil A
CL
SP
Ameren: Labadie UWL
Section: B-B'
Liquefaction, Initial Height Ash
300
400
500
600
700
800
900
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Partial Liquefaction.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL UD
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefaction A
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefaction B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 870 psf
Friction Angle: 0 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
-650.000 458.500
124.000 458.500
430.000 453.500
860.010 453.500

Material Boundary
-650.000 456.000
124.000 451.000
430.000 451.000
860.010 453.500

Material Boundary
-650.000 446.000
124.000 433.500

Material Boundary
-650.000 433.500
124.000 433.500

Material Boundary
-650.000 431.000
124.000 431.000
430.000 446.000
860.008 438.502

Material Boundary
190.000 483.000
214.462 474.846
491.000 474.000
671.000 473.000
860.012 473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
-650.000 446.000

124.000	446.000
430.000	446.000
124.000	441.000
-650.000	446.000

Material Boundary

124.000	433.500
430.000	446.000

Material Boundary

430.000	446.000
860.009	450.998

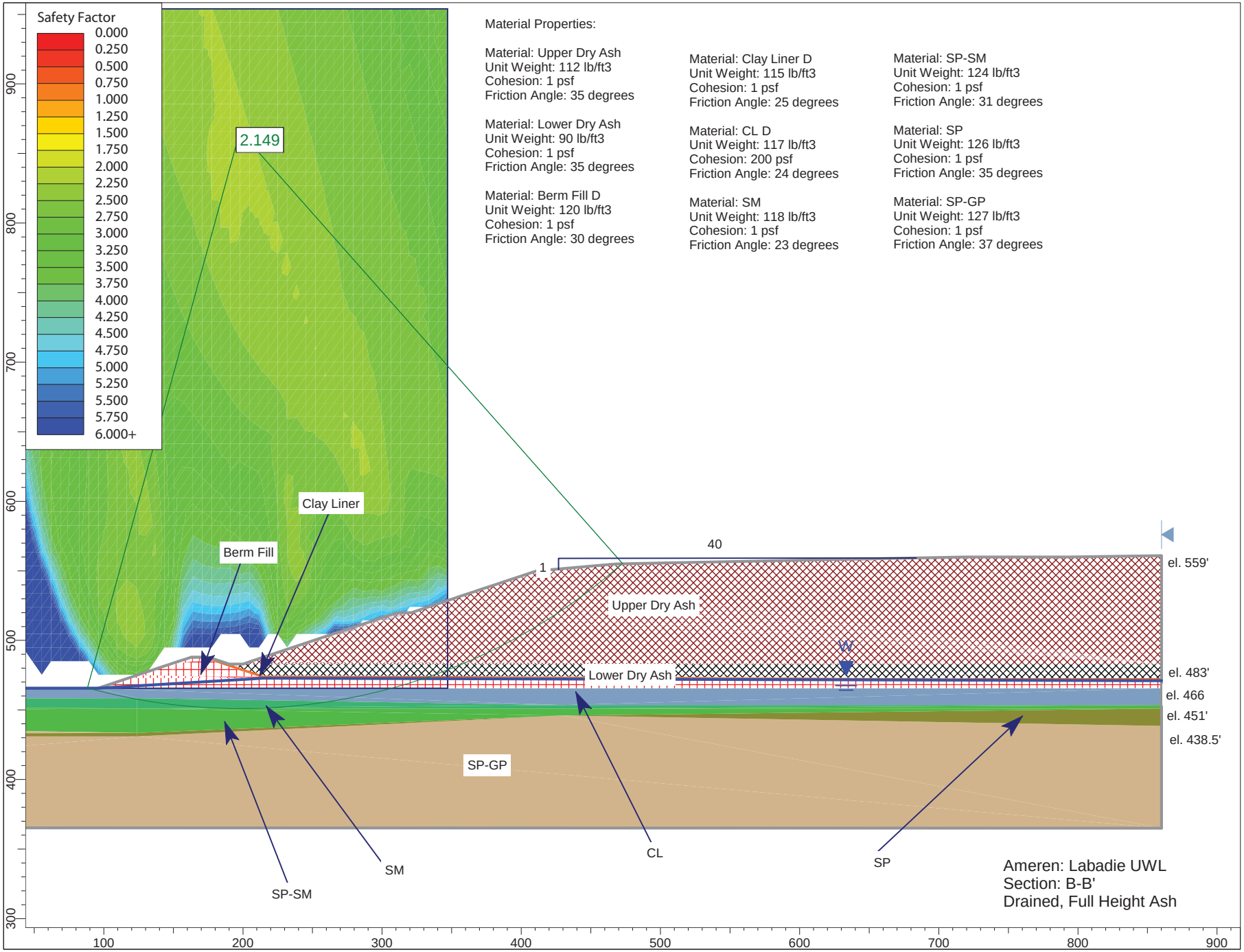
External Boundary

-650.000	365.500
860.000	365.000
860.008	438.502
860.009	450.998
860.010	453.500
860.010	453.500
860.011	465.591
860.011	471.000
860.012	473.000
860.013	482.998
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Search Grid	
61.845	465.568
170.821	465.568
170.821	658.343
61.845	658.343


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
2.149
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL D
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Clay Liner
Berm Fill
40
1
Upper Dry Ash
Lower Dry Ash
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Drained, Full Height Ash
300
400
500
600
700
800
900
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Full Drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL D
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
-650.000 458.500
124.000 458.500
430.000 453.500
860.010 453.500

Material Boundary
-650.000 456.000
124.000 451.000
430.000 451.000
860.010 453.500

Material Boundary
-650.000 446.000
124.000 433.500
430.000 446.000
860.009 450.998

Material Boundary
-650.000 433.500
124.000 433.500

Material Boundary
-650.000 431.000
124.000 431.000
430.000 446.000
860.008 438.502

Material Boundary
190.000 483.000
214.462 474.846
491.000 474.000
671.000 473.000
860.012 473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary

200.000	483.000
860.013	482.998

External Boundary

-650.000	365.500
860.000	365.000
860.008	438.502
860.009	450.998
860.010	453.500
860.010	453.500
860.011	465.591
860.011	471.000
860.012	473.000
860.013	482.998
860.021	560.896
792.394	560.000
718.434	560.000
500.172	555.635
468.434	555.000
461.429	554.390
411.000	550.000
401.743	546.914
396.000	545.000
386.646	541.882
381.000	540.000
371.552	536.851
366.000	535.000
356.462	531.821
351.000	530.000
341.374	526.791
336.000	525.000
329.925	522.975
321.000	520.000
315.050	520.000
311.000	520.000
302.030	517.010
296.000	515.000
286.965	511.988
281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000

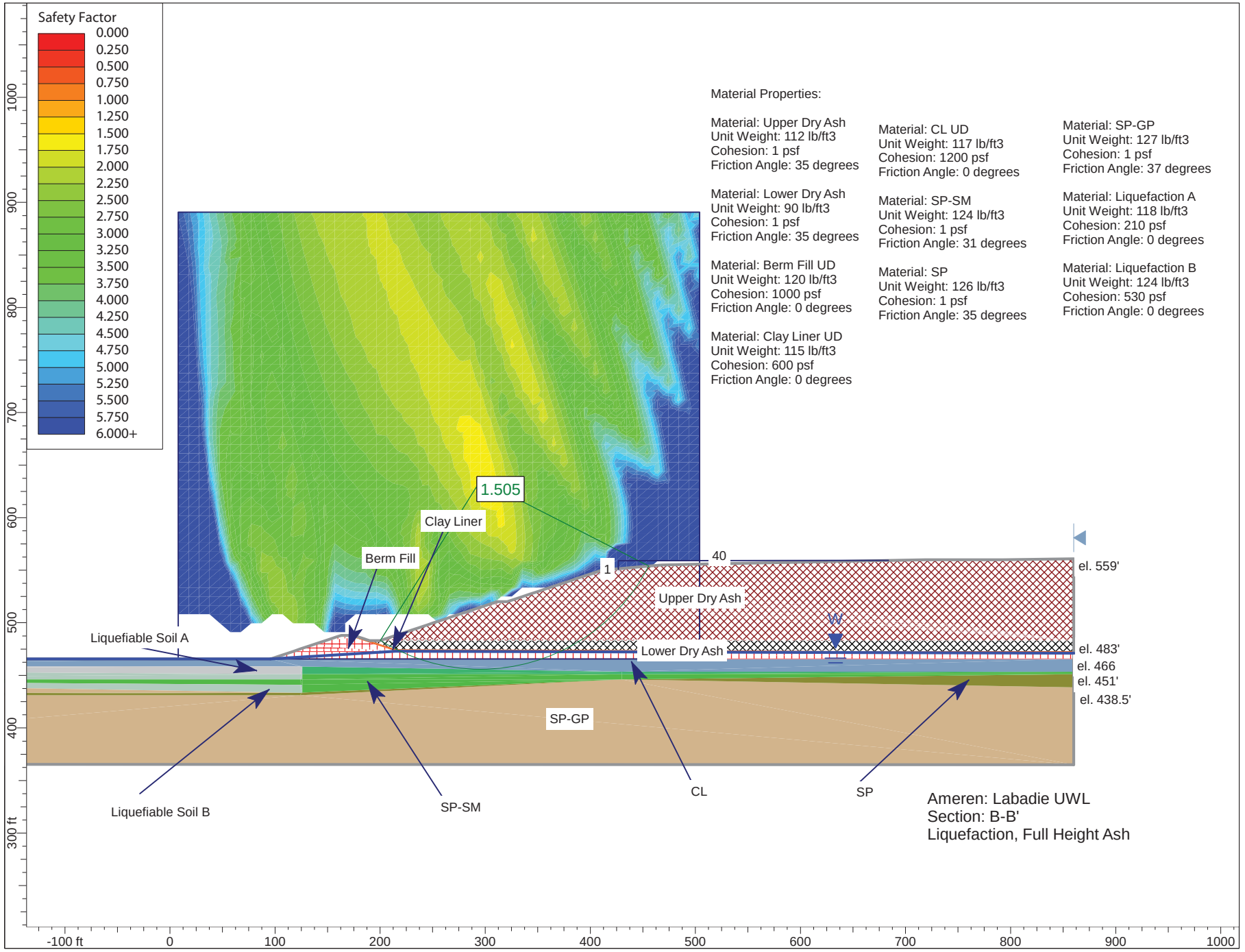
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Search Grid

7.917	465.568
347.082	465.568
347.082	953.907
7.917	953.907


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL UD
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Liquefaction A
Unit Weight: 118 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Material: Liquefaction B
Unit Weight: 124 lb/ft3
Cohesion: 530 psf
Friction Angle: 0 degrees
1.505
Clay Liner
Berm Fill
40
1
Upper Dry Ash
W
Liquefiable Soil A
Lower Dry Ash
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
Liquefiable Soil B
SP-SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Liquefaction, Full Height Ash
1000
900
800
700
600
500
400
300 ft
-100 ft
0
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section BB Full Liquefaction trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL UD
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquefaction A
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefaction B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 530 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.532100
Center: 295.619, 635.567
Radius: 179.968
Left Slip Surface Endpoint: 200.106, 483.035
Right Slip Surface Endpoint: 456.000, 553.918
Resisting Moment=8.14133e+007 lb-ft
Driving Moment=5.31383e+007 lb-ft

Method: spencer
FS: 1.505100
Center: 295.619, 635.567
Radius: 179.968
Left Slip Surface Endpoint: 200.106, 483.035
Right Slip Surface Endpoint: 456.000, 553.918
Resisting Moment=7.99786e+007 lb-ft
Driving Moment=5.31383e+007 lb-ft
Resisting Horizontal Force=380450 lb
Driving Horizontal Force=252774 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 9942
Number of Invalid Surfaces: 18669
Error Codes:
Error Code -103 reported for 18028 surfaces
Error Code -107 reported for 36 surfaces
Error Code -112 reported for 605 surfaces

Method: spencer
Number of Valid Surfaces: 9748
Number of Invalid Surfaces: 18863
Error Codes:
Error Code -103 reported for 18028 surfaces
Error Code -107 reported for 36 surfaces

Error Code -108 reported for 107 surfaces
Error Code -111 reported for 44 surfaces
Error Code -112 reported for 648 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

7.917	465.568
503.956	465.568
503.956	890.564
7.917	890.564

Material Boundary

-650.000	458.500
124.000	458.500
125.993	458.467
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
125.993	451.000
430.000	451.000

860.010 453.500

Material Boundary
-650.000 446.000
124.000 433.500

Material Boundary
-650.000 433.500
124.000 433.500

Material Boundary
-650.000 431.000
124.000 431.000
430.000 446.000
860.008 438.502

Material Boundary
190.000 483.000
214.462 474.846
491.000 474.000
671.000 473.000
860.012 473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
200.000 483.000
860.013 482.998

Material Boundary
-650.000 446.000
124.000 446.000
125.993 446.000
430.000 446.000
126.006 441.033
124.000 441.000
-650.000 446.000

Material Boundary
124.000 433.500
126.006 433.582

430.000 446.000

Material Boundary
430.000 446.000
860.009 450.998

Material Boundary
125.993 446.000
125.993 451.000
125.993 458.467

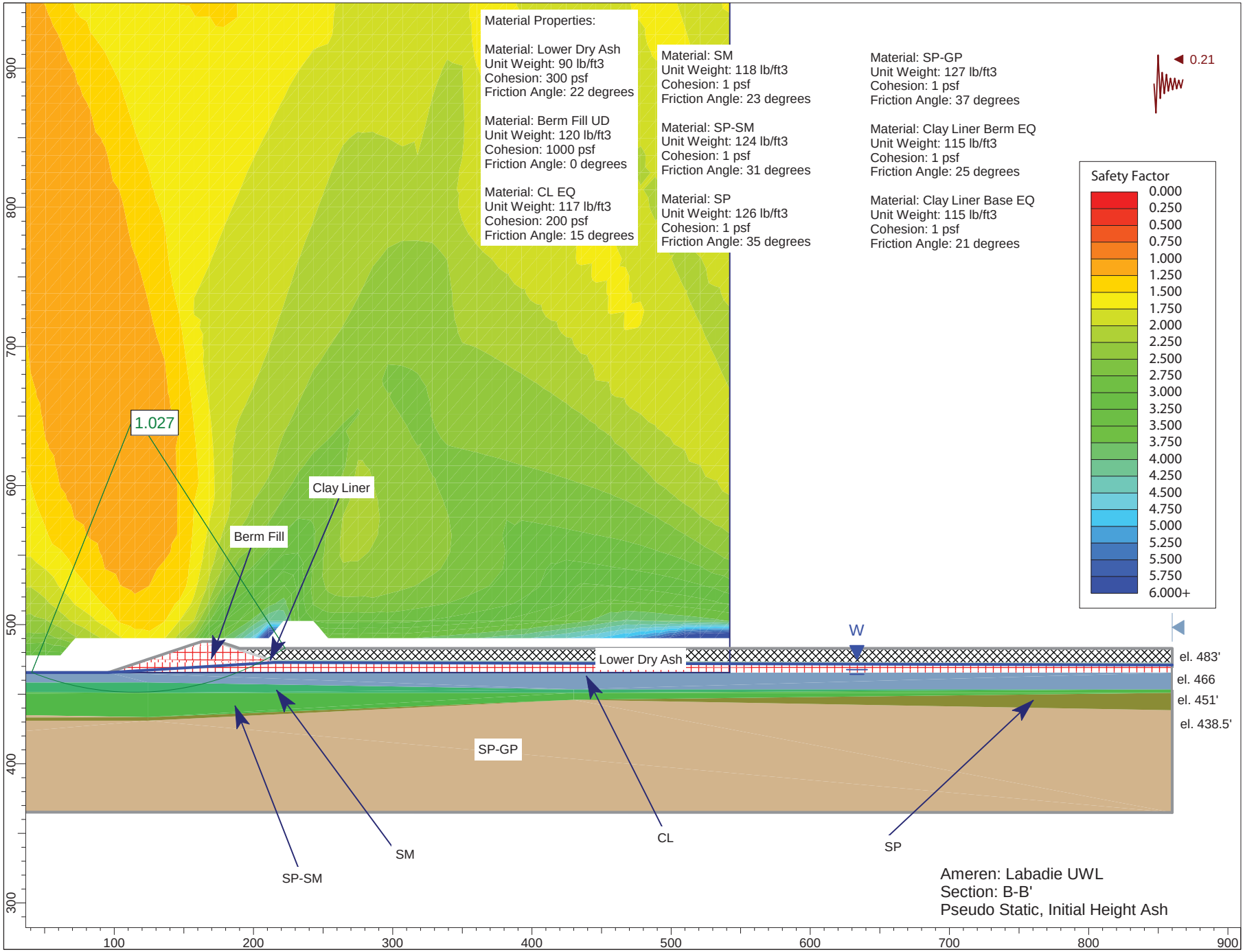
Material Boundary
126.006 433.582
126.006 441.033

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998
860.021 560.896
792.394 560.000
718.434 560.000
500.172 555.635
468.434 555.000
461.429 554.390
411.000 550.000
401.743 546.914
396.000 545.000
386.646 541.882
381.000 540.000
371.552 536.851
366.000 535.000
356.462 531.821
351.000 530.000
341.374 526.791
336.000 525.000
329.925 522.975
321.000 520.000
315.050 520.000
311.000 520.000
302.030 517.010
296.000 515.000
286.965 511.988
281.000 510.000
271.903 506.968
266.000 505.000
256.842 501.947
251.000 500.000
245.235 498.078

236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000


Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL EQ
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Clay Liner Berm EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Clay Liner Base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
0.21
Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
1.027
Clay Liner
Berm Fill
W
Lower Dry Ash
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Pseudo Static, Initial Height Ash
300
400
500
600
700
800
900
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Partial Pseudo Static.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.21

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD

Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL EQ
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3

Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500
430.000	446.000
860.009	450.998

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary

175.000	486.000
214.462	472.846
214.462	474.846

Material Boundary

214.462	472.846
860.011	471.000

Material Boundary

95.732	465.577

860.011	465.591

External Boundary

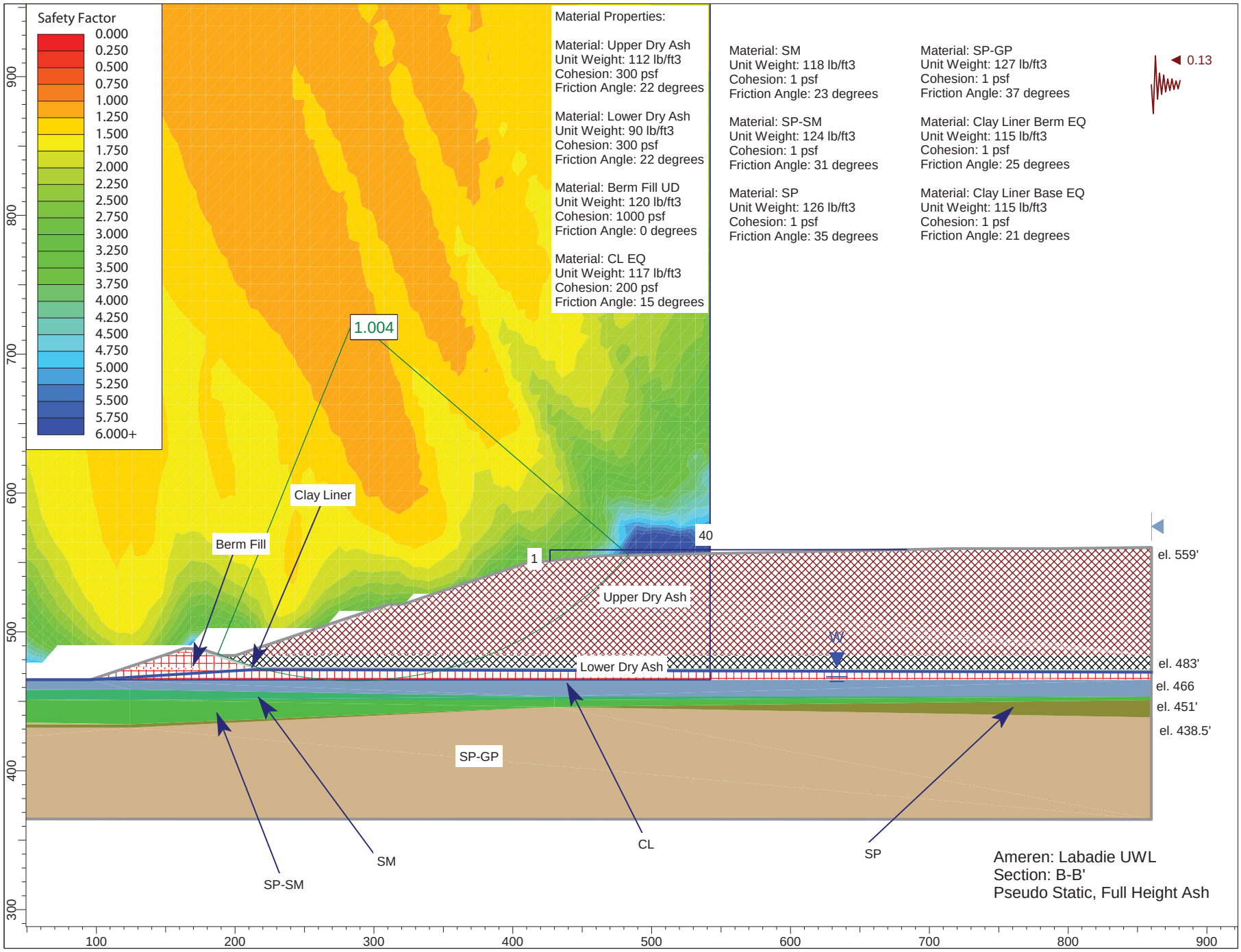
-650.000	365.500
860.000	365.000
860.008	438.502
860.009	450.998
860.010	453.500
860.010	453.500
860.011	465.591
860.011	471.000
860.012	473.000
860.013	482.998
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Search Grid

7.917	465.568
542.160	465.568
542.160	1085.206
7.917	1085.206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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL EQ
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Clay Liner Berm EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Clay Liner Base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
0.13
1.004
Clay Liner
Berm Fill
40
1
Upper Dry Ash
Lower Dry Ash
WY
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Pseudo Static, Full Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Full Pseudo Static.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.13

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash

Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL EQ
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3

Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500
430.000	446.000
860.009	450.998

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary

175.000	486.000
214.462	472.846

214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
200.000 483.000
860.013 482.998

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998
860.021 560.896
792.394 560.000
718.434 560.000
500.172 555.635
468.434 555.000
461.429 554.390
411.000 550.000
401.743 546.914
396.000 545.000
386.646 541.882
381.000 540.000
371.552 536.851
366.000 535.000
356.462 531.821
351.000 530.000
341.374 526.791
336.000 525.000
329.925 522.975
321.000 520.000
315.050 520.000
311.000 520.000
302.030 517.010
296.000 515.000
286.965 511.988
281.000 510.000
271.903 506.968
266.000 505.000
256.842 501.947
251.000 500.000
245.235 498.078
236.000 495.000
230.209 493.070

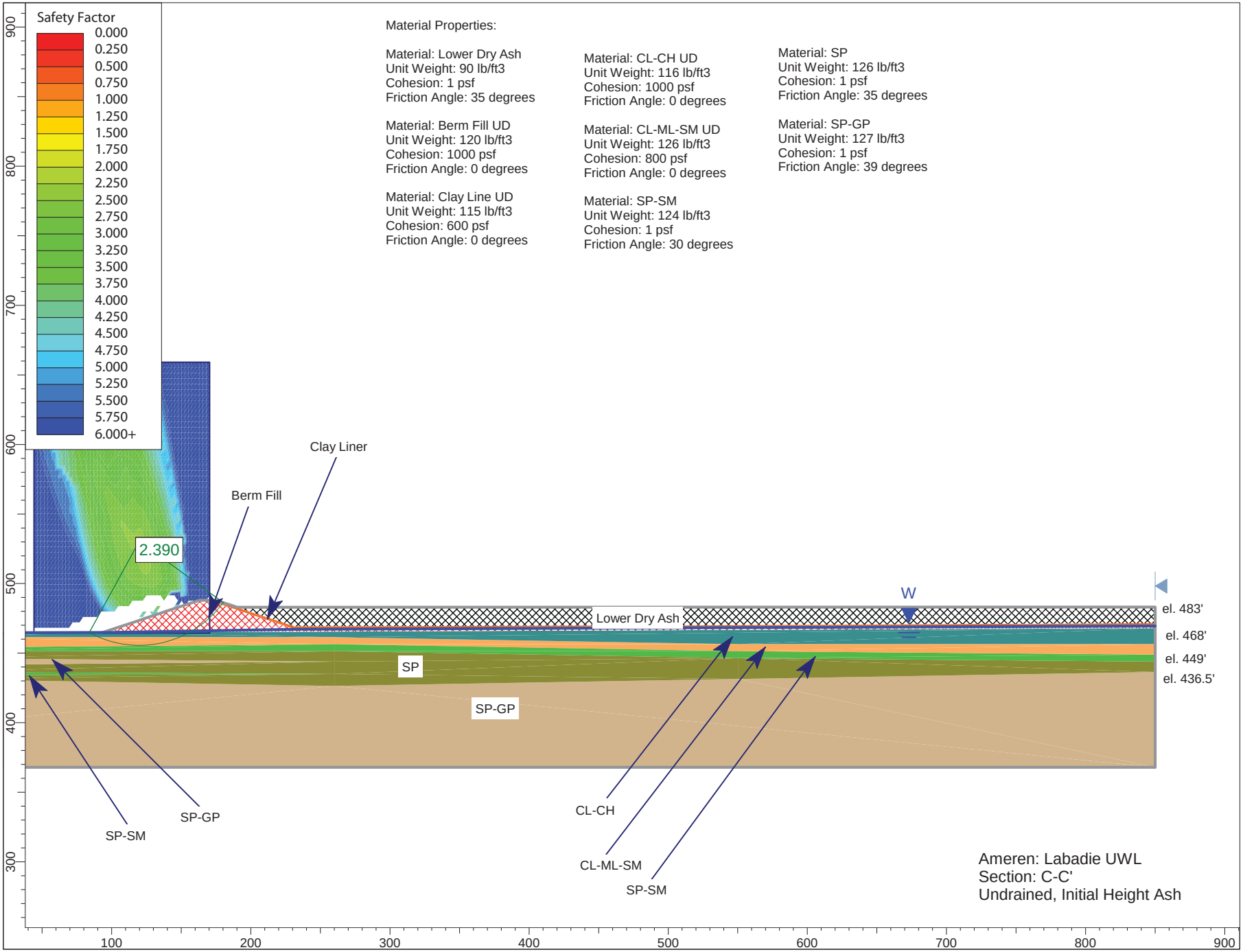
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Search Grid

7.917	465.568
542.160	465.568
542.160	1085.206
7.917	1085.206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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-CH UD
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL-ML-SM UD
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Clay Liner
Berm Fill
2.390
W
Lower Dry Ash
SP
SP-GP
el. 483'
el. 468'
el. 449'
el. 436.5'
SP-SM
SP-GP
CL-CH
CL-ML-SM
SP-SM
Ameren: Labadie UWL
Section: C-C'
Undrained, Initial Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: section CC partial undrained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM UD
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary
190.000 483.000
231.496 469.168
540.000 470.000
740.000 471.000
850.000 471.550

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
231.496 467.168
231.496 469.168

Material Boundary
231.496 467.168
850.000 469.550

Material Boundary
-330.000 461.500
-30.000 461.500
260.000 461.500
550.000 456.500
850.000 456.500

Material Boundary
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-30.000 454.000
260.000 456.500
550.000 451.500
850.000 449.000

Material Boundary
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-30.000 451.500
260.000 451.500
550.000 446.500
850.000 444.000

Material Boundary
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-30.000 446.500
260.000 444.000
-30.000 441.500
-330.000 444.000

Material Boundary
-330.000 431.500
-30.000 434.000
260.000 435.000
-30.000 436.500
-330.000 439.000

Material Boundary
-330.000 429.000

-30.000	431.500
260.000	426.500
550.000	431.500
850.000	436.500

External Boundary

200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
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850.000	368.000
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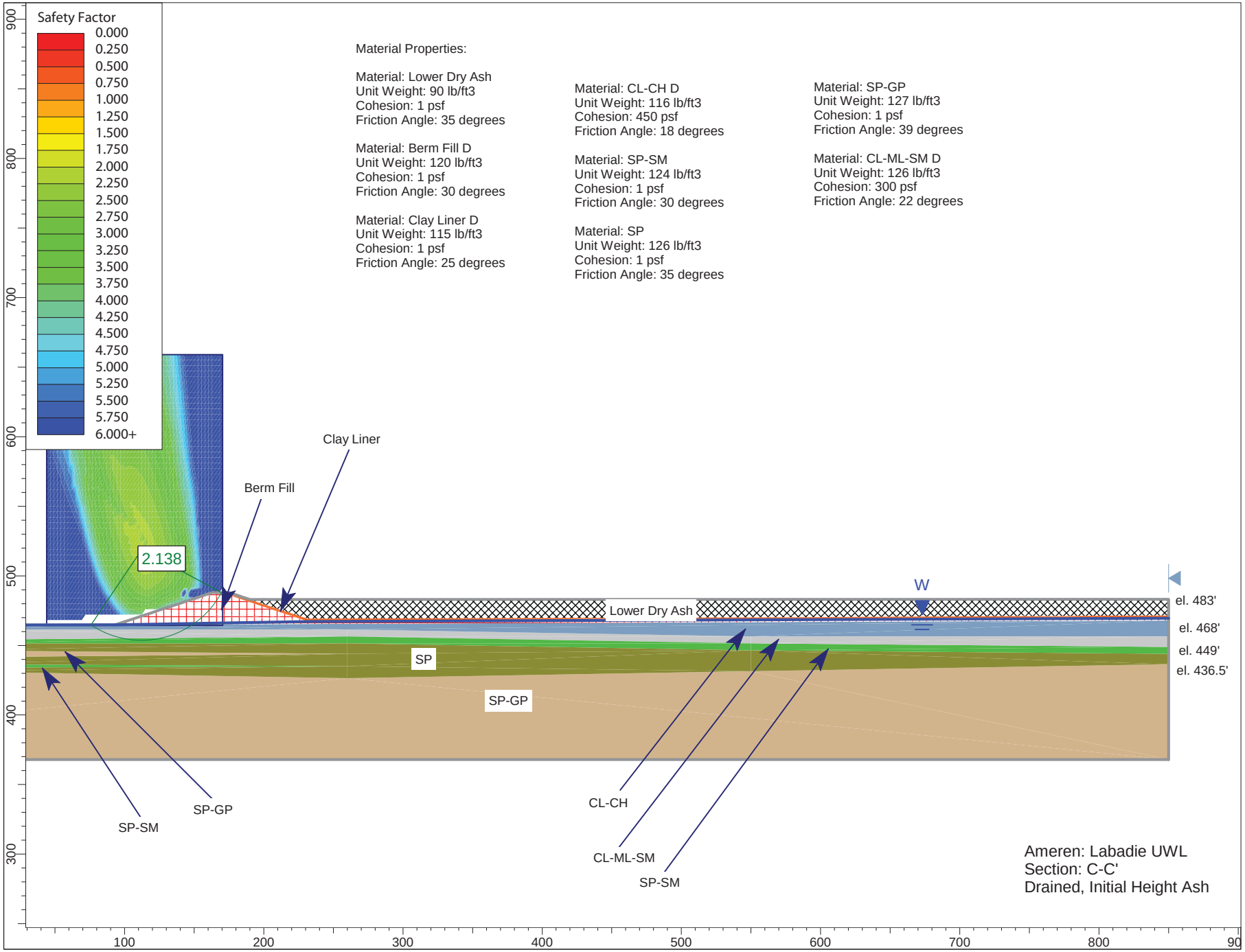
850.000	444.000
850.000	449.000
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550

Search Grid

44.084	464.321
170.428	464.321
170.428	659.049
44.084	659.049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0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-CH D
Unit Weight: 116 lb/ft3
Cohesion: 450 psf
Friction Angle: 18 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML-SM D
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Clay Liner
Berm Fill
2.138
W
Lower Dry Ash
el. 483'
el. 468'
el. 449'
el. 436.5'
SP
SP-GP
SP-SM
SP-GP
CL-CH
CL-ML-SM
SP-SM
Ameren: Labadie UWL
Section: C-C'
Drained, Initial Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
90

Slide Analysis Information

Document Name

File Name: section CC partial drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 450 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM D
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary
190.000 483.000
231.496 469.168
540.000 470.000
740.000 471.000
850.000 471.550

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
231.496 467.168
231.496 469.168

Material Boundary
231.496 467.168
850.000 469.550

Material Boundary
-330.000 461.500
-30.000 461.500
260.000 461.500
550.000 456.500
850.000 456.500

Material Boundary
-330.000 456.500
-30.000 454.000
260.000 456.500
550.000 451.500
850.000 449.000

Material Boundary
-330.000 449.000
-30.000 451.500
260.000 451.500
550.000 446.500
850.000 444.000

Material Boundary
-330.000 444.000
-30.000 446.500
260.000 444.000
-30.000 441.500
-330.000 444.000

Material Boundary
-330.000 431.500
-30.000 434.000
260.000 435.000
-30.000 436.500
-330.000 439.000

Material Boundary
-330.000 429.000

-30.000	431.500
260.000	426.500
550.000	431.500
850.000	436.500

External Boundary

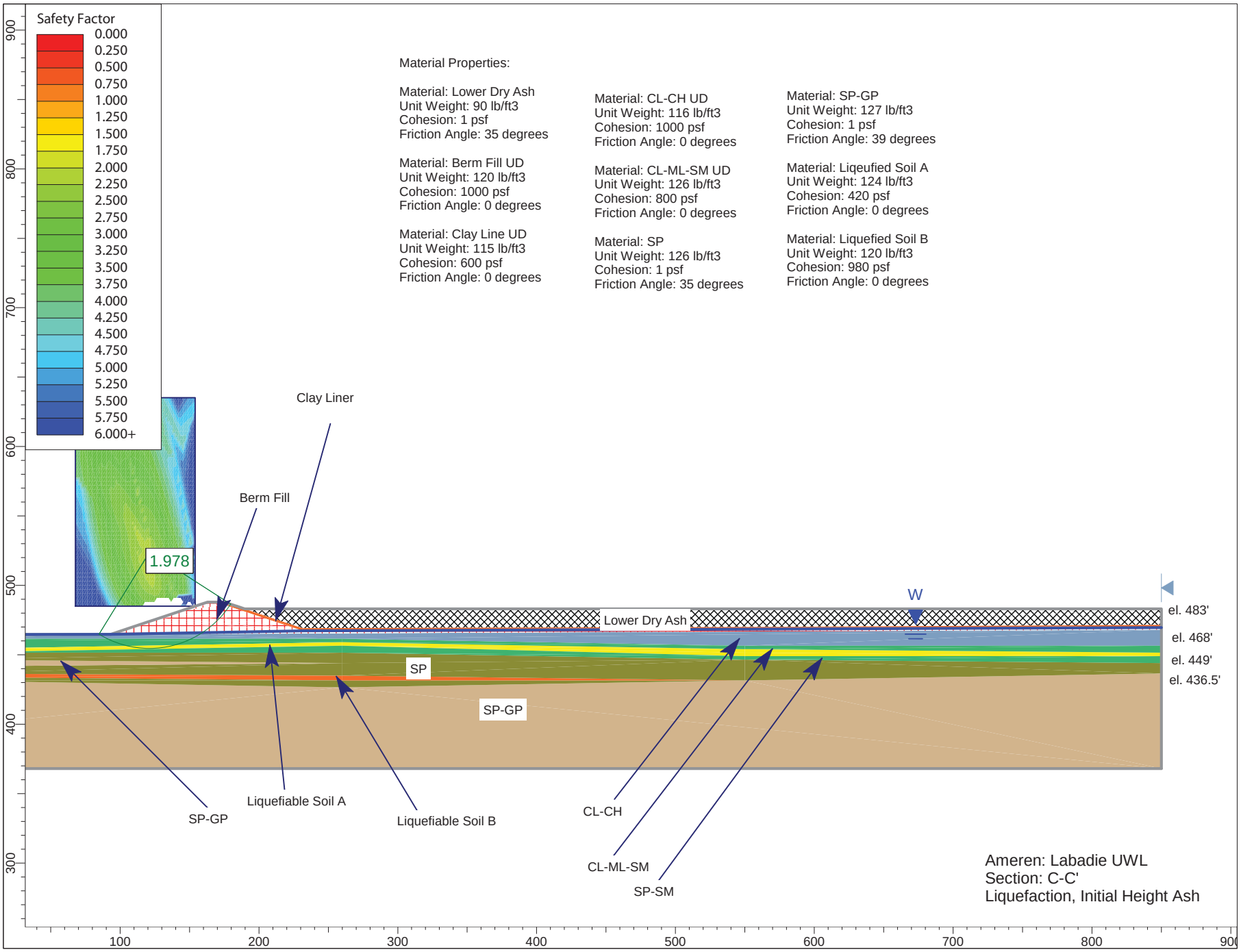
200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
-330.000	368.000
850.000	368.000
850.000	436.500
850.000	444.000
850.000	449.000
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550

Search Grid

44.084	464.321
170.428	464.321
170.428	659.049
44.084	659.049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0.500
0.750
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1.250
1.500
1.750
2.000
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2.500
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3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-CH UD
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL-ML-SM UD
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: Liqeufied Soil A
Unit Weight: 124 lb/ft3
Cohesion: 420 psf
Friction Angle: 0 degrees
Material: Liquefied Soil B
Unit Weight: 120 lb/ft3
Cohesion: 980 psf
Friction Angle: 0 degrees
Clay Liner
Berm Fill
1.978
W
Lower Dry Ash
SP
SP-GP
el. 483'
el. 468'
el. 449'
el. 436.5'
SP-GP
Liquefiable Soil A
Liquefiable Soil B
CL-CH
CL-ML-SM
SP-SM
Ameren: Labadie UWL
Section: C-C'
Liquefaction, Initial Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: section CC partial liquefaction.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM UD
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liqeufied Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 420 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 980 psf
Friction Angle: 0 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
93.161 464.720
850.000 468.000

Material Boundary
190.000 483.000
231.496 469.168
540.000 470.000
740.000 471.000
850.000 471.550

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
231.496 467.168
231.496 469.168

Material Boundary
231.496 467.168
850.000 469.550

Material Boundary
-330.000 461.500
-30.000 461.500
260.000 461.500
550.000 456.500
850.000 456.500

Material Boundary
-330.000 456.500
-30.000 454.000
260.000 456.500
550.000 451.500
850.000 449.000

Material Boundary
-330.000 449.000
-30.000 451.500
260.000 451.500
550.000 446.500
850.000 444.000

Material Boundary
-330.000 444.000
-30.000 446.500
260.000 444.000
-30.000 441.500
-330.000 444.000

Material Boundary

-330.000	431.500
-30.000	434.000
260.000	435.000
-30.000	436.500
-330.000	439.000

Material Boundary

-330.000	429.000
-30.000	431.500
260.000	426.500
550.000	431.500
850.000	436.500

Material Boundary

-30.000	454.000
260.000	459.000
550.000	454.000
850.000	451.500

Material Boundary

-30.000	451.500
260.000	456.500
550.000	449.000
850.000	449.000

Material Boundary

-30.000	434.000
260.000	431.500
550.000	431.500
260.000	435.000

External Boundary

200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500

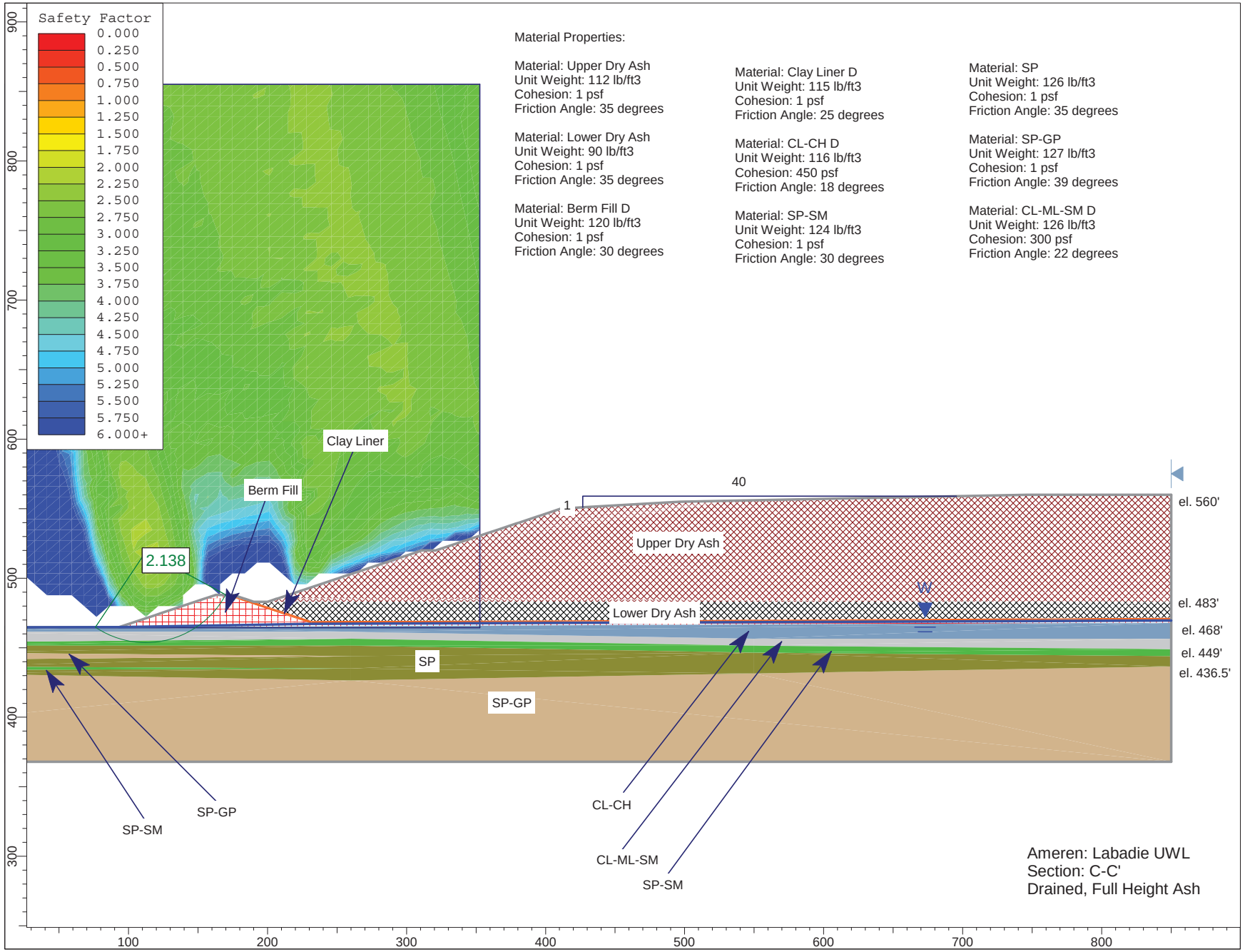
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
-330.000	368.000
850.000	368.000
850.000	436.500
850.000	444.000
850.000	449.000
850.000	451.500
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550

Search Grid

67.775	485.025
154.000	485.025
154.000	635.158
67.775	635.158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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-CH D
Unit Weight: 116 lb/ft3
Cohesion: 450 psf
Friction Angle: 18 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML-SM D
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Clay Liner
Berm Fill
2.138
40
1
Upper Dry Ash
Lower Dry Ash
W
SP
SP-GP
SP-SM
SP-GP
CL-CH
CL-ML-SM
SP-SM
el. 560'
el. 483'
el. 468'
el. 449'
el. 436.5'
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
Ameren: Labadie UWL
Section: C-C'
Drained, Full Height Ash

Slide Analysis Information

Document Name

File Name: section CC full drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 450 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM D
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
93.161 464.720
850.000 468.000

Material Boundary
190.000 483.000
231.496 469.168
540.000 470.000
740.000 471.000
850.000 471.550

Material Boundary
200.000 483.000
850.000 483.098

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
231.496 467.168
231.496 469.168

Material Boundary
231.496 467.168
850.000 469.550

Material Boundary
-330.000 461.500
-30.000 461.500
260.000 461.500
550.000 456.500
850.000 456.500

Material Boundary
-330.000 456.500
-30.000 454.000
260.000 456.500
550.000 451.500
850.000 449.000

Material Boundary
-330.000 449.000
-30.000 451.500
260.000 451.500
550.000 446.500
850.000 444.000

Material Boundary
-330.000 444.000
-30.000 446.500

260.000 444.000
-30.000 441.500
-330.000 444.000

Material Boundary
-330.000 431.500
-30.000 434.000
260.000 435.000
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-330.000 439.000

Material Boundary
-330.000 429.000
-30.000 431.500
260.000 426.500
550.000 431.500
850.000 436.500

External Boundary
850.000 560.000
746.465 560.000
531.296 555.697
496.414 555.000
428.162 551.003
411.000 550.000
410.785 549.928
396.000 545.000
394.686 544.562
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266.000 505.000
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251.000 500.000
249.169 499.390
236.000 495.000
234.321 494.440
221.000 490.000
207.609 485.536
206.000 485.000
205.359 484.786
200.000 483.000
198.942 483.000

190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
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850.000	436.500
850.000	444.000
850.000	449.000
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550

Search Grid

-92.049	464.321
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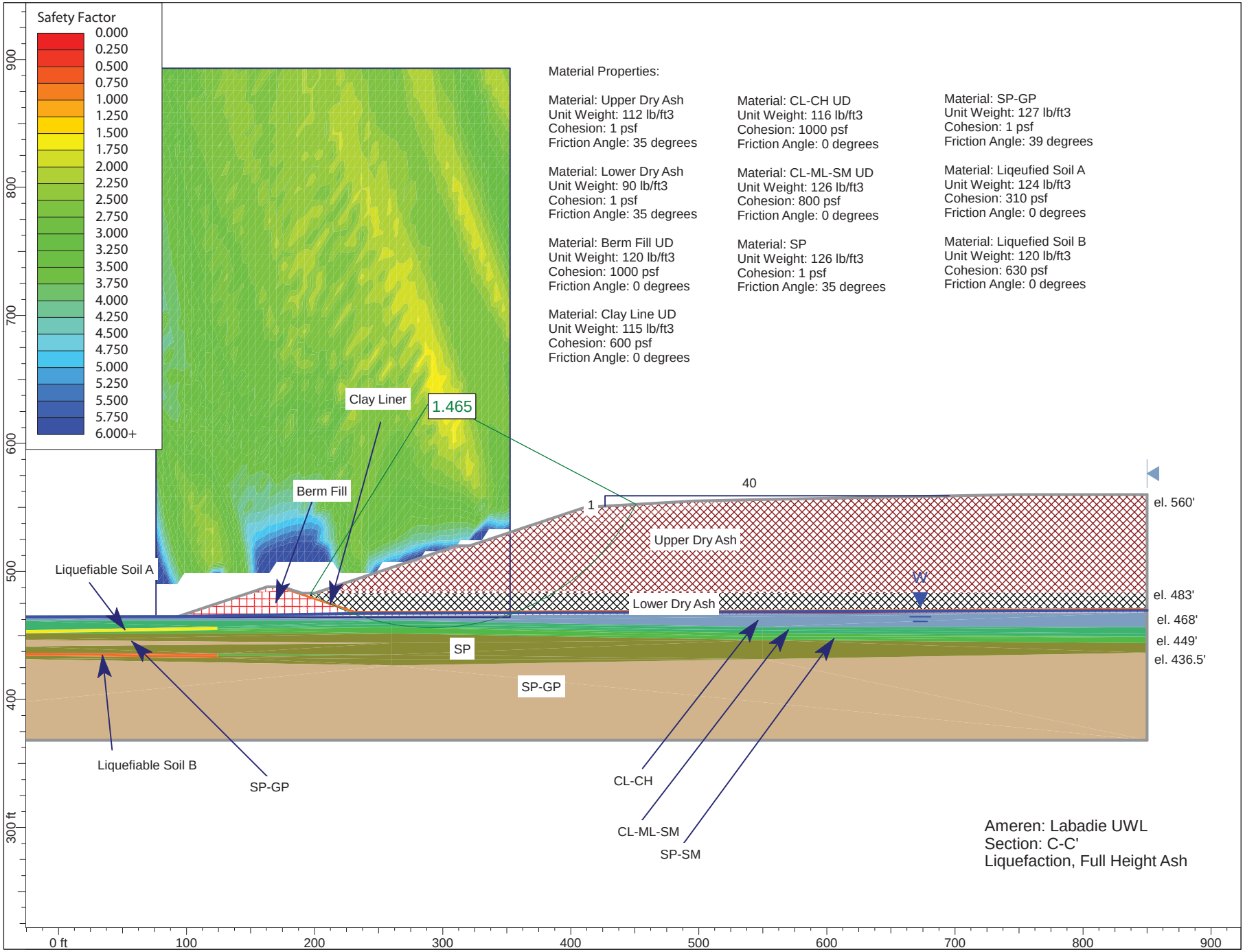
-92.049	855.143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0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-CH UD
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL-ML-SM UD
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: Liqeufied Soil A
Unit Weight: 124 lb/ft3
Cohesion: 310 psf
Friction Angle: 0 degrees
Material: Liquefied Soil B
Unit Weight: 120 lb/ft3
Cohesion: 630 psf
Friction Angle: 0 degrees
Clay Liner
1.465
Berm Fill
40
1
el. 560'
Upper Dry Ash
Liquefiable Soil A
Lower Dry Ash
el. 483'
el. 468'
el. 449'
el. 436.5'
SP
SP-GP
Liquefiable Soil B
SP-GP
CL-CH
CL-ML-SM
SP-SM
Ameren: Labadie UWL
Section: C-C'
Liquefaction, Full Height Ash
900
800
700
600
500
400
300 ft
0 ft
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: section CC full liquefaction trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM UD
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liqeufied Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 630 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.502530
Center: 291.823, 635.908
Radius: 179.900
Left Slip Surface Endpoint: 197.044, 483.000
Right Slip Surface Endpoint: 451.140, 552.349
Resisting Moment=7.78283e+007 lb-ft
Driving Moment=5.1798e+007 lb-ft

Method: spencer
FS: 1.465350
Center: 291.823, 635.908
Radius: 179.900
Left Slip Surface Endpoint: 197.044, 483.000
Right Slip Surface Endpoint: 451.140, 552.349
Resisting Moment=7.59023e+007 lb-ft
Driving Moment=5.1798e+007 lb-ft
Resisting Horizontal Force=359889 lb
Driving Horizontal Force=245599 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 9611
Number of Invalid Surfaces: 19000
Error Codes:
Error Code -103 reported for 18463 surfaces
Error Code -107 reported for 17 surfaces
Error Code -112 reported for 520 surfaces

Method: spencer
Number of Valid Surfaces: 9529
Number of Invalid Surfaces: 19082
Error Codes:
Error Code -103 reported for 18463 surfaces
Error Code -107 reported for 17 surfaces

Error Code -108 reported for 39 surfaces
Error Code -111 reported for 14 surfaces
Error Code -112 reported for 549 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

76.179	464.321
352.646	464.321
352.646	893.287
76.179	893.287

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary

190.000	483.000
231.496	469.168
540.000	470.000
740.000	471.000
850.000	471.550

Material Boundary

200.000 483.000
850.000 483.098

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
231.496 467.168
231.496 469.168

Material Boundary
231.496 467.168
850.000 469.550

Material Boundary
-330.000 461.500
-30.000 461.500
260.000 461.500
550.000 456.500
850.000 456.500

Material Boundary
-330.000 456.500
-30.000 454.000
124.000 455.328
260.000 456.500
550.000 451.500
850.000 449.000

Material Boundary
-330.000 449.000
-30.000 451.500
260.000 451.500
550.000 446.500
850.000 444.000

Material Boundary
-330.000 444.000
-30.000 446.500
260.000 444.000
-30.000 441.500
-330.000 444.000

Material Boundary
-330.000 431.500
-30.000 434.000
124.060 434.531
260.000 435.000
124.060 435.703
-30.000 436.500
-330.000 439.000

Material Boundary
-330.000 429.000

-30.000 431.500
260.000 426.500
550.000 431.500
850.000 436.500

Material Boundary
-30.000 454.000
124.000 456.655
260.000 459.000
550.000 454.000
850.000 451.500

Material Boundary
-30.000 451.500
124.000 454.155
260.000 456.500
550.000 449.000
850.000 449.000

Material Boundary
-30.000 434.000
124.060 432.672
260.000 431.500
550.000 431.500
260.000 435.000

Material Boundary
124.000 454.155
124.000 455.328
124.000 456.655

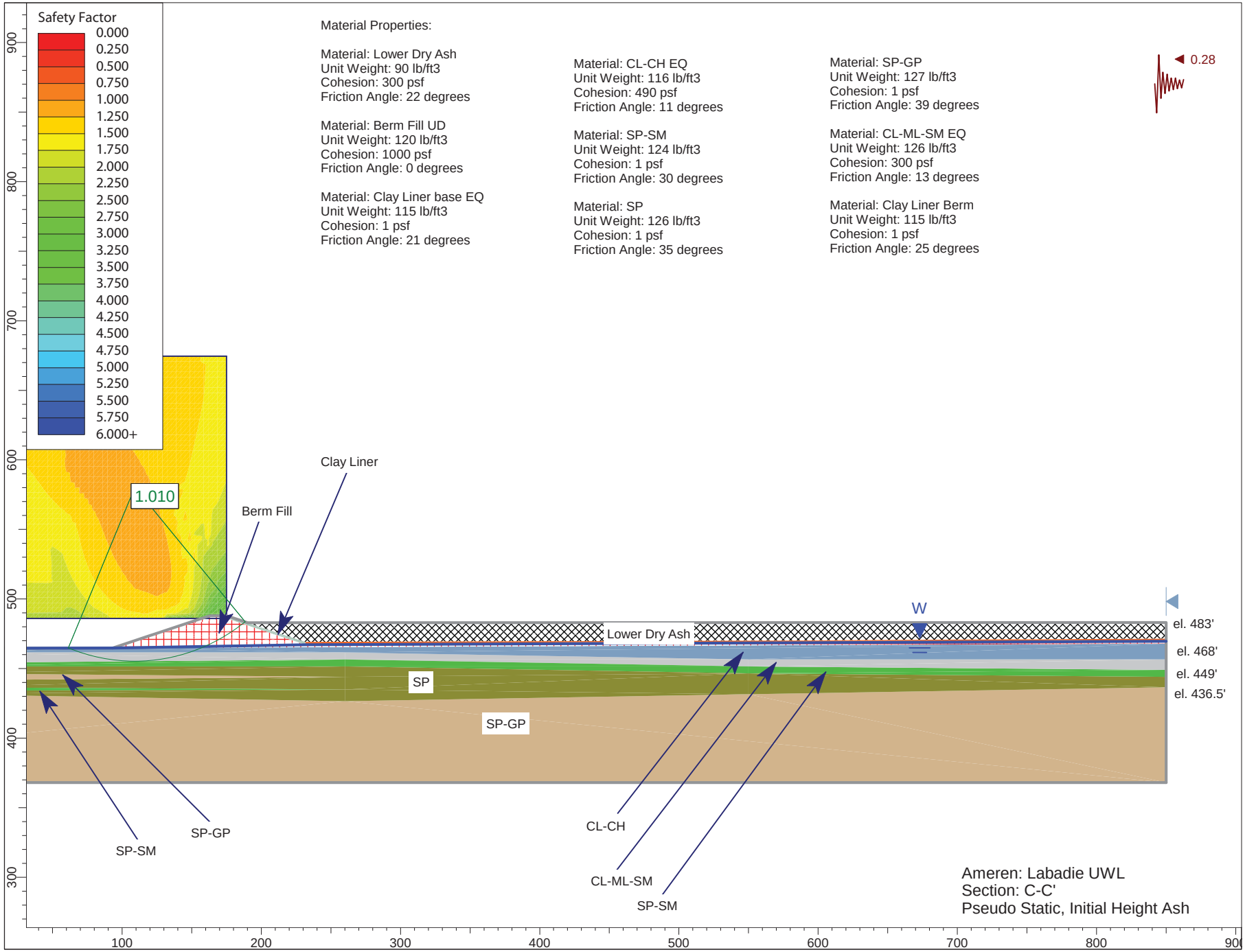
Material Boundary
124.060 432.672
124.060 434.531
124.060 435.703

External Boundary
850.000 560.000
746.465 560.000
531.296 555.697
496.414 555.000
428.162 551.003
411.000 550.000
410.785 549.928
396.000 545.000
394.686 544.562
381.000 540.000
378.604 539.201
366.000 535.000
357.068 532.023
351.000 530.000
337.385 525.462
336.000 525.000
321.299 520.100
321.000 520.000
316.824 520.000

311.000	520.000
310.590	519.863
296.000	515.000
294.508	514.503
281.000	510.000
278.441	509.147
266.000	505.000
256.165	501.722
251.000	500.000
249.169	499.390
236.000	495.000
234.321	494.440
221.000	490.000
207.609	485.536
206.000	485.000
205.359	484.786
200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
-330.000	368.000
850.000	368.000
850.000	436.500
850.000	444.000
850.000	449.000
850.000	451.500
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550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0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Material: CL-CH EQ
Unit Weight: 116 lb/ft3
Cohesion: 490 psf
Friction Angle: 11 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML-SM EQ
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 13 degrees
Material: Clay Liner Berm
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
0.28
1.010
Clay Liner
Berm Fill
W
Lower Dry Ash
SP
SP-GP
SP-SM
SP-GP
CL-CH
CL-ML-SM
SP-SM
el. 483'
el. 468'
el. 449'
el. 436.5'
Ameren: Labadie UWL
Section: C-C'
Pseudo Static, Initial Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: section CC Partial pseudo static.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Loading

Seismic Load Coefficient (Horizontal): 0.28

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD

Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH EQ
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 490 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM EQ
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 13 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3

Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary

190.000	483.000
231.496	469.168
540.000	470.000
740.000	471.000
850.000	471.550

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary

175.000	486.000
231.496	467.168
231.496	469.168

Material Boundary

231.496	467.168
850.000	469.550

Material Boundary

-330.000	461.500
-30.000	461.500
260.000	461.500
550.000	456.500
850.000	456.500

Material Boundary

-330.000	456.500
-30.000	454.000
260.000	456.500
550.000	451.500
850.000	449.000

Material Boundary

-330.000	449.000
-30.000	451.500
260.000	451.500
550.000	446.500
850.000	444.000

Material Boundary

-330.000	444.000
-30.000	446.500
260.000	444.000
-30.000	441.500

-330.000 444.000

Material Boundary
-330.000 431.500
-30.000 434.000
260.000 435.000
-30.000 436.500
-330.000 439.000

Material Boundary
-330.000 429.000
-30.000 431.500
260.000 426.500
550.000 431.500
850.000 436.500

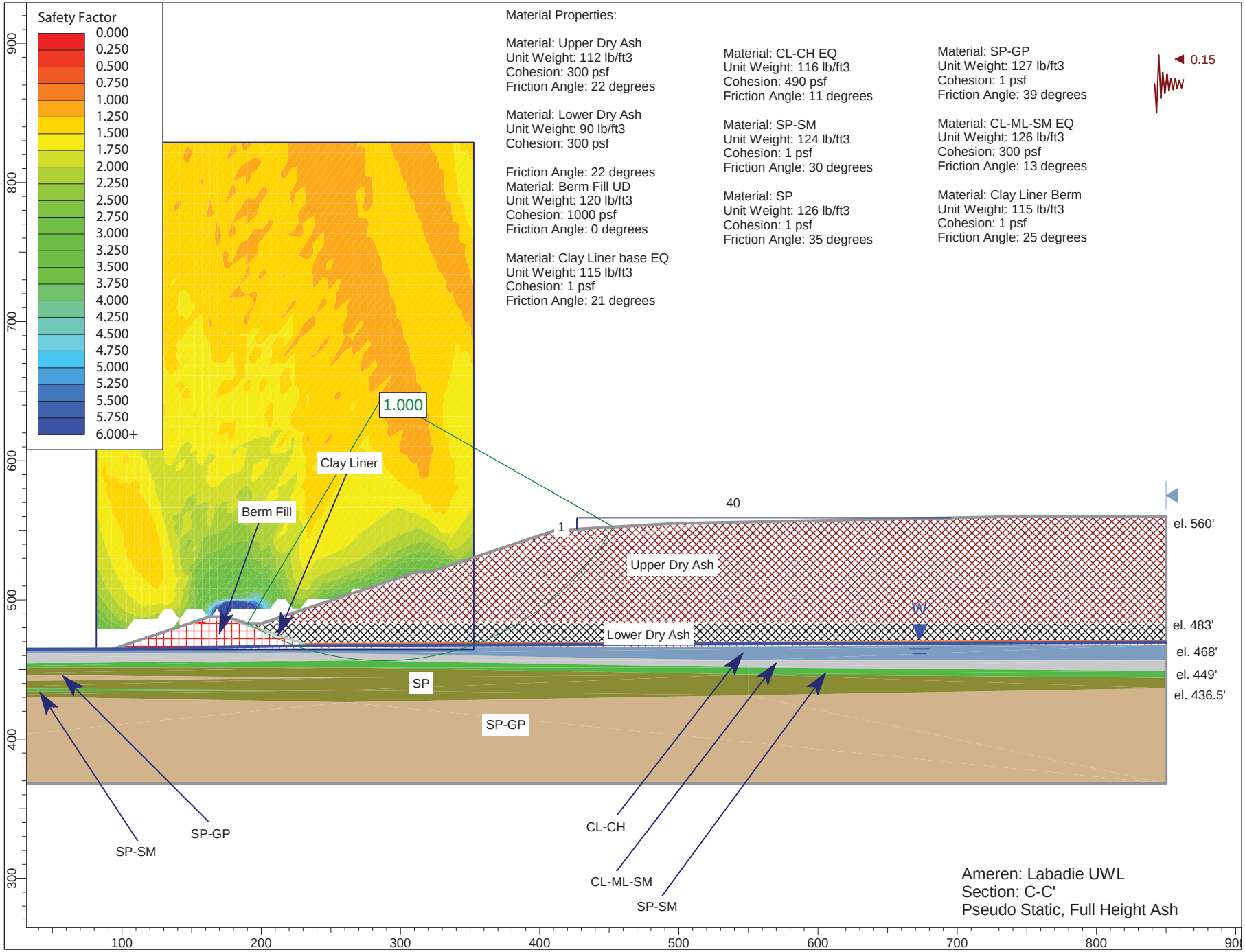
External Boundary
200.000 483.000
198.942 483.000
190.000 483.000
189.375 483.208
184.000 485.000
183.073 485.309
175.000 488.000
174.160 487.986
172.299 487.955
169.000 487.901
168.082 487.916
163.000 488.000
157.036 486.012
154.000 485.000
144.060 481.687
139.000 480.000
129.060 476.687
124.000 475.000
118.940 473.313
93.161 464.720
-330.000 464.000
-330.000 461.500
-330.000 456.500
-330.000 449.000
-330.000 444.000
-330.000 439.000
-330.000 431.500
-330.000 429.000
-330.000 368.000
850.000 368.000
850.000 436.500
850.000 444.000
850.000 449.000
850.000 456.500
850.000 468.000
850.000 469.550
850.000 471.550
850.000 483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550

Search Grid

10.389	486.000
175.000	486.000
175.000	674.579
10.389	674.579


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Material: CL-CH EQ
Unit Weight: 116 lb/ft3
Cohesion: 490 psf
Friction Angle: 11 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML-SM EQ
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 13 degrees
Material: Clay Liner Berm
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
0.15
1.000
Clay Liner
Berm Fill
40
1
Upper Dry Ash
Lower Dry Ash
SP
SP-GP
el. 560'
el. 483'
el. 468'
el. 449'
el. 436.5'
SP-SM
SP-GP
CL-CH
CL-ML-SM
SP-SM
Ameren: Labadie UWL
Section: C-C'
Pseudo Static, Full Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: section CC full pseudo static.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Loading

Seismic Load Coefficient (Horizontal): 0.15

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash

Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH EQ
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 490 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM EQ
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3

Cohesion: 300 psf
Friction Angle: 13 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary

190.000	483.000
231.496	469.168
540.000	470.000
740.000	471.000
850.000	471.550

Material Boundary

200.000	483.000
850.000	483.098

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary

175.000	486.000
231.496	467.168
231.496	469.168

Material Boundary

231.496	467.168
850.000	469.550

Material Boundary

-330.000	461.500
-30.000	461.500
260.000	461.500
550.000	456.500
850.000	456.500

Material Boundary

-330.000	456.500
-30.000	454.000
260.000	456.500
550.000	451.500
850.000	449.000

Material Boundary

-330.000	449.000
-30.000	451.500
260.000	451.500
550.000	446.500
850.000	444.000

Material Boundary

-330.000	444.000
-30.000	446.500
260.000	444.000
-30.000	441.500
-330.000	444.000

Material Boundary

-330.000	431.500
-30.000	434.000
260.000	435.000
-30.000	436.500
-330.000	439.000

Material Boundary

-330.000	429.000
-30.000	431.500
260.000	426.500
550.000	431.500
850.000	436.500

External Boundary

850.000	560.000
746.465	560.000
531.296	555.697
496.414	555.000
428.162	551.003
411.000	550.000
410.785	549.928
396.000	545.000
394.686	544.562
381.000	540.000
378.604	539.201
366.000	535.000
357.068	532.023
351.000	530.000
337.385	525.462
336.000	525.000
321.299	520.100
321.000	520.000
316.824	520.000
311.000	520.000
310.590	519.863
296.000	515.000
294.508	514.503
281.000	510.000
278.441	509.147
266.000	505.000
256.165	501.722
251.000	500.000

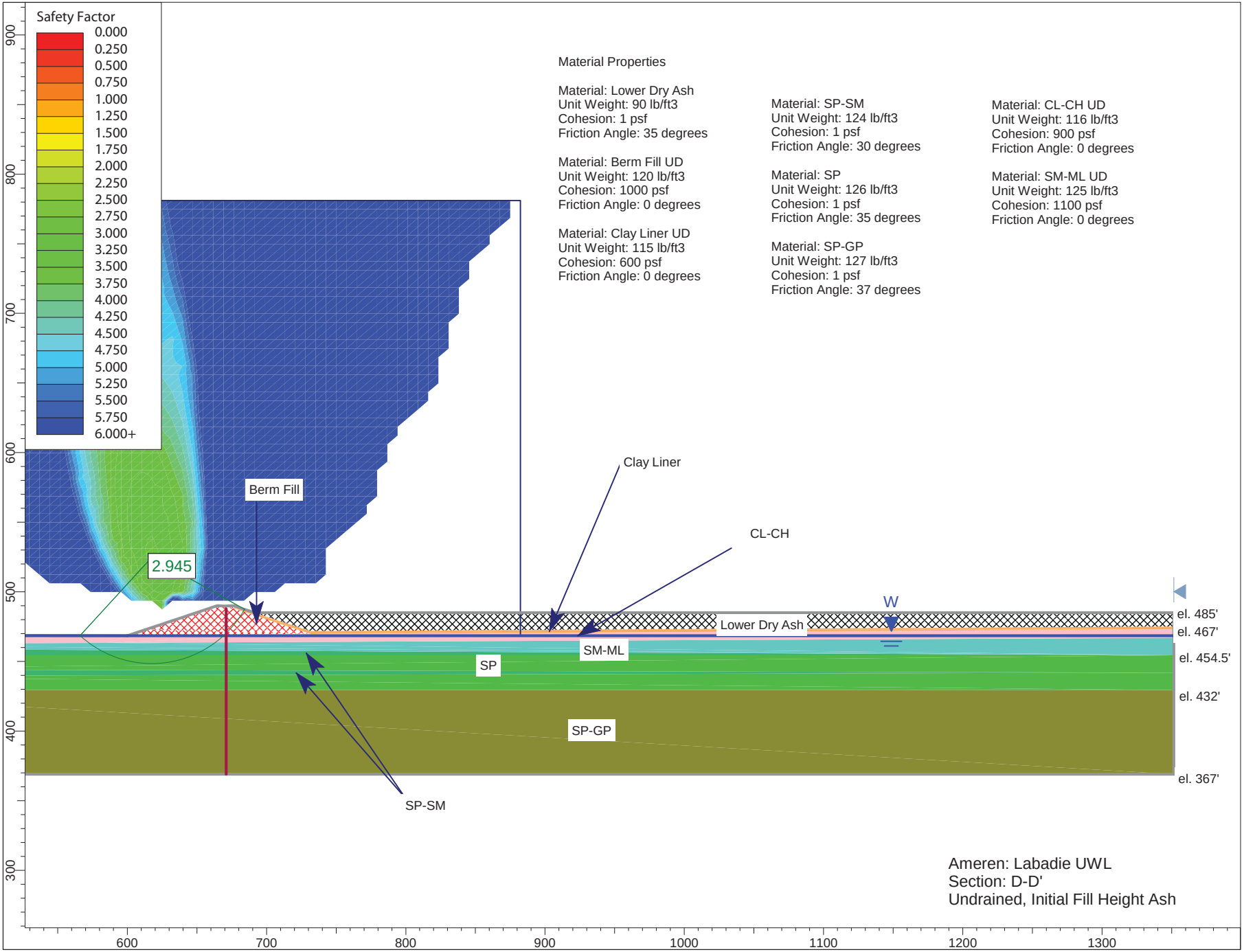
249.169	499.390
236.000	495.000
234.321	494.440
221.000	490.000
207.609	485.536
206.000	485.000
205.359	484.786
200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
-330.000	368.000
850.000	368.000
850.000	436.500
850.000	444.000
850.000	449.000
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550

Search Grid

81.576	464.321
352.646	464.321
352.646	828.742
81.576	828.742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0.500
0.750
1.000
1.250
1.500
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2.000
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2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: CL-CH UD
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: SM-ML UD
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Berm Fill
Clay Liner
CL-CH
2.945
W
Lower Dry Ash
SM-ML
SP
SP-GP
SP-SM
el. 485'
el. 467'
el. 454.5'
el. 432'
el. 367'
900
800
700
600
500
400
300
600
700
800
900
1000
1100
1200
1300
Ameren: Labadie UWL
Section: D-D'
Undrained, Initial Fill Height Ash

Slide Analysis Information

Document Name

File Name: Section DD Partial UnDrained 10192012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

691.524	485.008
731.239	471.770
966.524	473.008

1151.524 474.008
1351.524 475.008

Material Boundary
676.524 488.008
676.524 490.008

Material Boundary
676.524 488.008
731.239 469.770
731.239 471.770

Material Boundary
731.239 469.770
1351.524 473.008

Material Boundary
89.000 459.500
280.000 457.000
320.000 462.000
586.149 463.291
1351.524 467.002

Material Boundary
1351.524 454.500
320.000 459.500
280.000 457.000
320.000 454.500
1351.524 454.500

Material Boundary
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 432.000
89.000 432.000

Material Boundary
0.000 459.500
89.000 459.500

Material Boundary
0.000 454.500
280.000 457.000

Material Boundary
320.000 462.000
1351.524 454.500

Material Boundary
600.000 468.500
731.239 469.770

Material Boundary

280.000	442.000
330.000	444.500
1351.524	441.973
330.000	439.500
280.000	442.000

External Boundary

-0.000	469.008
0.000	459.500
0.000	454.500
0.000	432.000
-0.000	369.008
1351.524	369.008
1351.524	429.500
1351.524	441.973
1351.524	454.500
1351.524	467.002
1351.524	473.008
1351.524	475.008
1351.524	484.949
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

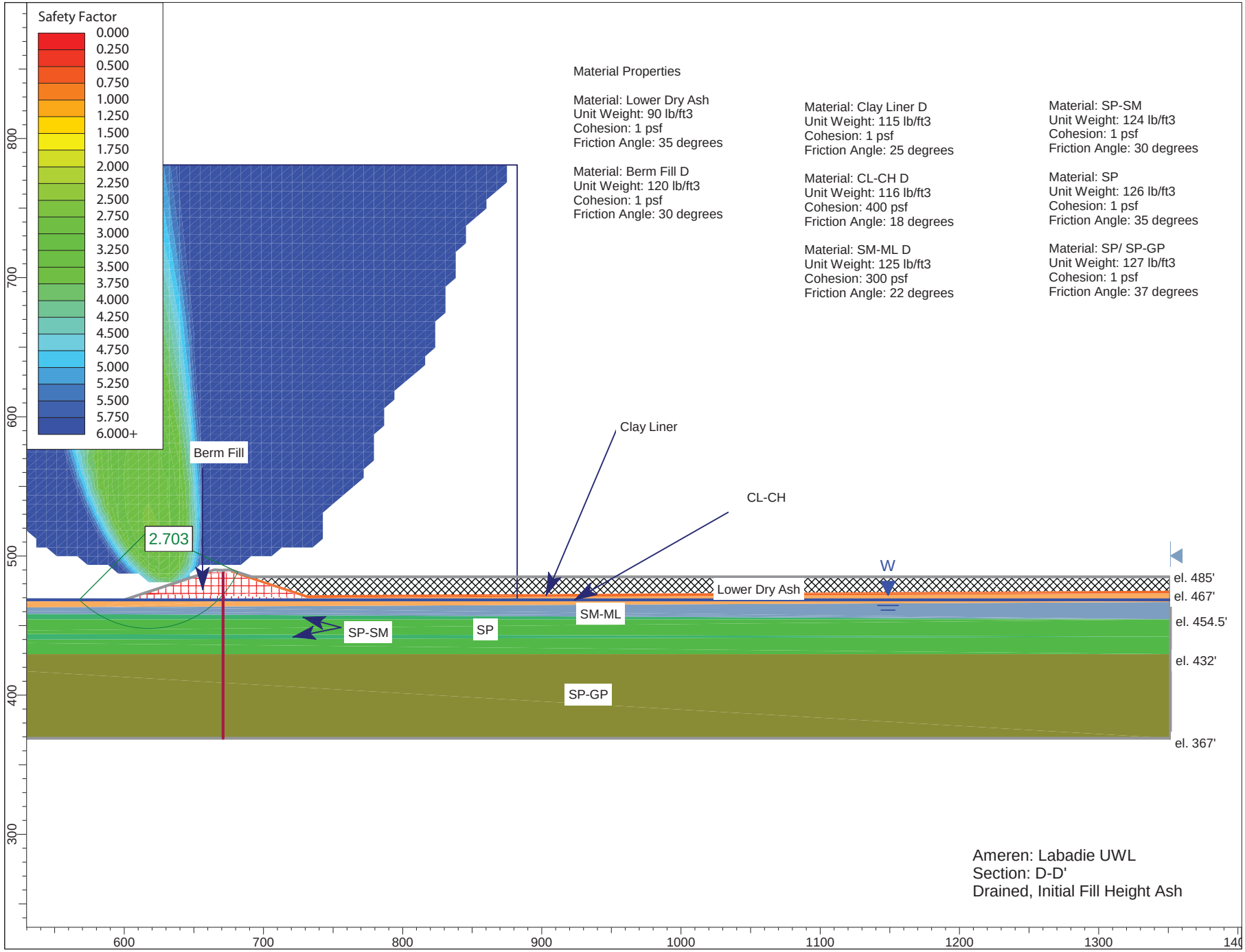
-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731

Search Grid

514.811	468.572
882.239	468.572
882.239	781.073
514.811	781.073


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-CH D
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 18 degrees
Material: SM-ML D
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Berm Fill
Clay Liner
CL-CH
2.703
W
Lower Dry Ash
SM-ML
SP-SM
SP
SP-GP
el. 485'
el. 467'
el. 454.5'
el. 432'
el. 367'
Ameren: Labadie UWL
Section: D-D'
Drained, Initial Fill Height Ash
800
700
600
500
400
300
600
700
800
900
1000
1100
1200
1300

Slide Analysis Information

Document Name

File Name: Section DD Partial Drained 10192012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

691.524	485.008
731.239	471.770
966.524	473.008

1151.524 474.008
1351.524 475.008

Material Boundary
676.524 488.008
676.524 490.008

Material Boundary
676.524 488.008
731.239 469.770
731.239 471.770

Material Boundary
731.239 469.770
1351.524 473.008

Material Boundary
89.000 459.500
280.000 457.000
320.000 462.000
586.149 463.291
1351.524 467.002

Material Boundary
1351.524 454.500
320.000 459.500
280.000 457.000
320.000 454.500
1351.524 454.500

Material Boundary
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 432.000
89.000 432.000

Material Boundary
0.000 459.500
89.000 459.500

Material Boundary
0.000 454.500
280.000 457.000

Material Boundary
320.000 462.000
1351.524 454.500

Material Boundary
600.000 468.500
731.239 469.770

Material Boundary

280.000	442.000
320.000	444.500
1351.524	442.037
330.000	439.500
280.000	442.000

External Boundary

-0.000	469.008
0.000	459.500
0.000	454.500
0.000	432.000
-0.000	369.008
1351.524	369.008
1351.524	429.500
1351.524	442.037
1351.524	454.500
1351.524	467.002
1351.524	473.008
1351.524	475.008
1351.524	484.949
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

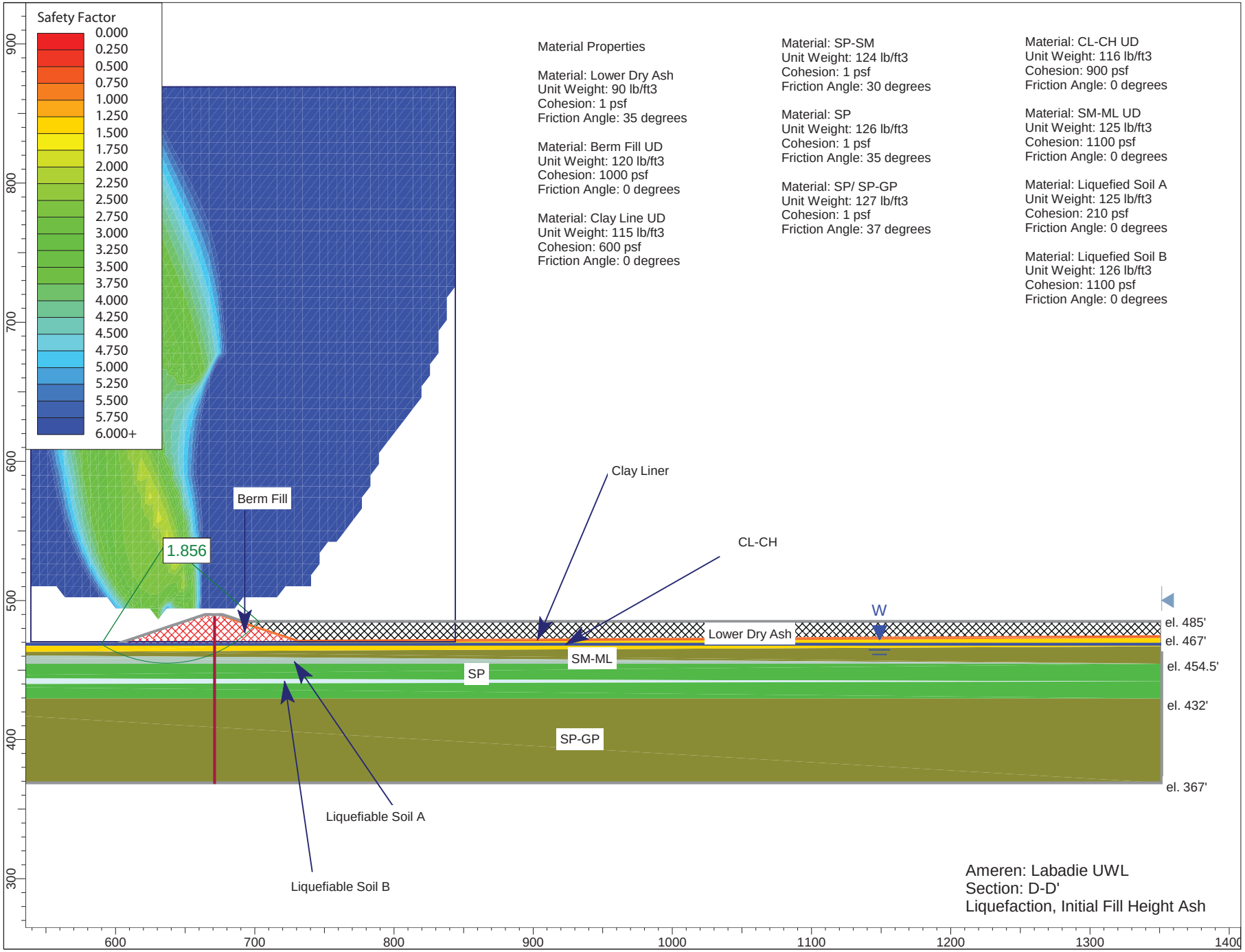
-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731

Search Grid

514.811	468.572
882.239	468.572
882.239	781.073
514.811	781.073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3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: CL-CH UD
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: SM-ML UD
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Material: Liquefied Soil A
Unit Weight: 125 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Material: Liquefied Soil B
Unit Weight: 126 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Clay Liner
CL-CH
Berm Fill
1.856
W
el. 485'
el. 467'
Lower Dry Ash
SM-ML
SP
el. 454.5'
el. 432'
SP-GP
el. 367'
Liquefiable Soil A
Liquefiable Soil B
Ameren: Labadie UWL
Section: D-D'
Liquefaction, Initial Fill Height Ash
900
800
700
600
500
400
300
600
700
800
900
1000
1100
1200
1300
1400

Slide Analysis Information

Document Name

File Name: Section DD Partial liquefaction10192012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
691.524 485.008
731.239 471.770
966.524 473.008
1151.524 474.008
1351.524 475.008

Material Boundary
676.524 488.008
676.524 490.008

Material Boundary
676.524 488.008
731.239 469.770
731.239 471.770

Material Boundary
600.000 468.500
731.239 469.770
1351.524 473.008

Material Boundary
0.000 459.500
89.000 459.500
280.000 457.000
320.000 462.000
586.149 463.291
1351.524 467.002

Material Boundary
1351.524 454.500
320.000 459.500
280.000 457.000
320.000 454.500
1351.524 454.500

Material Boundary
0.000 432.000
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 454.500
280.000 457.000

Material Boundary
320.000 462.000
1351.524 454.500

Material Boundary

280.000	442.000
330.000	444.500
1351.524	441.903
330.000	439.500
280.000	442.000

External Boundary

-0.000	469.008
0.000	459.500
0.000	454.500
0.000	432.000
-0.000	369.008
1351.524	369.008
1351.524	429.500
1351.524	441.903
1351.524	454.500
1351.524	467.002
1351.524	473.008
1351.524	475.008
1351.524	484.949
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

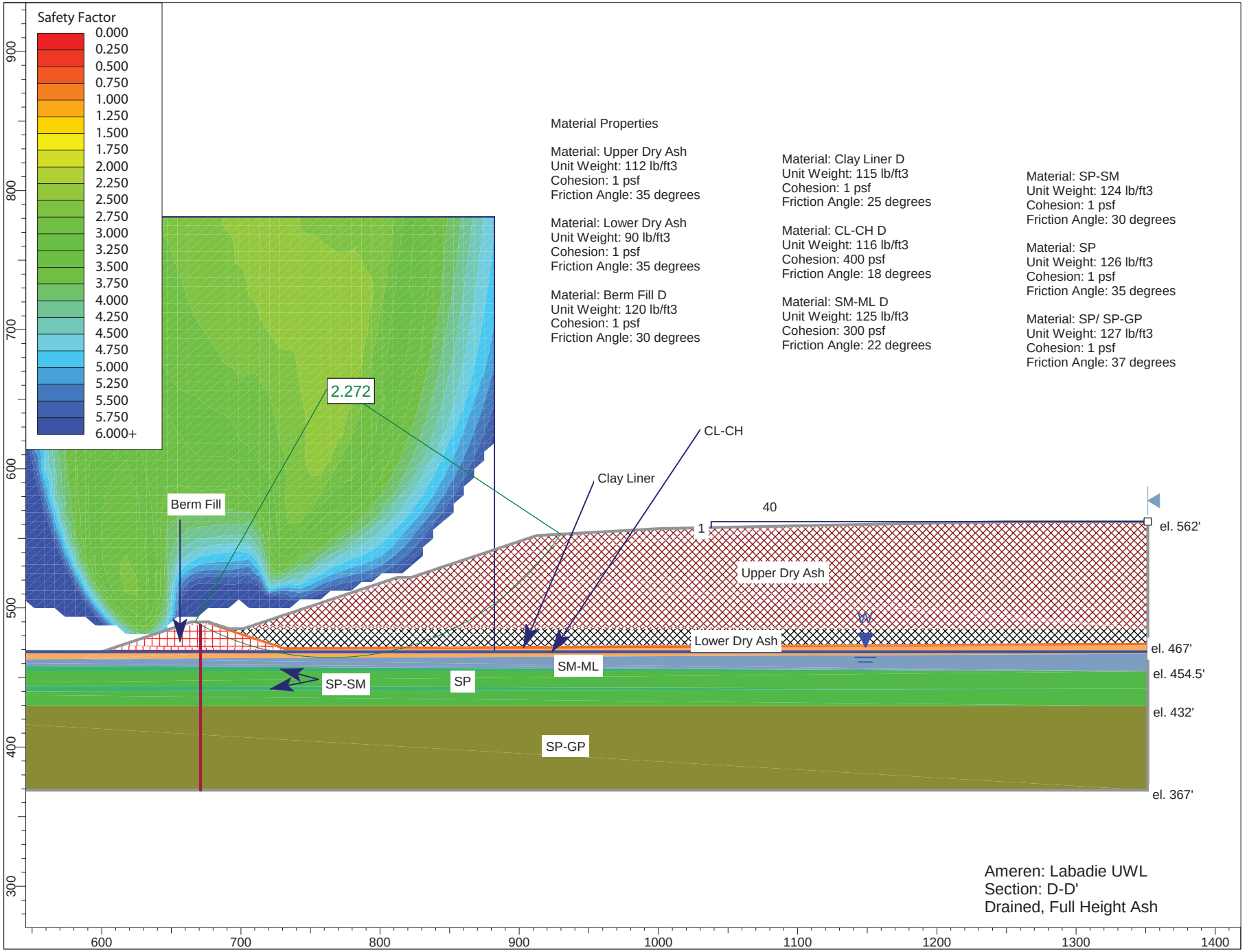
-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731

Search Grid

539.169	470.359
844.124	470.359
844.124	869.204
539.169	869.204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0.750
1.000
1.250
1.500
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2.000
2.250
2.500
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3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-CH D
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 18 degrees
Material: SM-ML D
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
2.272
CL-CH
Clay Liner
Berm Fill
40
1
el. 562'
Upper Dry Ash
Lower Dry Ash
el. 467'
SM-ML
SP-SM
SP
el. 454.5'
el. 432'
SP-GP
el. 367'
Ameren: Labadie UWL
Section: D-D'
Drained, Full Height Ash
900
800
700
600
500
400
300
600
700
800
900
1000
1100
1200
1300
1400

Slide Analysis Information

Document Name

File Name: Section DD Full Drained 10192012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
691.524 485.008
731.239 471.770
966.524 473.008
1151.524 474.008
1351.524 475.008

Material Boundary
676.524 488.008
676.524 490.008

Material Boundary
676.524 488.008
731.239 469.770
731.239 471.770

Material Boundary
731.239 469.770
1351.524 473.008

Material Boundary
701.524 485.008
1351.524 484.949

Material Boundary
89.000 459.500
280.000 457.000
320.000 462.000
586.149 463.291
1351.524 467.002

Material Boundary
1351.524 454.500
320.000 459.500
280.000 457.000
320.000 454.500
1351.524 454.500

Material Boundary
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 432.000
89.000 432.000

Material Boundary
0.000 459.500
89.000 459.500

Material Boundary

0.000	454.500
280.000	457.000

Material Boundary

320.000	462.000
1351.524	454.500

Material Boundary

600.000	468.500
731.239	469.770

Material Boundary

280.000	442.000
330.000	444.500
1351.524	441.961
330.000	439.500
280.000	442.000

External Boundary

-0.000	469.008
0.000	459.500
0.000	454.500
0.000	432.000
-0.000	369.008
1351.524	369.008
1351.524	429.500
1351.524	441.961
1351.524	454.500
1351.524	467.002
1351.524	473.008
1351.524	475.008
1351.524	484.949
1351.524	562.008
1250.221	562.008
1135.274	559.709
1000.182	557.008
935.839	553.357
912.524	552.008
900.658	548.053
897.524	547.008
884.510	542.670
882.524	542.008
868.376	537.292
867.524	537.008
866.146	536.549
852.524	532.008
843.872	529.124
837.524	527.008
827.732	523.744
822.524	522.008
815.418	522.008
812.524	522.008
800.863	518.121
797.524	517.008
784.760	512.753

782.524	512.008
768.670	507.390
767.524	507.008
765.715	506.405
752.524	502.008
744.442	499.314
737.524	497.008
729.376	494.292
722.524	492.008
714.376	489.292
707.524	487.008
704.265	485.922
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

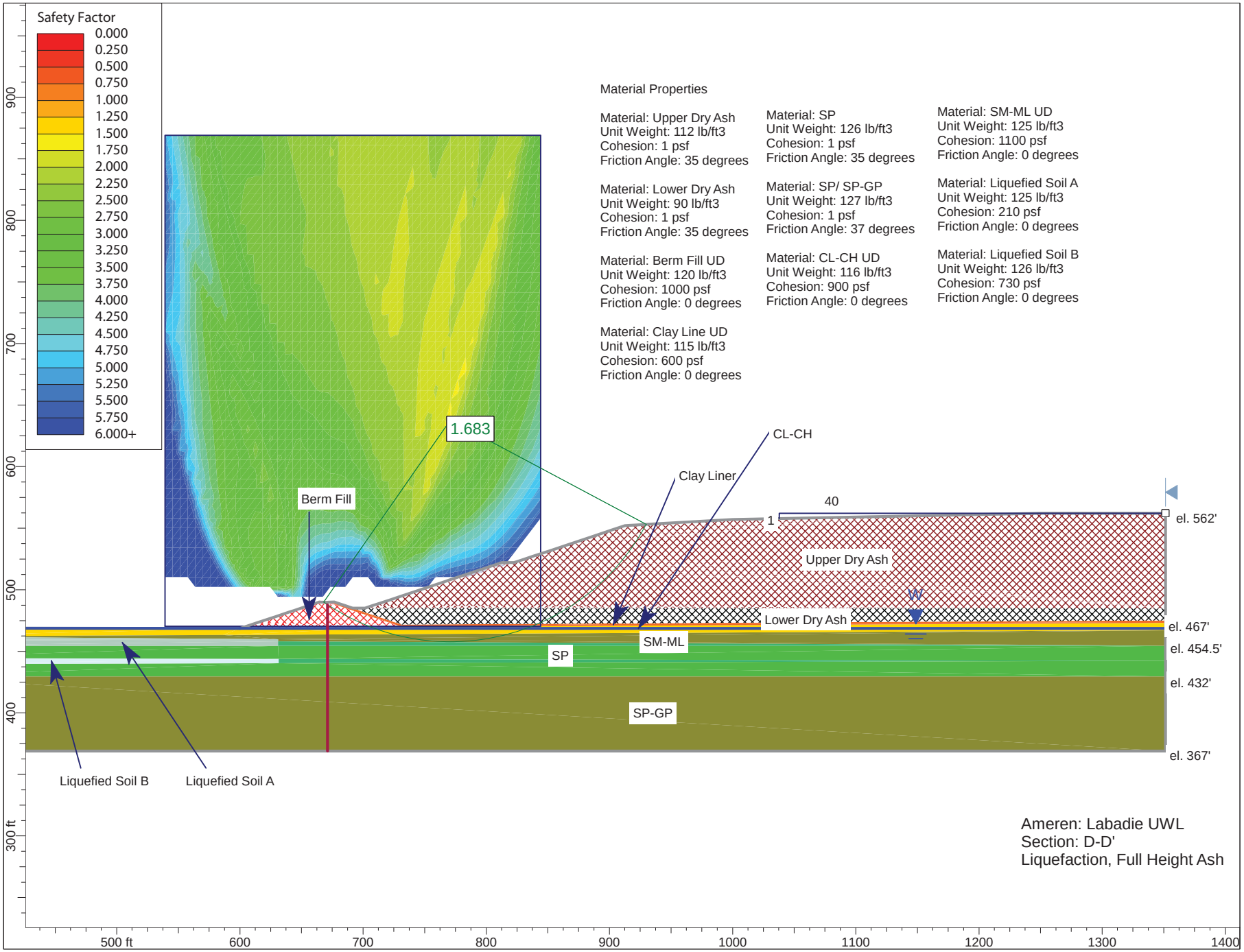
-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731

Search Grid

514.811	468.572
882.239	468.572
882.239	781.073
514.811	781.073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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: CL-CH UD
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: SM-ML UD
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Material: Liquefied Soil A
Unit Weight: 125 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Material: Liquefied Soil B
Unit Weight: 126 lb/ft3
Cohesion: 730 psf
Friction Angle: 0 degrees
1.683
CL-CH
Clay Liner
Berm Fill
40
1
el. 562'
Upper Dry Ash
Lower Dry Ash
el. 467'
SM-ML
SP
el. 454.5'
el. 432'
SP-GP
el. 367'
Liquefied Soil B
Liquefied Soil A
900
800
700
600
500
400
300 ft
500 ft
600
700
800
900
1000
1100
1200
1300
1400
Ameren: Labadie UWL
Section: D-D'
Liquefaction, Full Height Ash

Slide Analysis Information

Document Name

File Name: Section DD Full liquefaction10192012 trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquefied Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 730 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.729460
Center: 783.133, 677.758
Radius: 220.615
Left Slip Surface Endpoint: 667.461, 489.899
Right Slip Surface Endpoint: 966.504, 555.097
Resisting Moment=1.19849e+008 lb-ft
Driving Moment=6.92989e+007 lb-ft

Method: spencer
FS: 1.683230
Center: 770.935, 637.874
Radius: 180.327
Left Slip Surface Endpoint: 667.897, 489.883
Right Slip Surface Endpoint: 930.052, 553.022
Resisting Moment=7.82576e+007 lb-ft
Driving Moment=4.64926e+007 lb-ft
Resisting Horizontal Force=373621 lb
Driving Horizontal Force=221967 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 20901
Number of Invalid Surfaces: 7710
Error Codes:
Error Code -103 reported for 6371 surfaces
Error Code -107 reported for 8 surfaces
Error Code -112 reported for 1288 surfaces
Error Code -118 reported for 43 surfaces

Method: spencer
Number of Valid Surfaces: 20847
Number of Invalid Surfaces: 7764
Error Codes:
Error Code -103 reported for 6371 surfaces

Error Code -107 reported for 8 surfaces
Error Code -108 reported for 12 surfaces
Error Code -111 reported for 10 surfaces
Error Code -112 reported for 1320 surfaces
Error Code -118 reported for 43 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

-118 = Surface does not pass through the search focus

List of All Coordinates

Search Grid

539.169	470.359
844.124	470.359
844.124	869.204
539.169	869.204

Material Boundary

691.524	485.008
731.239	471.770
966.524	473.008
1151.524	474.008
1351.524	475.008

Material Boundary

676.524 488.008
676.524 490.008

Material Boundary
676.524 488.008
731.239 469.770
731.239 471.770

Material Boundary
600.000 468.500
731.239 469.770
1351.524 473.008

Material Boundary
701.524 485.008
1351.524 484.949

Material Boundary
0.000 459.500
89.000 459.500
280.000 457.000
320.000 462.000
586.149 463.291
1351.524 467.002

Material Boundary
1351.524 454.500
630.976 457.993
320.000 459.500
280.000 457.000
320.000 454.500
630.976 454.500
1351.524 454.500

Material Boundary
0.000 432.000
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 454.500
280.000 457.000

Material Boundary
320.000 462.000
630.976 459.739
1351.524 454.500

Material Boundary
280.000 442.000
320.000 444.500
631.373 443.790
1351.524 442.149
631.373 440.300

320.000 439.500
280.000 442.000

Material Boundary
630.976 454.500
630.976 457.993
630.976 459.739

Material Boundary
631.373 440.300
631.373 443.790

External Boundary
-0.000 469.008
0.000 459.500
0.000 454.500
0.000 432.000
-0.000 369.008
1351.524 369.008
1351.524 429.500
1351.524 442.149
1351.524 454.500
1351.524 467.002
1351.524 473.008
1351.524 475.008
1351.524 484.949
1351.524 562.008
1250.221 562.008
1135.274 559.709
1000.182 557.008
935.839 553.357
912.524 552.008
900.658 548.053
897.524 547.008
884.510 542.670
882.524 542.008
868.376 537.292
867.524 537.008
866.146 536.549
852.524 532.008
843.872 529.124
837.524 527.008
827.732 523.744
822.524 522.008
815.418 522.008
812.524 522.008
800.863 518.121
797.524 517.008
784.760 512.753
782.524 512.008
768.670 507.390
767.524 507.008
765.715 506.405
752.524 502.008
744.442 499.314
737.524 497.008

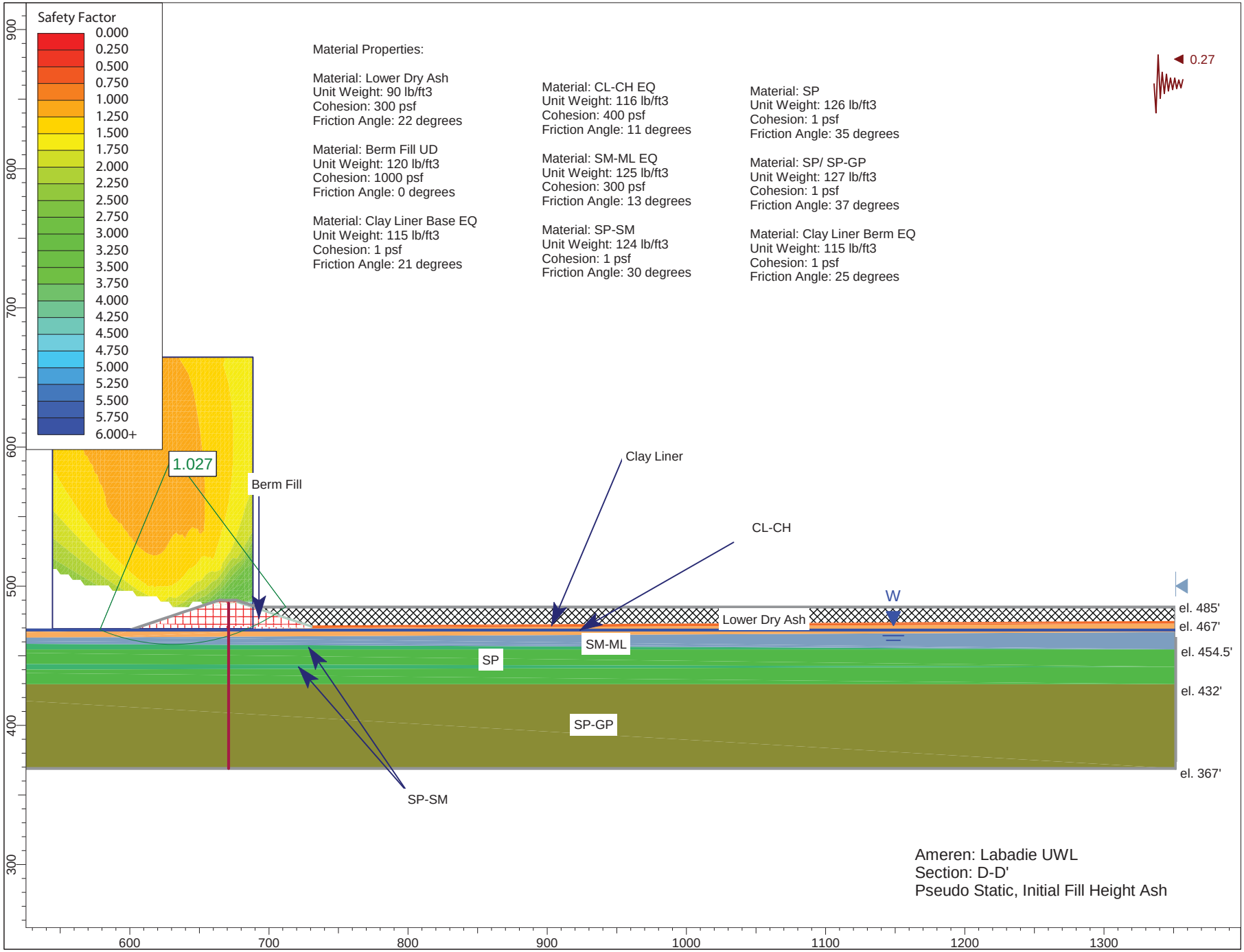
729.376	494.292
722.524	492.008
714.376	489.292
707.524	487.008
704.265	485.922
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner Base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Material: CL-CH EQ
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Material: SM-ML EQ
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 13 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Clay Liner Berm EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
0.27
1.027
Berm Fill
Clay Liner
CL-CH
W
Lower Dry Ash
SM-ML
SP
SP-GP
SP-SM
el. 485'
el. 467'
el. 454.5'
el. 432'
el. 367'
900
800
700
600
500
400
300
600
700
800
900
1000
1100
1200
1300
Ameren: Labadie UWL
Section: D-D'
Pseudo Static, Initial Fill Height Ash

Slide Analysis Information

Document Name

File Name: Section DD Partial Pseudo Static 10192012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.27

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD

Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH EQ
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML EQ
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 13 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3

Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

691.524	485.008
731.239	471.770
966.524	473.008
1151.524	474.008
1351.524	475.008

Material Boundary

676.524	488.008
676.524	490.008

Material Boundary

676.524	488.008
731.239	469.770
731.239	471.770

Material Boundary

600.000	468.500
731.239	469.770
1351.524	473.008

Material Boundary

0.000	459.500
89.000	459.500
280.000	457.000
320.000	462.000
586.149	463.291
1351.524	467.002

Material Boundary

1351.524	454.500
320.000	459.500
280.000	457.000
320.000	454.500
1351.524	454.500

Material Boundary

0.000	432.000
89.000	432.000
280.000	432.000
320.000	429.500
1351.524	429.500

Material Boundary

0.000	454.500
280.000	457.000

Material Boundary

320.000	462.000
1351.524	454.500

Material Boundary

280.000	442.000
320.000	444.500
1351.524	442.088
320.000	439.500
280.000	442.000

External Boundary

-0.000	469.008
0.000	459.500
0.000	454.500
0.000	432.000
-0.000	369.008
1351.524	369.008
1351.524	429.500
1351.524	442.088
1351.524	454.500
1351.524	467.002
1351.524	473.008
1351.524	475.008
1351.524	484.949
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

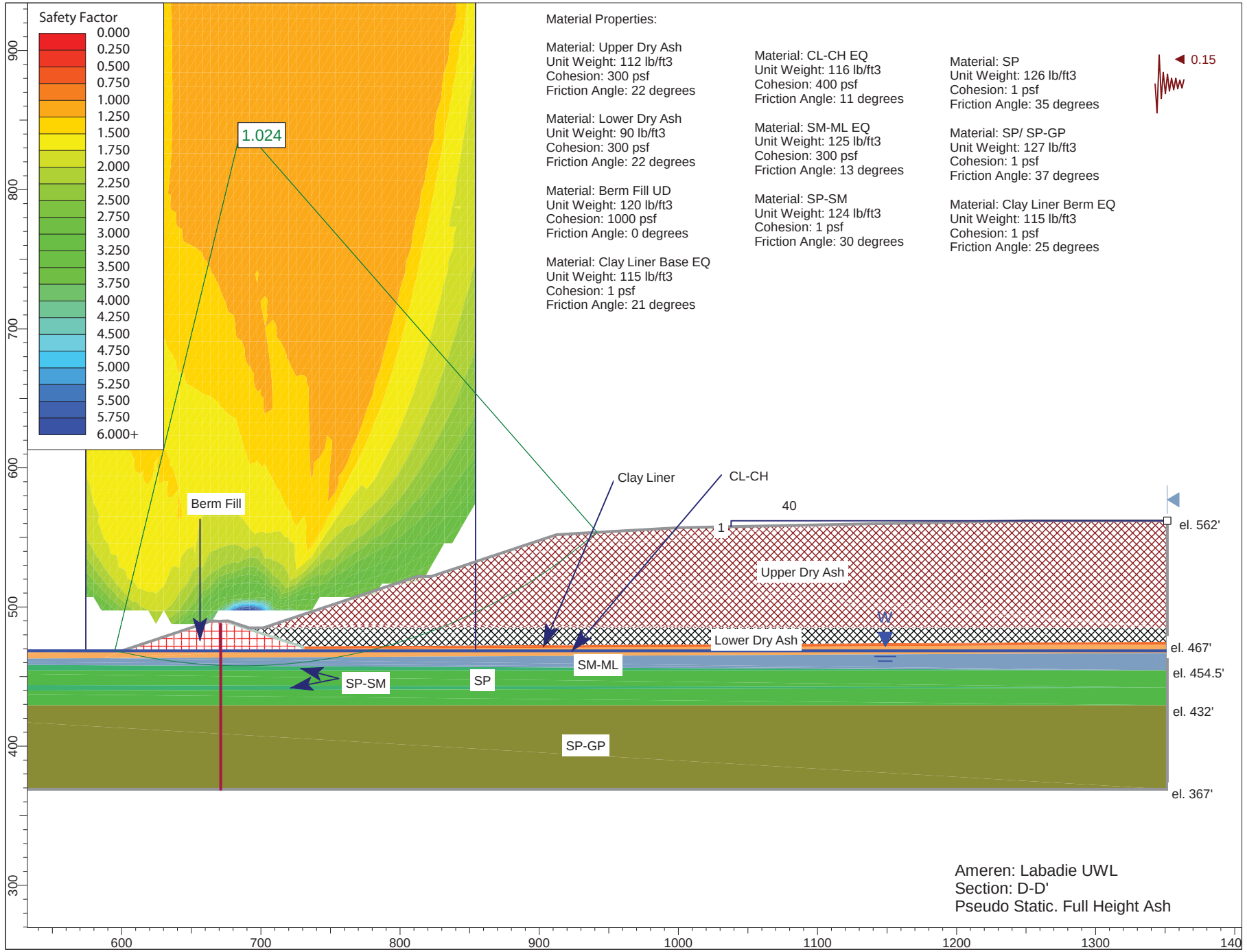
-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731

Search Grid

544.464	469.356
688.483	469.356
688.483	664.586
544.464	664.586



REITZ & JENS, INC.

Figure E-29

SCHEDULE CJG-ST1

Slide Analysis Information

Document Name

File Name: Section DD Full Pseudo Static 10182012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.15

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash

Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH EQ
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML EQ
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 13 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3

Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

List of All Coordinates

Material Boundary

691.524	485.008
731.239	471.770
966.524	473.008
1151.524	474.008
1351.524	475.008

Material Boundary

676.524	488.008
676.524	490.008

Material Boundary

676.524	488.008
731.239	469.770
731.239	471.770

Material Boundary

600.000	468.500
731.239	469.770
1351.524	473.008

Material Boundary

701.524	485.008
1351.524	484.949

Material Boundary

0.000	459.500
89.000	459.500
280.000	457.000
320.000	462.000
586.149	463.291
1351.524	467.002

Material Boundary

1351.524	454.500
320.000	459.500
280.000	457.000
320.000	454.500
1351.524	454.500

Material Boundary

0.000	432.000

89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 454.500
280.000 457.000

Material Boundary
320.000 462.000
1351.524 454.500

Material Boundary
280.000 442.000
320.000 444.500
1351.524 442.119
320.000 439.500
280.000 442.000

External Boundary
-0.000 469.008
0.000 459.500
0.000 454.500
0.000 432.000
-0.000 369.008
1351.524 369.008
1351.524 429.500
1351.524 442.119
1351.524 454.500
1351.524 467.002
1351.524 473.008
1351.524 475.008
1351.524 484.949
1351.524 562.008
1250.221 562.008
1135.274 559.709
1000.182 557.008
935.839 553.357
912.524 552.008
900.658 548.053
897.524 547.008
884.510 542.670
882.524 542.008
868.376 537.292
867.524 537.008
866.146 536.549
852.524 532.008
843.872 529.124
837.524 527.008
827.732 523.744
822.524 522.008
815.418 522.008
812.524 522.008
800.863 518.121
797.524 517.008
784.760 512.753

782.524	512.008
768.670	507.390
767.524	507.008
765.715	506.405
752.524	502.008
744.442	499.314
737.524	497.008
729.376	494.292
722.524	492.008
714.376	489.292
707.524	487.008
704.265	485.922
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

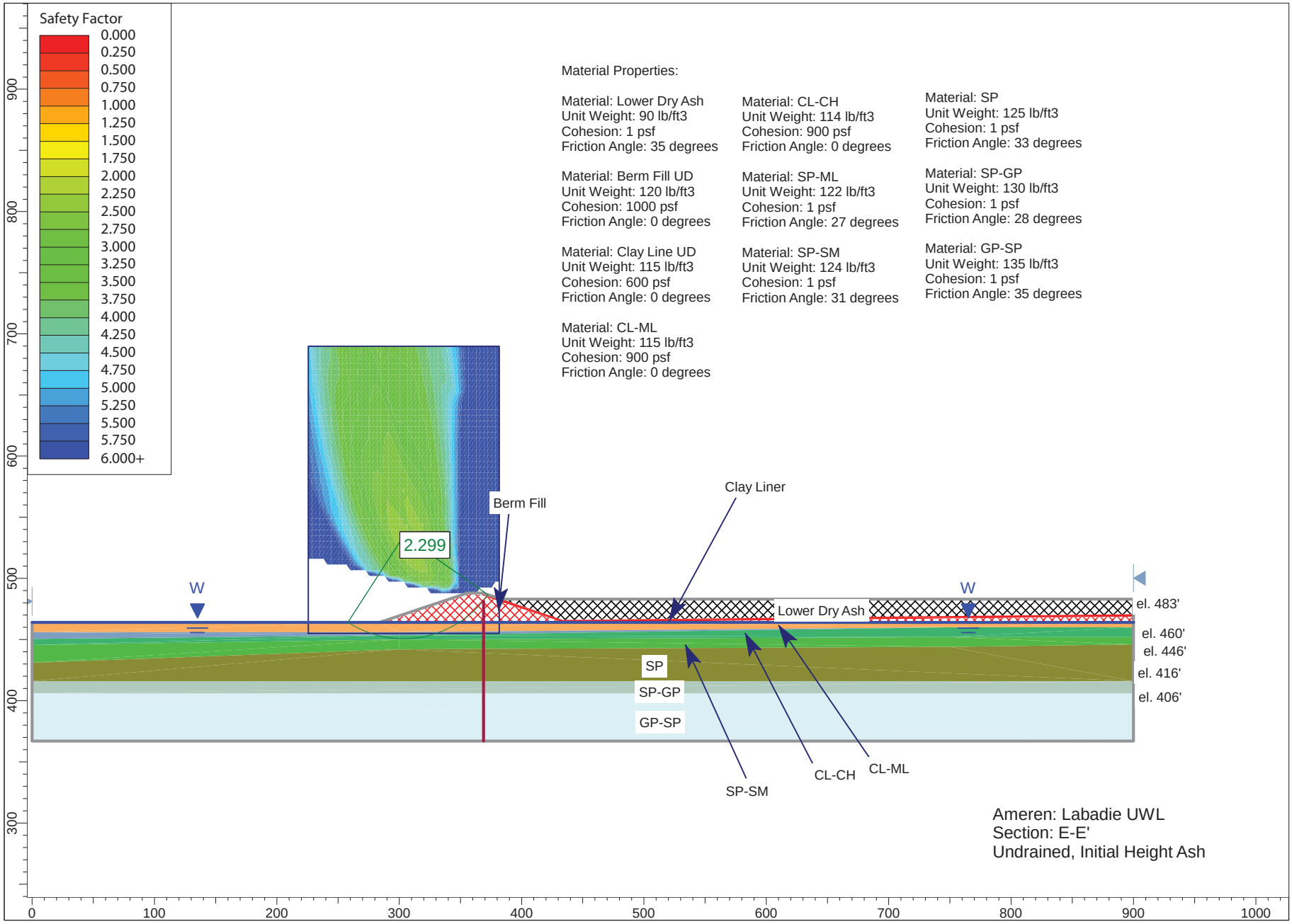
-0.000	469.008
600.000	468.500
1351.524	468.500

Focus/Block Search Line

671.059	369.008
671.059	487.731

Search Grid

574.112	468.500
854.236	468.500
854.236	951.794
574.112	951.794


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-ML
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Berm Fill
Clay Liner
2.299
W
W
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
SP
SP-GP
GP-SP
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Undrained, Initial Height Ash
0
100
200
300
400
500
600
700
800
900
1000
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section EE Partial Undrained 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 2.299110
Center: 303.681, 534.874
Radius: 84.338
Left Slip Surface Endpoint: 257.966, 464.000
Right Slip Surface Endpoint: 372.770, 486.504
Resisting Moment=9.51331e+006 lb-ft
Driving Moment=4.13782e+006 lb-ft
Resisting Horizontal Force=99308.2 lb
Driving Horizontal Force=43194.2 lb

Method: gle/morgenstern-price
FS: 2.311290
Center: 303.681, 534.874
Radius: 84.338
Left Slip Surface Endpoint: 257.966, 464.000
Right Slip Surface Endpoint: 372.770, 486.504
Resisting Moment=9.5637e+006 lb-ft
Driving Moment=4.13782e+006 lb-ft
Resisting Horizontal Force=99899.2 lb
Driving Horizontal Force=43222.3 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 18509
Number of Invalid Surfaces: 10102
Error Codes:
Error Code -103 reported for 6978 surfaces
Error Code -107 reported for 606 surfaces
Error Code -108 reported for 111 surfaces
Error Code -111 reported for 2 surfaces
Error Code -112 reported for 2405 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 18503
Number of Invalid Surfaces: 10108
Error Codes:
Error Code -103 reported for 6978 surfaces
Error Code -107 reported for 606 surfaces
Error Code -108 reported for 117 surfaces
Error Code -111 reported for 2 surfaces
Error Code -112 reported for 2405 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

225.631	455.071
381.730	455.071
381.730	689.787
225.631	689.787

Material Boundary

384.053	482.998
433.806	466.000
900.000	470.650

Material Boundary

367.800	486.000
367.800	488.000

Material Boundary

367.800	486.000
433.806	464.000
433.806	466.000

Material Boundary

433.806	464.000

900.000 468.650

Material Boundary
283.800 464.000
433.806 464.000
900.000 464.000

Material Boundary
0.000 456.000
300.000 456.000
750.000 460.000
900.000 460.000

Material Boundary
0.000 450.500
300.000 453.500
750.000 460.000

Material Boundary
0.000 445.500
300.000 450.000
750.000 452.000
900.000 452.000

Material Boundary
0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

External Boundary
0.000 464.000
0.000 456.000
0.000 450.500
0.000 445.500
0.000 431.000
0.000 416.000
0.000 406.000
0.000 367.000
900.000 367.000
900.000 406.000
900.000 416.000
900.000 446.000
900.000 452.000
900.000 460.000
900.000 464.000
900.000 468.650
900.000 470.650

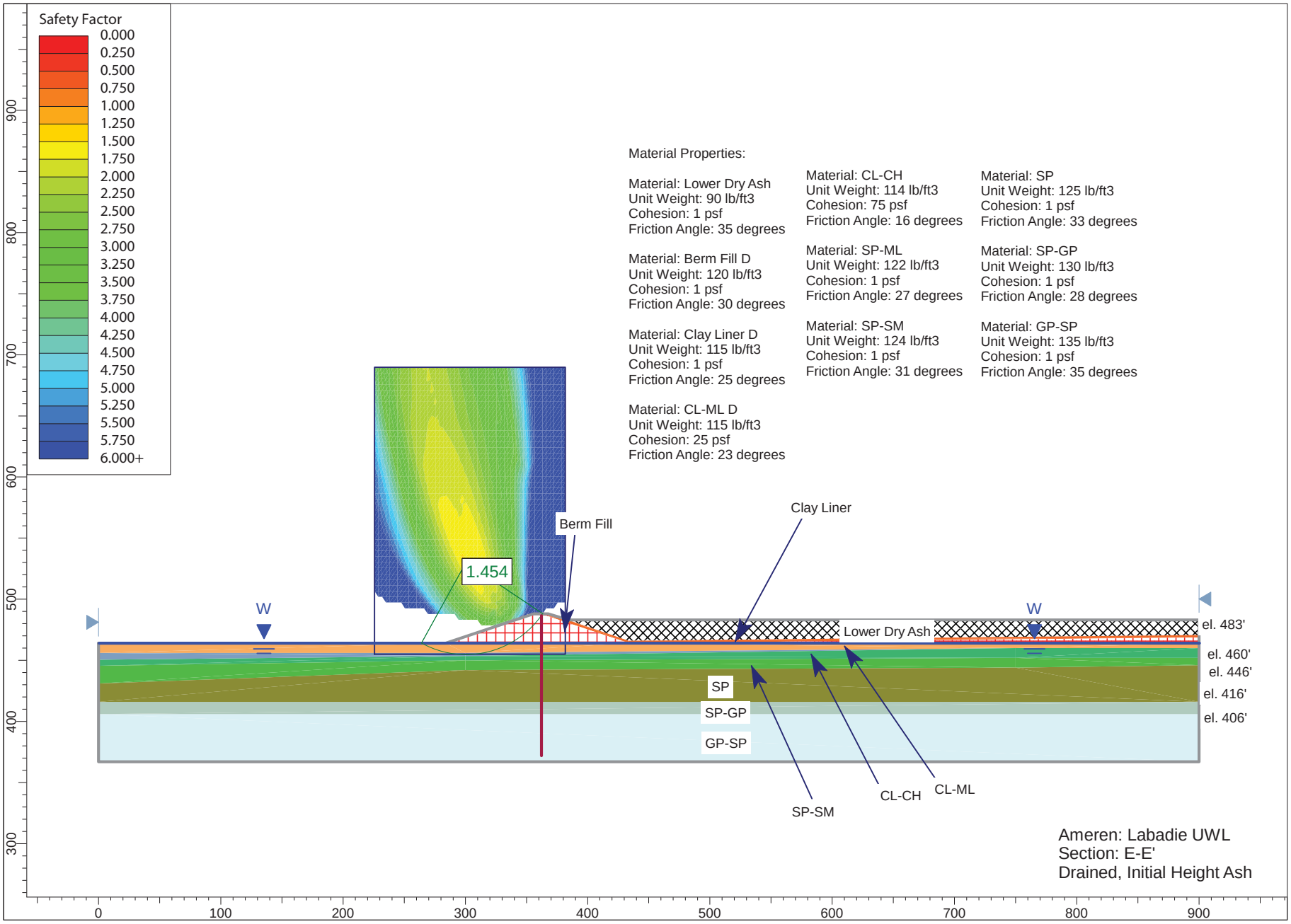
900.000	483.000
384.053	482.998
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

0.104	464.000
433.910	464.000
900.104	464.000

Focus/Block Search Line

368.937	367.000
368.937	481.446


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-ML D
Unit Weight: 115 lb/ft3
Cohesion: 25 psf
Friction Angle: 23 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 75 psf
Friction Angle: 16 degrees
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Berm Fill
Clay Liner
1.454
W
W
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
SP
SP-GP
GP-SP
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Drained, Initial Height Ash
900
800
700
600
500
400
300
0
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section EE Partial Drained 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 25 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 75 psf
Friction Angle: 16 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.453920
Center: 300.559, 530.180
Radius: 75.618
Left Slip Surface Endpoint: 263.976, 464.000
Right Slip Surface Endpoint: 363.319, 488.000
Resisting Moment=4.03455e+006 lb-ft
Driving Moment=2.77495e+006 lb-ft
Resisting Horizontal Force=47488.2 lb
Driving Horizontal Force=32662.1 lb

Method: gle/morgenstern-price
FS: 1.445600
Center: 300.559, 530.180
Radius: 75.618
Left Slip Surface Endpoint: 263.976, 464.000
Right Slip Surface Endpoint: 363.319, 488.000
Resisting Moment=4.01147e+006 lb-ft
Driving Moment=2.77495e+006 lb-ft
Resisting Horizontal Force=47287.9 lb
Driving Horizontal Force=32711.5 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 20636
Number of Invalid Surfaces: 7975
Error Codes:
Error Code -103 reported for 4828 surfaces
Error Code -107 reported for 624 surfaces
Error Code -108 reported for 97 surfaces
Error Code -111 reported for 8 surfaces
Error Code -112 reported for 2418 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 20645
Number of Invalid Surfaces: 7966
Error Codes:
Error Code -103 reported for 4828 surfaces
Error Code -107 reported for 624 surfaces
Error Code -108 reported for 96 surfaces
Error Code -111 reported for 5 surfaces
Error Code -112 reported for 2413 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

225.631	455.071
381.730	455.071
381.730	689.787
225.631	689.787

Material Boundary

384.047	483.000
433.806	466.000
900.000	470.650

Material Boundary

367.800	486.000
367.800	488.000

Material Boundary

367.800	486.000
433.806	464.000
433.806	466.000

Material Boundary

433.806	464.000

900.000 468.650

Material Boundary
283.800 464.000
433.806 464.000
900.000 464.000

Material Boundary
0.000 456.000
300.000 456.000
750.000 460.000
900.000 460.000

Material Boundary
0.000 450.500
300.000 453.500
750.000 460.000

Material Boundary
0.000 445.500
300.000 450.000
750.000 452.000
900.000 452.000

Material Boundary
0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

External Boundary
0.000 464.000
0.000 456.000
0.000 450.500
0.000 445.500
0.000 431.000
0.000 416.000
0.000 406.000
0.000 367.000
900.000 367.000
900.000 406.000
900.000 416.000
900.000 446.000
900.000 452.000
900.000 460.000
900.000 464.000
900.000 468.650
900.000 470.650

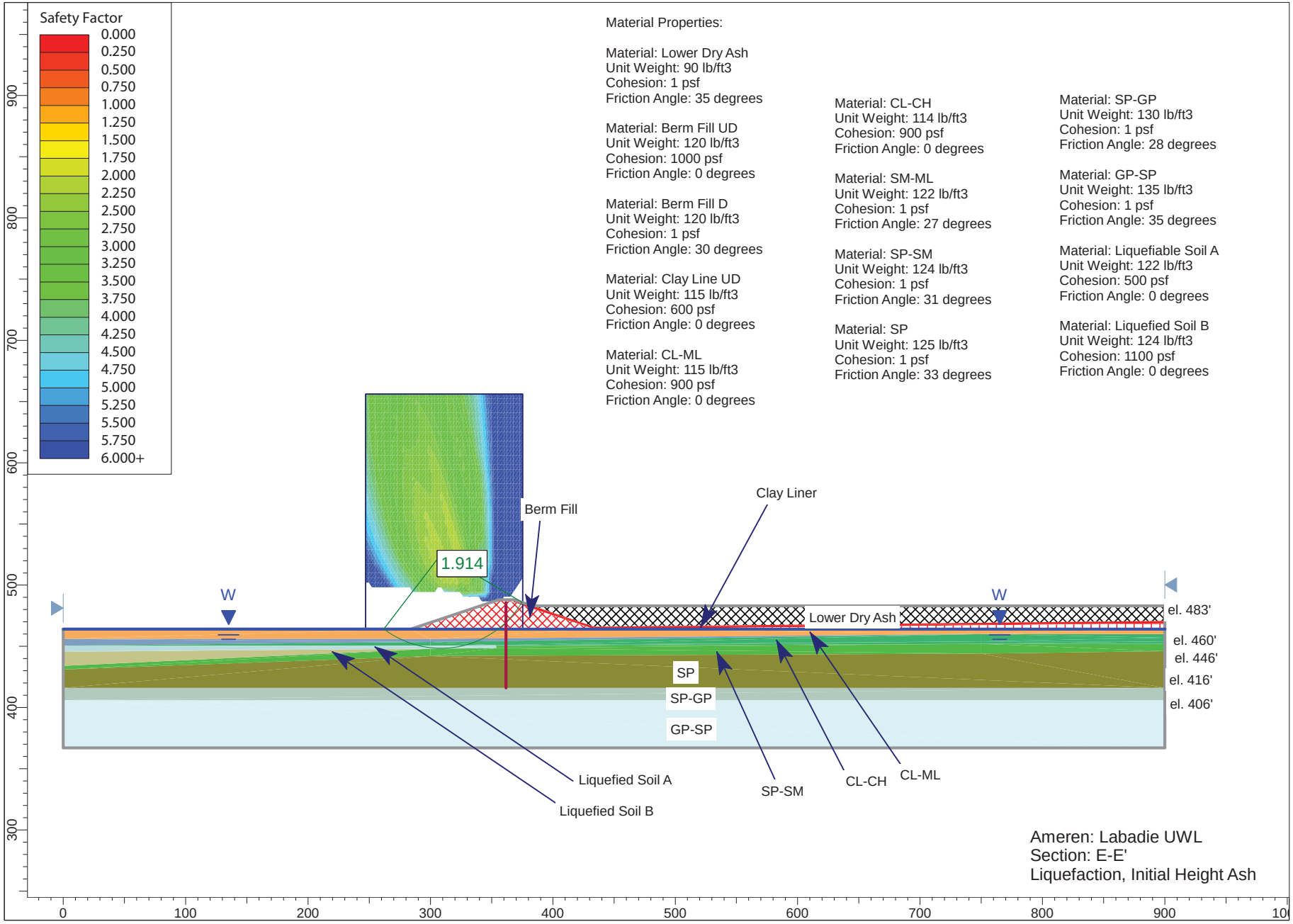
900.000	483.000
384.047	483.000
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

0.425	464.000
434.231	464.000
900.425	464.000

Focus/Block Search Line

362.308	372.087
362.308	486.533


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-ML
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: SM-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Liquefiable Soil A
Unit Weight: 122 lb/ft3
Cohesion: 500 psf
Friction Angle: 0 degrees
Material: Liquefied Soil B
Unit Weight: 124 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Berm Fill
Clay Liner
1.914
W
W
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
SP
SP-GP
GP-SP
Liquefied Soil A
Liquefied Soil B
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Liquefaction, Initial Height Ash
300
400
500
600
700
800
900
0
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section EE Partial Liquefaction 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefiable Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.914130
Center: 308.703, 525.238
Radius: 77.096
Left Slip Surface Endpoint: 261.867, 464.000
Right Slip Surface Endpoint: 374.972, 485.842
Resisting Moment=7.87829e+006 lb-ft
Driving Moment=4.11586e+006 lb-ft
Resisting Horizontal Force=86716.9 lb
Driving Horizontal Force=45303.5 lb

Method: gle/morgenstern-price
FS: 1.914420
Center: 308.703, 525.238
Radius: 77.096
Left Slip Surface Endpoint: 261.867, 464.000
Right Slip Surface Endpoint: 374.972, 485.842
Resisting Moment=7.87947e+006 lb-ft
Driving Moment=4.11586e+006 lb-ft
Resisting Horizontal Force=86713.3 lb

Driving Horizontal Force=45294.9 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 23000
Number of Invalid Surfaces: 5611
Error Codes:
Error Code -103 reported for 580 surfaces
Error Code -107 reported for 688 surfaces
Error Code -108 reported for 241 surfaces
Error Code -111 reported for 65 surfaces
Error Code -112 reported for 4037 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 22997
Number of Invalid Surfaces: 5614
Error Codes:
Error Code -103 reported for 580 surfaces
Error Code -107 reported for 688 surfaces
Error Code -108 reported for 245 surfaces
Error Code -111 reported for 65 surfaces
Error Code -112 reported for 4036 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

247.102	463.651
375.437	463.651
375.437	656.111
247.102	656.111

Material Boundary

384.049	483.000
433.806	466.000
900.000	470.650

Material Boundary

367.800	486.000
367.800	488.000

Material Boundary

367.800	486.000
433.806	464.000
433.806	466.000

Material Boundary

433.806	464.000
900.000	468.650

Material Boundary

283.800	464.000
433.806	464.000
900.000	464.000

Material Boundary

0.000	456.000
300.000	456.000
750.000	460.000
900.000	460.000

Material Boundary

0.000	450.500
300.000	453.500
750.000	460.000

Material Boundary

0.000	445.500
300.000	450.000
353.785	450.239
750.000	452.000
900.000	452.000

Material Boundary

0.000	431.000
300.000	442.000
750.000	444.000
900.000	446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

Material Boundary
0.000 450.500
300.073 450.500
353.785 450.918
750.000 454.000
900.000 457.000

Material Boundary
750.000 452.000
900.000 454.000

Material Boundary
0.000 445.500
300.000 448.000
353.785 448.478
750.000 452.000

Material Boundary
0.000 434.000
300.000 448.000

Material Boundary
353.785 448.478
353.785 450.239
353.785 450.918

External Boundary
0.000 464.000
0.000 456.000
0.000 450.500
0.000 445.500
0.000 434.000
0.000 431.000
0.000 416.000
0.000 406.000
0.000 367.000
900.000 367.000
900.000 406.000
900.000 416.000
900.000 446.000
900.000 452.000
900.000 454.000
900.000 457.000
900.000 460.000
900.000 464.000
900.000 468.650

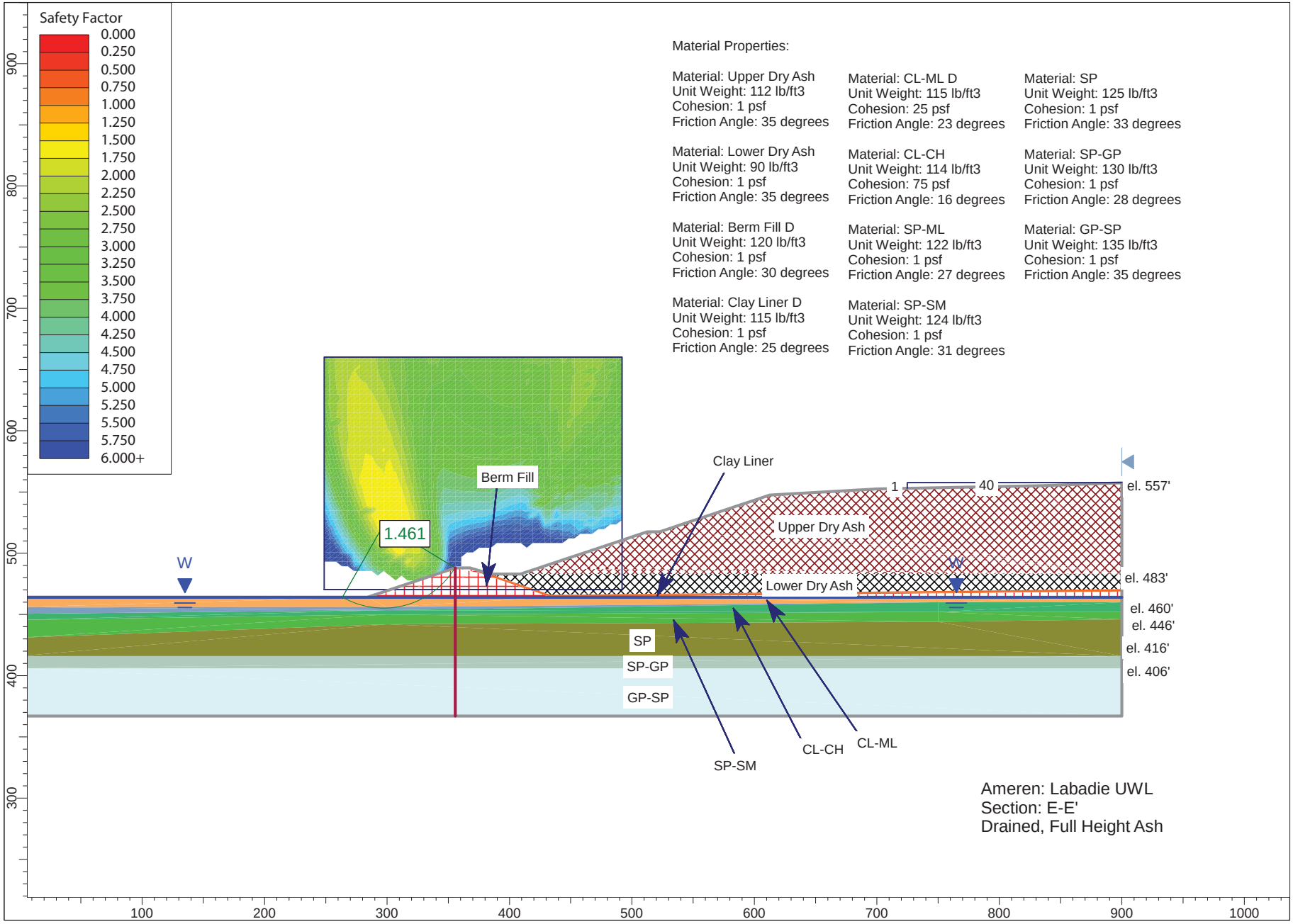
900.000	470.650
900.000	483.000
384.049	483.000
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

0.189	464.000
433.995	464.000
900.189	464.000

Focus/Block Search Line

361.650	416.000
361.650	485.800


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-ML D
Unit Weight: 115 lb/ft3
Cohesion: 25 psf
Friction Angle: 23 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 75 psf
Friction Angle: 16 degrees
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Clay Liner
Berm Fill
1.461
1
40
el. 557'
Upper Dry Ash
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
W
W
SP
SP-GP
GP-SP
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Drained, Full Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section EE Full Drained 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 25 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 75 psf
Friction Angle: 16 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.461290
Center: 297.304, 523.511
Radius: 68.431
Left Slip Surface Endpoint: 263.522, 464.000
Right Slip Surface Endpoint: 355.800, 488.000
Resisting Moment=3.01894e+006 lb-ft
Driving Moment=2.06594e+006 lb-ft
Resisting Horizontal Force=39146.3 lb
Driving Horizontal Force=26788.8 lb

Method: gle/morgenstern-price
FS: 1.453250
Center: 297.304, 523.511
Radius: 68.431
Left Slip Surface Endpoint: 263.522, 464.000
Right Slip Surface Endpoint: 355.800, 488.000
Resisting Moment=3.00233e+006 lb-ft
Driving Moment=2.06594e+006 lb-ft
Resisting Horizontal Force=38979.9 lb
Driving Horizontal Force=26822.5 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 19364
Number of Invalid Surfaces: 9247
Error Codes:
Error Code -101 reported for 243 surfaces
Error Code -103 reported for 5972 surfaces
Error Code -107 reported for 289 surfaces
Error Code -108 reported for 66 surfaces
Error Code -111 reported for 65 surfaces
Error Code -112 reported for 2612 surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 19428
Number of Invalid Surfaces: 9183
Error Codes:
Error Code -101 reported for 243 surfaces
Error Code -103 reported for 5972 surfaces
Error Code -107 reported for 289 surfaces
Error Code -108 reported for 35 surfaces
Error Code -111 reported for 56 surfaces
Error Code -112 reported for 2588 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero)
surface / slope intersections.

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

248.639	470.329
491.964	470.329
491.964	660.264
248.639	660.264

Material Boundary

384.014	483.011
433.806	466.000

900.000 470.650

Material Boundary
367.800 488.000
376.524 483.508

Material Boundary
376.524 483.508
433.806 464.000
433.806 466.000

Material Boundary
409.030 483.010
900.000 483.000

Material Boundary
433.806 464.000
900.000 468.650

Material Boundary
283.800 464.000
433.806 464.000
900.000 464.000

Material Boundary
0.000 456.000
300.000 456.000
750.000 460.000
900.000 460.000

Material Boundary
0.000 450.500
300.000 453.500
750.000 460.000

Material Boundary
0.000 445.500
300.000 450.000
750.000 452.000
900.000 452.000

Material Boundary
0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

External Boundary

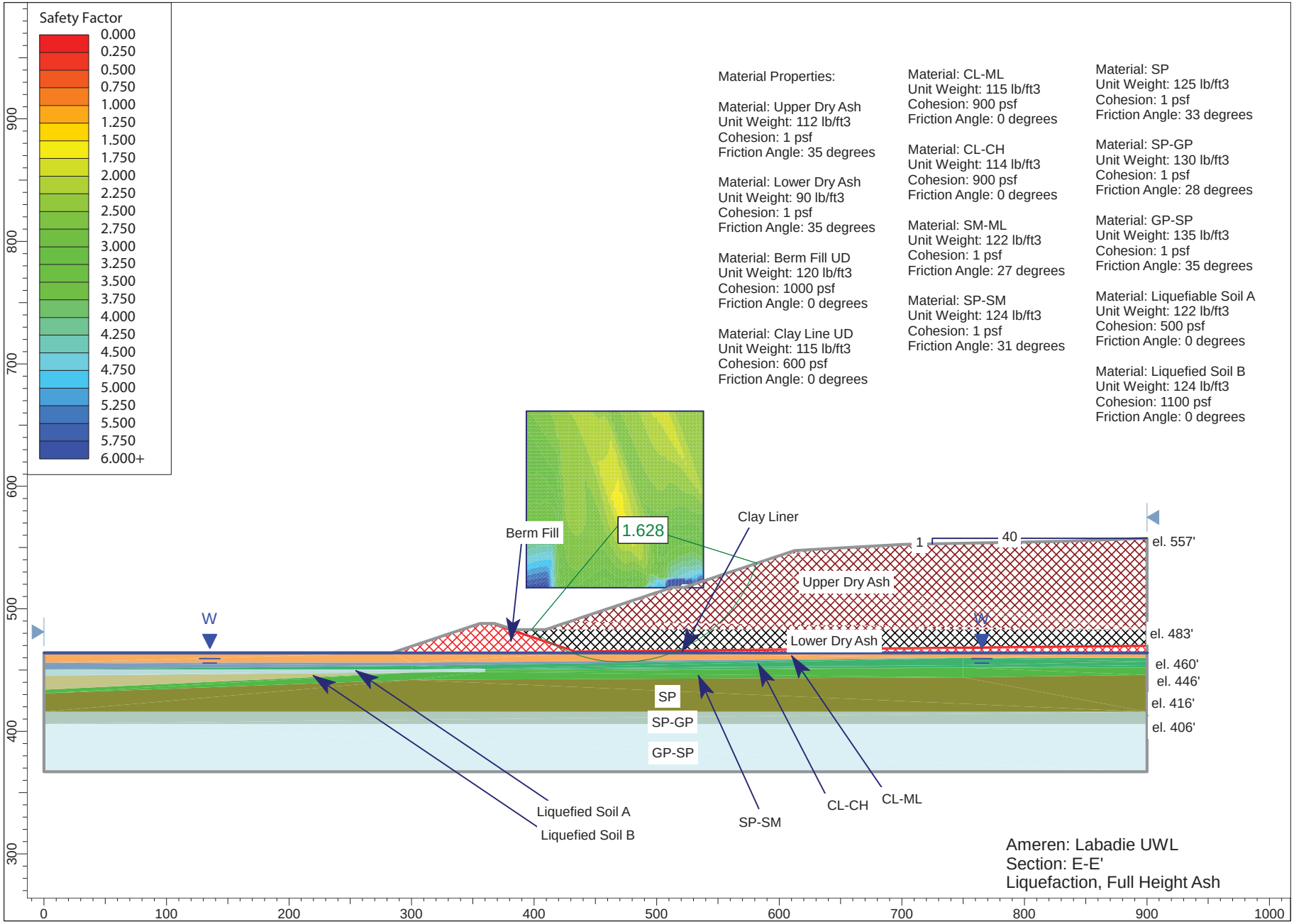
0.000	464.000
0.000	456.000
0.000	450.500
0.000	445.500
0.000	431.000
0.000	416.000
0.000	406.000
0.000	367.000
900.000	367.000
900.000	406.000
900.000	416.000
900.000	446.000
900.000	452.000
900.000	460.000
900.000	464.000
900.000	468.650
900.000	470.650
900.000	483.000
900.000	557.508
835.274	555.209
700.182	552.508
635.839	548.857
612.524	547.508
600.658	543.553
597.524	542.508
584.510	538.170
582.524	537.508
568.376	532.792
567.524	532.508
566.146	532.049
552.524	527.508
543.872	524.624
537.524	522.508
527.732	519.244
522.524	517.508
515.418	517.508
512.524	517.508
500.863	513.621
497.524	512.508
484.760	508.253
482.524	507.508
468.670	502.890
467.524	502.508
465.715	501.905
452.524	497.508
444.442	494.814
437.524	492.508
429.376	489.792
422.524	487.508
414.376	484.792
409.030	483.010
384.014	483.011
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

-0.000	464.000
433.805	464.000
900.000	464.000

Focus/Block Search Line

355.800	367.000
355.800	488.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Line UD
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Material: CL-ML
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Material: SM-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Liquefiable Soil A
Unit Weight: 122 lb/ft3
Cohesion: 500 psf
Friction Angle: 0 degrees
Material: Liquefied Soil B
Unit Weight: 124 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
1.628
Berm Fill
Clay Liner
1
40
el. 557'
Upper Dry Ash
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
W
W
SP
SP-GP
GP-SP
Liquefied Soil A
Liquefied Soil B
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Liquefaction, Full Height Ash
300
400
500
600
700
800
900
0
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section EE Full Liquefaction 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefiable Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 500 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.627860
Center: 471.644, 571.976
Radius: 115.560
Left Slip Surface Endpoint: 397.890, 483.012
Right Slip Surface Endpoint: 581.876, 537.292
Resisting Moment=3.03045e+007 lb-ft
Driving Moment=1.86161e+007 lb-ft
Resisting Horizontal Force=217947 lb
Driving Horizontal Force=133886 lb

Method: gle/morgenstern-price
FS: 1.601280
Center: 471.644, 571.976
Radius: 115.560
Left Slip Surface Endpoint: 397.890, 483.012
Right Slip Surface Endpoint: 581.876, 537.292
Resisting Moment=2.98097e+007 lb-ft
Driving Moment=1.86161e+007 lb-ft
Resisting Horizontal Force=214284 lb

Driving Horizontal Force=133820 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 11768
Number of Invalid Surfaces: 16843
Error Codes:
Error Code -103 reported for 16622 surfaces
Error Code -107 reported for 2 surfaces
Error Code -108 reported for 24 surfaces
Error Code -111 reported for 28 surfaces
Error Code -112 reported for 167 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 11771
Number of Invalid Surfaces: 16840
Error Codes:
Error Code -103 reported for 16622 surfaces
Error Code -107 reported for 2 surfaces
Error Code -108 reported for 23 surfaces
Error Code -111 reported for 26 surfaces
Error Code -112 reported for 167 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid
393.664 517.152
538.071 517.152
538.071 661.427
393.664 661.427

Material Boundary
384.047 483.000
433.806 466.000
900.000 470.650

Material Boundary
367.800 486.000
367.800 488.000

Material Boundary
367.800 486.000
433.806 464.000
433.806 466.000

Material Boundary
409.064 483.021
900.000 483.000

Material Boundary
433.806 464.000
900.000 468.650

Material Boundary
283.800 464.000
433.806 464.000
900.000 464.000

Material Boundary
0.000 456.000
300.000 456.000
750.000 460.000
900.000 460.000

Material Boundary
0.000 450.500
300.000 453.500
750.000 460.000

Material Boundary
0.000 445.500
300.000 450.000
360.037 450.267
750.000 452.000
900.000 452.000

Material Boundary

0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

Material Boundary
0.000 450.500
300.073 450.500
360.037 450.966
750.000 454.000
900.000 457.000

Material Boundary
750.000 452.000
900.000 454.000

Material Boundary
0.000 445.500
300.000 448.000
360.037 448.534
750.000 452.000

Material Boundary
0.000 434.000
300.000 448.000

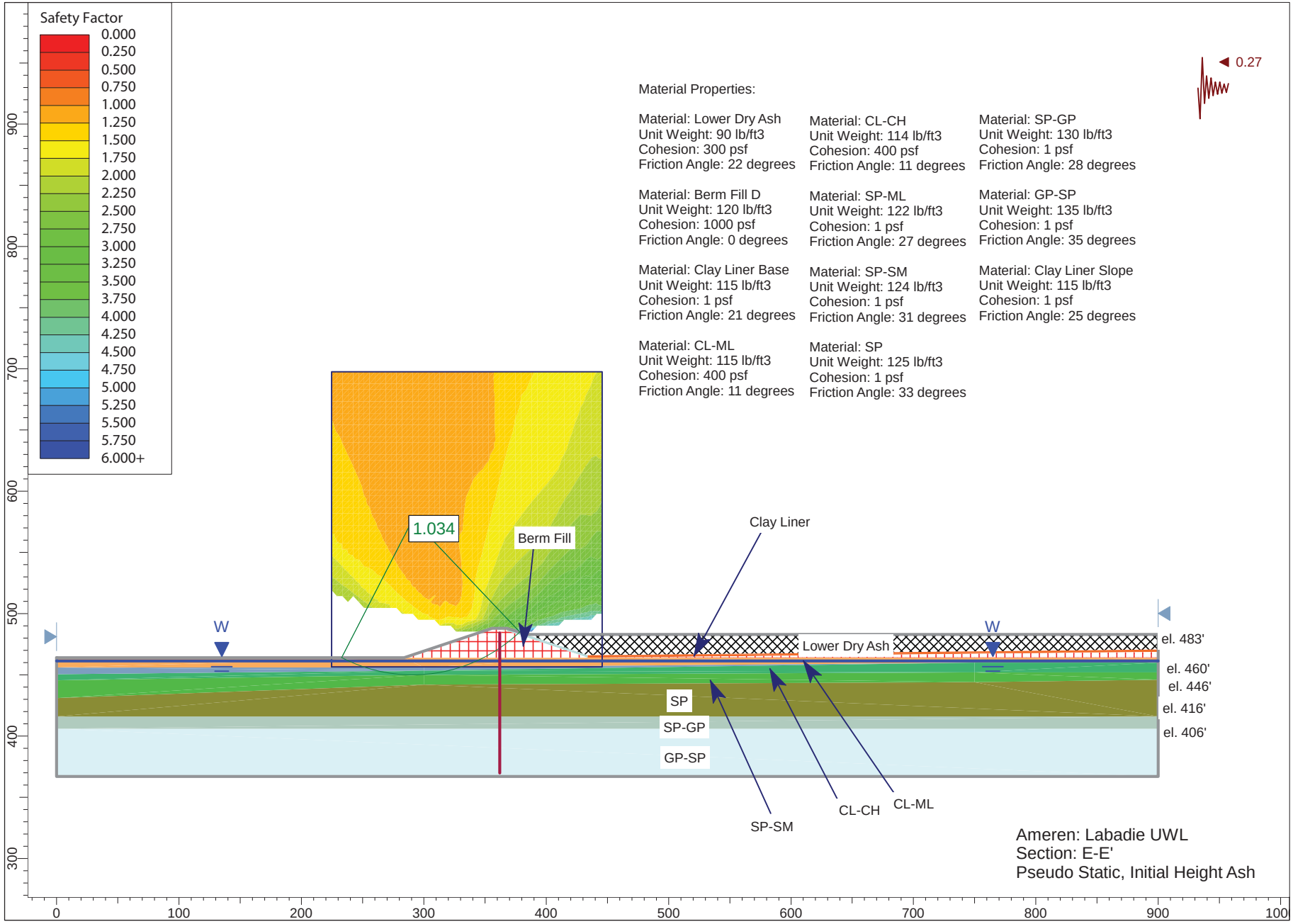
Material Boundary
360.037 448.534
360.037 450.267
360.037 450.966

External Boundary
0.000 464.000
0.000 456.000
0.000 450.500
0.000 445.500
0.000 434.000
0.000 431.000
0.000 416.000
0.000 406.000
0.000 367.000
900.000 367.000
900.000 406.000
900.000 416.000
900.000 446.000
900.000 452.000
900.000 454.000

900.000	457.000
900.000	460.000
900.000	464.000
900.000	468.650
900.000	470.650
900.000	483.000
900.000	557.508
835.274	555.209
700.182	552.508
635.839	548.857
612.524	547.508
600.658	543.553
597.524	542.508
584.510	538.170
582.524	537.508
568.376	532.792
567.524	532.508
566.146	532.049
552.524	527.508
543.872	524.624
537.524	522.508
527.732	519.244
522.524	517.508
515.418	517.508
512.524	517.508
500.863	513.621
497.524	512.508
484.760	508.253
482.524	507.508
468.670	502.890
467.524	502.508
465.715	501.905
452.524	497.508
444.442	494.814
437.524	492.508
429.376	489.792
422.524	487.508
414.376	484.792
409.064	483.021
384.047	483.000
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

0.444	464.000
434.250	464.000
900.444	464.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
0.27
Material Properties:
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner Base
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Material: CL-ML
Unit Weight: 115 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Clay Liner Slope
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
1.034
Berm Fill
Clay Liner
W
W
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
SP
SP-GP
GP-SP
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Pseudo Static, Initial Height Ash
900
800
700
600
500
400
300
0
100
200
300
400
500
600
700
800
900
100

Slide Analysis Information

Document Name

File Name: Section EE Partial Pseudo Static 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.27

Material Properties

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D

Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3

Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Slope
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.033930
Center: 290.995, 577.017
Radius: 127.100
Left Slip Surface Endpoint: 232.844, 464.000
Right Slip Surface Endpoint: 378.455, 484.794
Resisting Moment=1.47209e+007 lb-ft
Driving Moment=1.42378e+007 lb-ft
Resisting Horizontal Force=106694 lb
Driving Horizontal Force=103193 lb

Method: gle/morgenstern-price
FS: 1.031440
Center: 313.086, 538.437
Radius: 84.504
Left Slip Surface Endpoint: 273.085, 464.000
Right Slip Surface Endpoint: 378.395, 484.812
Resisting Moment=7.71979e+006 lb-ft
Driving Moment=7.48444e+006 lb-ft
Resisting Horizontal Force=82375 lb
Driving Horizontal Force=79863.7 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 20608
Number of Invalid Surfaces: 8003
Error Codes:
Error Code -103 reported for 4592 surfaces
Error Code -108 reported for 82 surfaces
Error Code -111 reported for 186 surfaces
Error Code -112 reported for 3143 surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 20649
Number of Invalid Surfaces: 7962
Error Codes:
Error Code -103 reported for 4592 surfaces
Error Code -108 reported for 80 surfaces
Error Code -111 reported for 147 surfaces
Error Code -112 reported for 3143 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

224.722	456.455
445.632	456.455
445.632	697.579
224.722	697.579

Material Boundary

383.980	483.023
433.806	466.000
900.000	470.650

Material Boundary

367.800	486.000
367.800	488.000

Material Boundary

367.800	486.000
433.806	464.000
433.806	466.000

Material Boundary

433.806 464.000
900.000 468.650

Material Boundary
283.800 464.000
433.806 464.000
900.000 464.000

Material Boundary
0.000 456.000
300.000 456.000
750.000 460.000
900.000 460.000

Material Boundary
0.000 450.500
300.000 453.500
750.000 460.000

Material Boundary
0.000 445.500
300.000 450.000
750.000 452.000
900.000 452.000

Material Boundary
0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

External Boundary
0.000 464.000
0.000 456.000
0.000 450.500
0.000 445.500
0.000 431.000
0.000 416.000
0.000 406.000
0.000 367.000
900.000 367.000
900.000 406.000
900.000 416.000
900.000 446.000
900.000 452.000
900.000 460.000
900.000 464.000
900.000 468.650
900.000 470.650

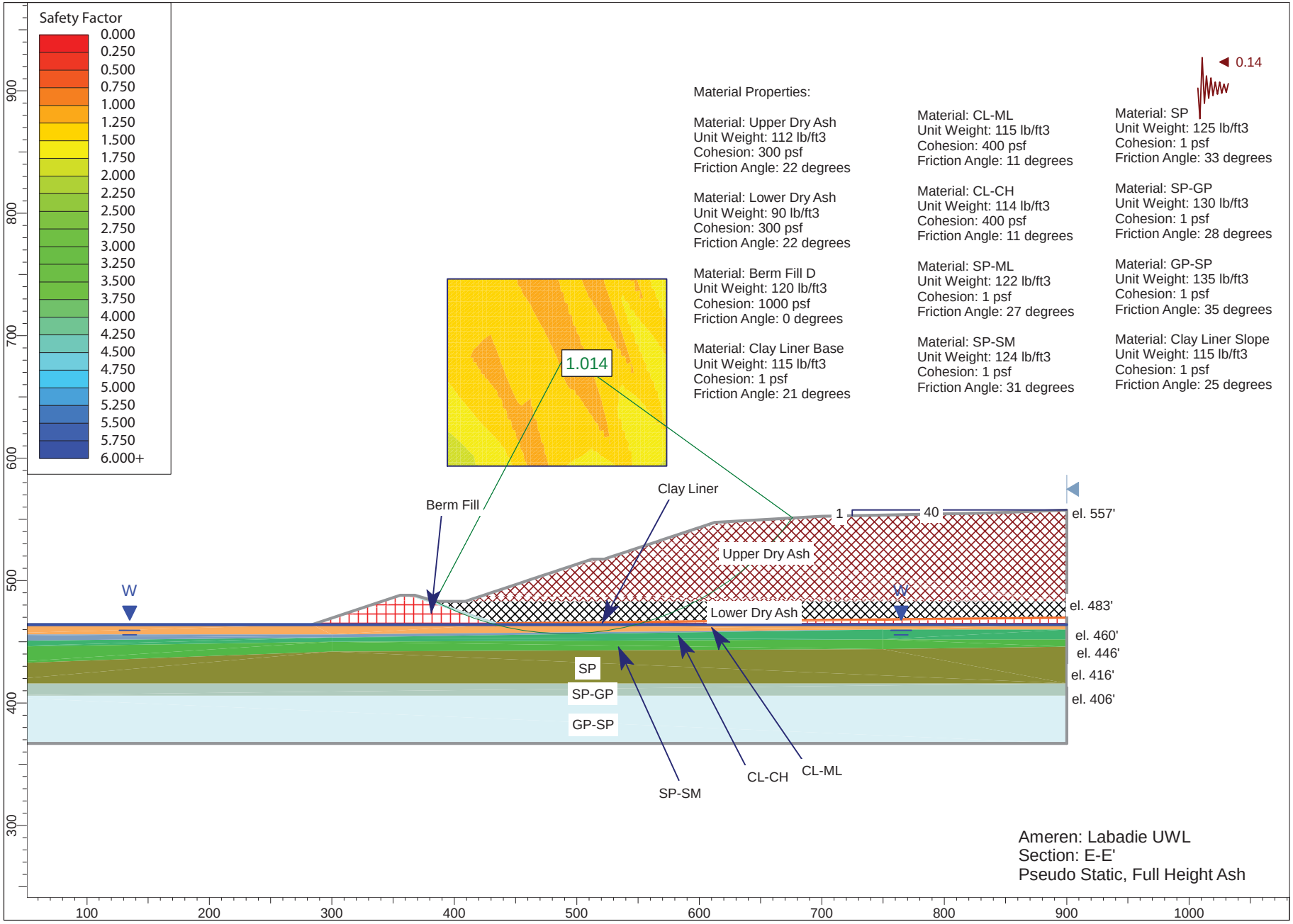
900.000	483.000
383.980	483.023
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

0.000	461.305
433.806	461.305
900.000	461.305

Focus/Block Search Line

362.051	369.772
362.051	484.218


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
0.14
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: Clay Liner Base
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Material: CL-ML
Unit Weight: 115 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Clay Liner Slope
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
1.014
Berm Fill
Clay Liner
1
40
el. 557'
Upper Dry Ash
W
W
el. 483'
Lower Dry Ash
el. 460'
el. 446'
el. 416'
el. 406'
SP
SP-GP
GP-SP
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Pseudo Static, Full Height Ash
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section EE Full Pseudo Static 7292013.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Loading

Seismic Load Coefficient (Horizontal): 0.14

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash

Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 400 psf
Friction Angle: 11 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3

Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Slope
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.014230
Center: 491.009, 685.181
Radius: 228.702
Left Slip Surface Endpoint: 384.103, 483.004
Right Slip Surface Endpoint: 676.323, 551.154
Resisting Moment=1.06578e+008 lb-ft
Driving Moment=1.05083e+008 lb-ft
Resisting Horizontal Force=422533 lb
Driving Horizontal Force=416604 lb

Method: gle/morgenstern-price
FS: 1.007860
Center: 491.009, 685.181
Radius: 228.702
Left Slip Surface Endpoint: 384.103, 483.004
Right Slip Surface Endpoint: 676.323, 551.154
Resisting Moment=1.05909e+008 lb-ft
Driving Moment=1.05083e+008 lb-ft
Resisting Horizontal Force=420603 lb
Driving Horizontal Force=417321 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 16193

Number of Invalid Surfaces: 12418
Error Codes:
Error Code -103 reported for 12394 surfaces
Error Code -109 reported for 1 surface
Error Code -111 reported for 23 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 16216
Number of Invalid Surfaces: 12395
Error Codes:
Error Code -103 reported for 12394 surfaces
Error Code -109 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

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

-109 = Soiltype for slice base not
located. This error should occur very rarely,
if at all. It may occur if a very low number of
slices is combined with certain soil geometries,
such that the midpoint of a slice base is
actually outside the soil region,even though
the slip surface is wholly within the soil region.

-111 = safety factor equation did not converge

List of All Coordinates

Search Grid

394.284	593.514
573.404	593.514
573.404	746.293
394.284	746.293

Material Boundary

384.035	483.004
433.806	466.000
900.000	470.650

Material Boundary

367.800	486.000
367.800	488.000

Material Boundary

367.800	486.000
433.806	464.000
433.806	466.000

Material Boundary

409.010	483.003
900.000	483.000

Material Boundary

433.806	464.000
900.000	468.650

Material Boundary

283.800	464.000
433.806	464.000
900.000	464.000

Material Boundary

0.000	456.000
300.000	456.000
750.000	460.000
900.000	460.000

Material Boundary

0.000	450.500
300.000	453.500
750.000	460.000

Material Boundary

0.000	445.500
300.000	450.000
750.000	452.000
900.000	452.000

Material Boundary

0.000	431.000
300.000	442.000
750.000	444.000
900.000	446.000

Material Boundary

0.000	416.000
900.000	416.000

Material Boundary

0.000	406.000
900.000	406.000

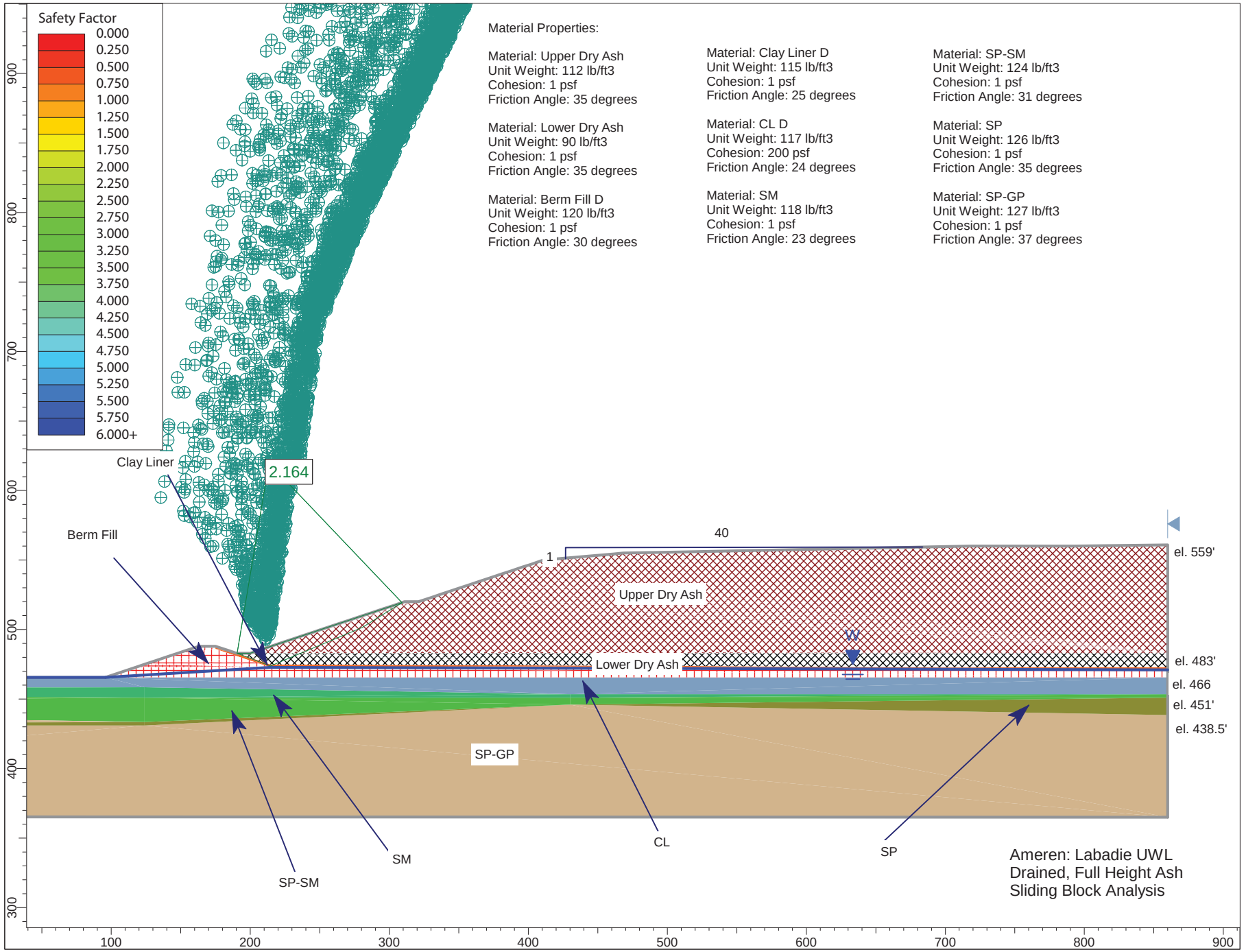
External Boundary

0.000	464.000
0.000	456.000
0.000	450.500
0.000	445.500
0.000	431.000
0.000	416.000
0.000	406.000
0.000	367.000
900.000	367.000
900.000	406.000
900.000	416.000
900.000	446.000

900.000	452.000
900.000	460.000
900.000	464.000
900.000	468.650
900.000	470.650
900.000	483.000
900.000	557.508
835.274	555.209
700.182	552.508
635.839	548.857
612.524	547.508
600.658	543.553
597.524	542.508
584.510	538.170
582.524	537.508
568.376	532.792
567.524	532.508
566.146	532.049
552.524	527.508
543.872	524.624
537.524	522.508
527.732	519.244
522.524	517.508
515.418	517.508
512.524	517.508
500.863	513.621
497.524	512.508
484.760	508.253
482.524	507.508
468.670	502.890
467.524	502.508
465.715	501.905
452.524	497.508
444.442	494.814
437.524	492.508
429.376	489.792
422.524	487.508
414.376	484.792
409.010	483.003
384.035	483.004
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

-0.089	464.000
433.717	464.000
899.911	464.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL D
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Clay Liner
2.164
Berm Fill
40
1
Upper Dry Ash
W
Lower Dry Ash
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Drained, Full Height Ash
Sliding Block Analysis
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Full Drained Sliding Block.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): -85
Right Projection Angle (End Angle): 85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb

Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL D
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3

Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 2.164490
Axis Location: 213.470, 619.831
Left Slip Surface Endpoint: 190.547, 483.000
Right Slip Surface Endpoint: 309.181, 519.394
Resisting Moment=9.52735e+006 lb-ft
Driving Moment=4.40166e+006 lb-ft

Method: spencer
FS: 2.254100
Axis Location: 239.420, 780.724
Left Slip Surface Endpoint: 173.044, 487.991
Right Slip Surface Endpoint: 433.781, 551.983
Resisting Moment=5.67719e+007 lb-ft
Driving Moment=2.51861e+007 lb-ft
Resisting Horizontal Force=186672 lb
Driving Horizontal Force=82814.3 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 3852
Number of Invalid Surfaces: 1148
Error Codes:
Error Code -105 reported for 154 surfaces
Error Code -107 reported for 1 surface
Error Code -108 reported for 81 surfaces
Error Code -111 reported for 22 surfaces
Error Code -112 reported for 890 surfaces

Method: spencer
Number of Valid Surfaces: 3424
Number of Invalid Surfaces: 1576
Error Codes:
Error Code -105 reported for 154 surfaces
Error Code -107 reported for 1 surface
Error Code -108 reported for 289 surfaces
Error Code -111 reported for 214 surfaces
Error Code -112 reported for 918 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope
intersections with no valid slip surface.

-107 = Total driving moment or
total driving force is negative. This will occur

if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500
430.000	446.000
860.009	450.998

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

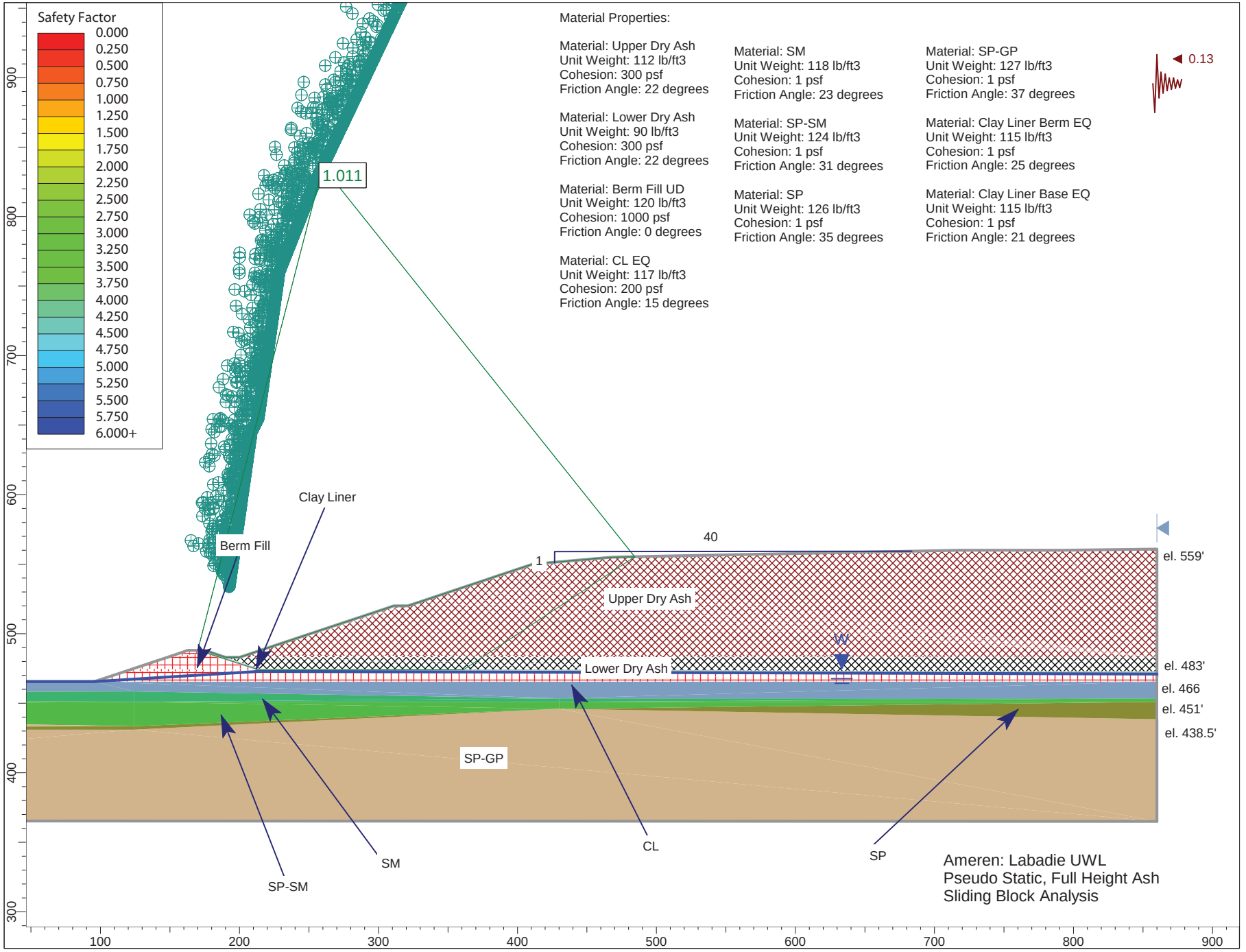
Material Boundary
200.000 483.000
860.013 482.998

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998
860.021 560.896
792.394 560.000
718.434 560.000
500.172 555.635
468.434 555.000
461.429 554.390
411.000 550.000
401.743 546.914
396.000 545.000
386.646 541.882
381.000 540.000
371.552 536.851
366.000 535.000
356.462 531.821
351.000 530.000
341.374 526.791
336.000 525.000
329.925 522.975
321.000 520.000
315.050 520.000
311.000 520.000
302.030 517.010
296.000 515.000
286.965 511.988

281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL EQ
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Clay Liner Berm EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Clay Liner Base EQ
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 21 degrees
0.13
1.011
Clay Liner
Berm Fill
40
1
Upper Dry Ash
Lower Dry Ash
WY
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Pseudo Static, Full Height Ash
Sliding Block Analysis
900
800
700
600
500
400
300
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Full Pseudo Static Sliding Block.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Janbu corrected
Spencer

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

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 195
Right Projection Angle (Start Angle): -85
Right Projection Angle (End Angle): 85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.13

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL EQ
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.003900
Axis Location: 238.860, 786.102
Left Slip Surface Endpoint: 170.055, 487.977
Right Slip Surface Endpoint: 436.077, 552.183
Resisting Horizontal Force=285838 lb
Driving Horizontal Force=284728 lb

Method: spencer
FS: 1.011170
Axis Location: 259.880, 835.983
Left Slip Surface Endpoint: 170.055, 487.977
Right Slip Surface Endpoint: 484.389, 555.319
Resisting Moment=1.34538e+008 lb-ft
Driving Moment=1.33051e+008 lb-ft
Resisting Horizontal Force=342406 lb
Driving Horizontal Force=338622 lb

Valid / Invalid Surfaces

Method: janbu corrected
Number of Valid Surfaces: 3792
Number of Invalid Surfaces: 1208
Error Codes:
Error Code -105 reported for 1129 surfaces
Error Code -108 reported for 57 surfaces
Error Code -111 reported for 19 surfaces
Error Code -112 reported for 3 surfaces

Method: spencer
Number of Valid Surfaces: 3293
Number of Invalid Surfaces: 1707
Error Codes:
Error Code -105 reported for 1129 surfaces
Error Code -108 reported for 68 surfaces
Error Code -111 reported for 505 surfaces
Error Code -112 reported for 5 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope
intersections with no valid slip surface.

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500
430.000	446.000
860.009	450.998

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

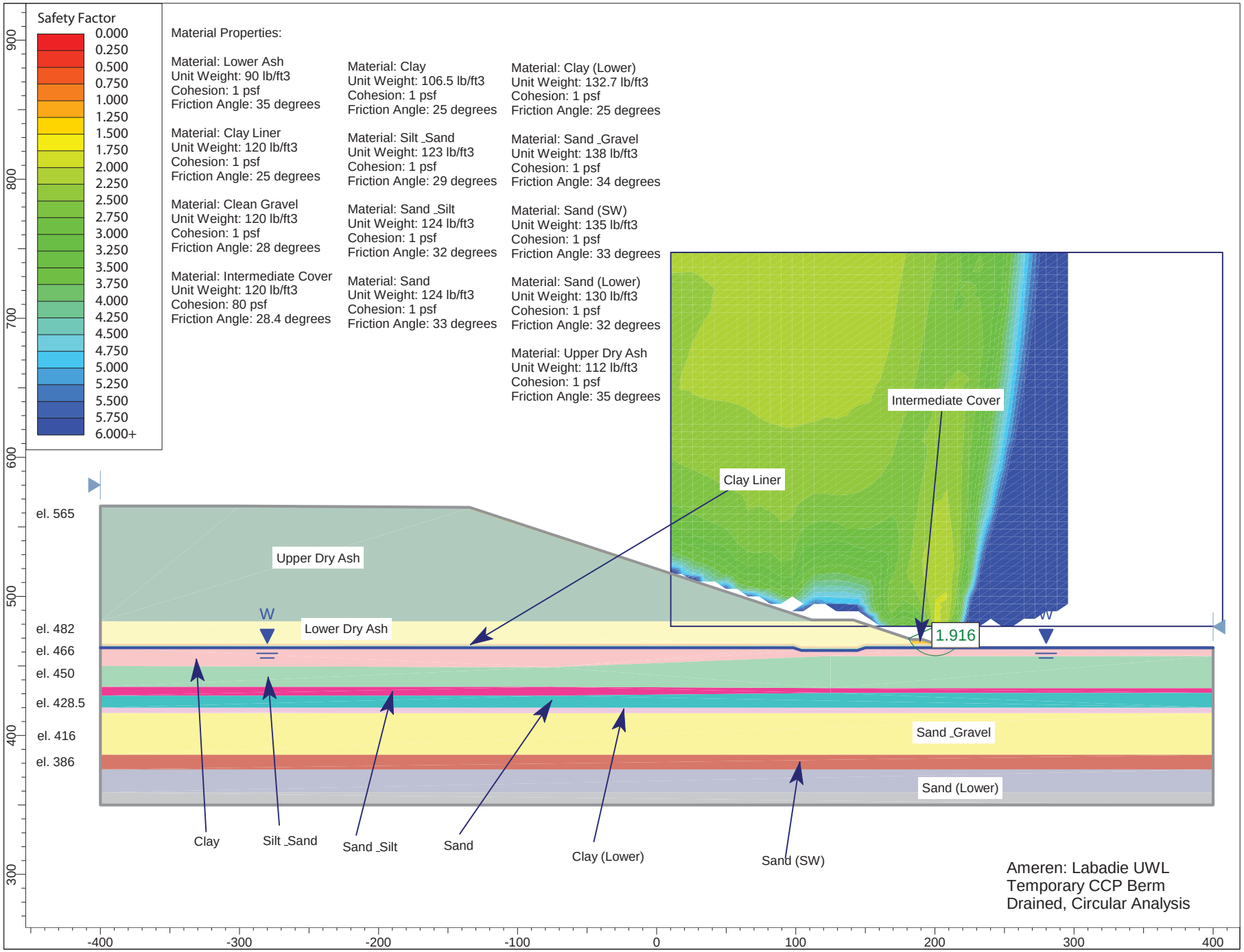
Material Boundary
200.000 483.000
860.013 482.998

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998
860.021 560.896
792.394 560.000
718.434 560.000
500.172 555.635
468.434 555.000
461.429 554.390
411.000 550.000
401.743 546.914
396.000 545.000
386.646 541.882
381.000 540.000
371.552 536.851
366.000 535.000
356.462 531.821
351.000 530.000
341.374 526.791
336.000 525.000
329.925 522.975
321.000 520.000
315.050 520.000
311.000 520.000
302.030 517.010
296.000 515.000
286.965 511.988

281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Clay Liner
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Clean Gravel
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: Intermediate Cover
Unit Weight: 120 lb/ft3
Cohesion: 80 psf
Friction Angle: 28.4 degrees
Material: Clay
Unit Weight: 106.5 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Silt _Sand
Unit Weight: 123 lb/ft3
Cohesion: 1 psf
Friction Angle: 29 degrees
Material: Sand _Silt
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Material: Sand
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: Clay (Lower)
Unit Weight: 132.7 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Sand _Gravel
Unit Weight: 138 lb/ft3
Cohesion: 1 psf
Friction Angle: 34 degrees
Material: Sand (SW)
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: Sand (Lower)
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Intermediate Cover
Clay Liner
1.916
el. 565
Upper Dry Ash
W
el. 482
Lower Dry Ash
el. 466
el. 450
el. 428.5
el. 416
el. 386
Sand _Gravel
Sand (Lower)
Clay
Silt _Sand
Sand _Silt
Sand
Clay (Lower)
Sand (SW)
Ameren: Labadie UWL
Temporary CCP Berm
Drained, Circular Analysis
900
800
700
600
500
400
300
-400
-300
-200
-100
0
100
200
300
400

Slide Analysis Information

Document Name

File Name: Ash Berm Global.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
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 corrected
Spencer

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

Surface Options

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

Material Properties

Material: Lower Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Clean Gravel
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Intermediate Cover
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 80 psf
Friction Angle: 28.4 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay
Strength Type: Mohr-Coulomb
Unit Weight: 106.5 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Silt & Sand
Strength Type: Mohr-Coulomb
Unit Weight: 123 lb/ft3
Cohesion: 1 psf
Friction Angle: 29 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand & Silt
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay (Lower)
Strength Type: Mohr-Coulomb
Unit Weight: 132.7 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Sand & Gravel
Strength Type: Mohr-Coulomb
Unit Weight: 138 lb/ft3
Cohesion: 1 psf
Friction Angle: 34 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand (SW)
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand (Lower)
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Limestone
Strength Type: Infinite strength
Unit Weight: 120 lb/ft3

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.826810
Center: 200.519, 478.457
Radius: 21.327
Left Slip Surface Endpoint: 181.068, 469.711
Right Slip Surface Endpoint: 215.213, 463.000
Resisting Horizontal Force=8227.58 lb
Driving Horizontal Force=4503.8 lb

Method: spencer
FS: 1.916280
Center: 200.519, 478.457
Radius: 21.327
Left Slip Surface Endpoint: 181.068, 469.711
Right Slip Surface Endpoint: 215.213, 463.000
Resisting Moment=186332 lb-ft

Driving Moment=97236.8 lb-ft
Resisting Horizontal Force=7727.48 lb
Driving Horizontal Force=4032.55 lb

Valid / Invalid Surfaces

Method: janbu corrected
Number of Valid Surfaces: 13853
Number of Invalid Surfaces: 14758
Error Codes:
Error Code -99 reported for 574 surfaces
Error Code -103 reported for 4298 surfaces
Error Code -106 reported for 413 surfaces
Error Code -107 reported for 423 surfaces
Error Code -108 reported for 7878 surfaces
Error Code -111 reported for 102 surfaces
Error Code -112 reported for 509 surfaces
Error Code -1000 reported for 561 surfaces

Method: spencer
Number of Valid Surfaces: 13685
Number of Invalid Surfaces: 14926
Error Codes:
Error Code -99 reported for 574 surfaces
Error Code -103 reported for 4298 surfaces
Error Code -106 reported for 413 surfaces
Error Code -107 reported for 423 surfaces
Error Code -108 reported for 7914 surfaces
Error Code -111 reported for 122 surfaces
Error Code -112 reported for 621 surfaces
Error Code -1000 reported for 561 surfaces

Error Codes

The following errors were encountered during the computation:

-99 = Slip surface intersects an infinite
strength material. If infinite strength regions
are defined for a model, a large number of
potential slip surfaces may show this error code.
This is Normal.

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

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

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

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

-111 = safety factor equation did not converge

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

-1000 = No valid slip surfaces are generated
at a grid center. Unable to draw a surface.

List of All Coordinates

Search Grid

10.111	478.457
406.794	478.457
406.794	747.380
10.111	747.380

Material Boundary

-134.500	564.000
-135.500	563.000
111.500	482.000
141.200	482.000
183.200	468.000
183.200	466.000
195.000	466.000
196.000	465.000
200.000	465.000
206.000	463.000
209.200	463.000

Material Boundary

-400.000	463.000
98.200	463.000
104.200	461.000
144.200	461.000
150.200	463.000
206.000	463.000

Material Boundary

-400.000	465.000

98.200 465.000
104.200 463.000
144.200 463.000
150.200 465.000
196.000 465.000

Material Boundary
-400.000 466.000
63.500 466.000
98.200 466.000
104.200 463.982
144.200 463.982
150.200 466.000
183.200 466.000

Material Boundary
63.500 466.000
111.500 482.000

Material Boundary
-400.000 450.000
-75.000 449.000
125.000 457.000
400.000 457.000

Material Boundary
-400.000 435.000
-75.000 435.000
125.000 434.000
400.000 434.000

Material Boundary
-400.000 428.500
-75.000 428.500
125.000 430.500
400.000 430.500

Material Boundary
-400.000 420.000
400.000 420.000

Material Boundary
-400.000 416.000
400.000 416.000

Material Boundary
-400.000 386.000
400.000 386.000

Material Boundary
-400.000 375.500
400.000 375.500

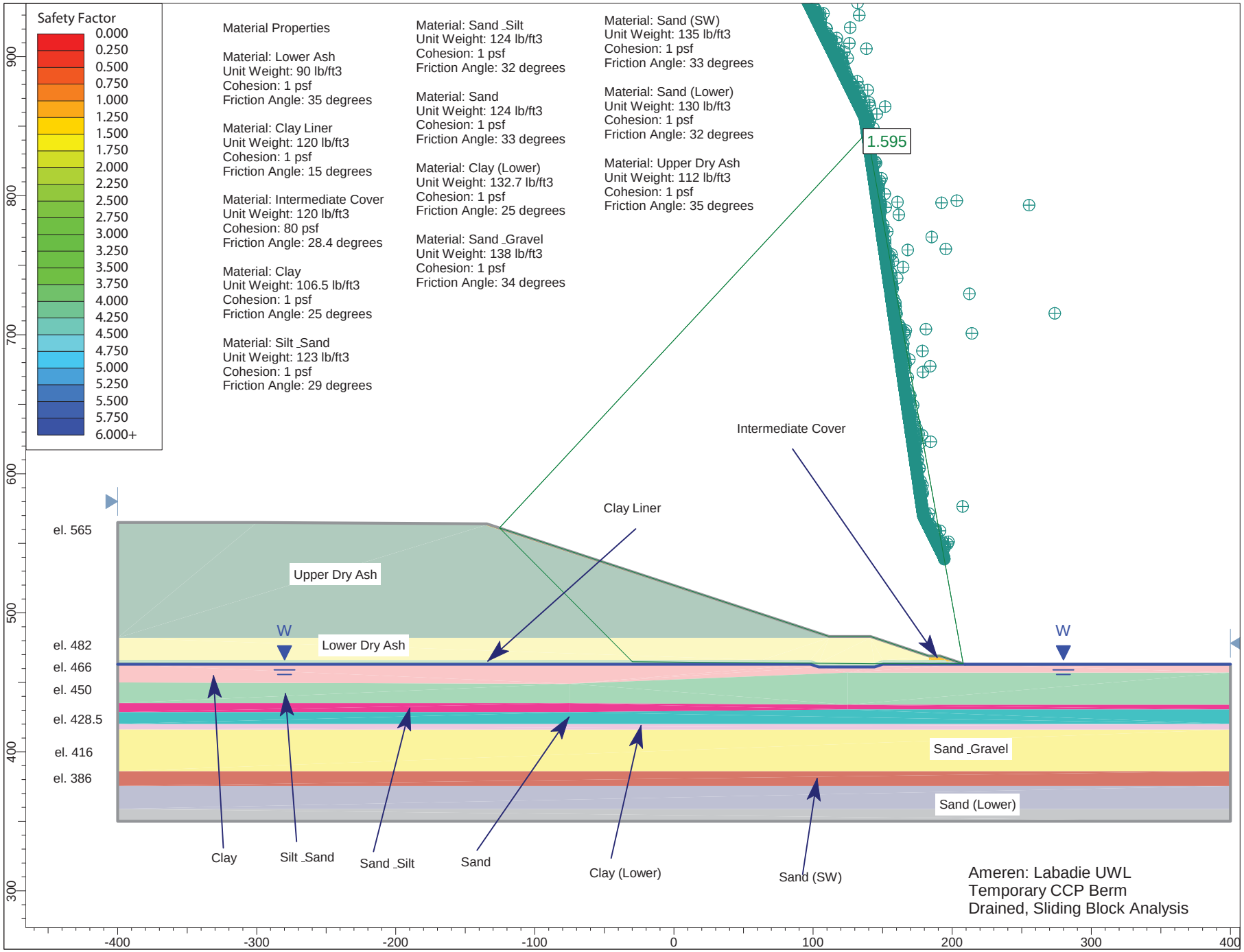
Material Boundary
-400.000 359.000

400.000 359.000

Material Boundary
-400.000 482.000
111.500 482.000

External Boundary
209.200 463.000
191.200 469.000
183.200 469.000
141.200 483.000
111.500 483.000
-134.500 564.000
-300.000 565.000
-400.000 565.000
-400.000 482.000
-400.000 466.000
-400.000 465.000
-400.000 463.000
-400.000 450.000
-400.000 435.000
-400.000 428.500
-400.000 420.000
-400.000 416.000
-400.000 386.000
-400.000 375.500
-400.000 359.000
-400.000 350.000
400.000 350.000
400.000 359.000
400.000 375.500
400.000 386.000
400.000 416.000
400.000 420.000
400.000 430.500
400.000 434.000
400.000 457.000
400.000 463.000

Water Table
-400.000 463.000
98.200 463.000
104.200 461.000
144.200 461.000
150.200 463.000
206.000 463.000
400.000 463.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Lower Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Clay Liner
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 15 degrees
Material: Intermediate Cover
Unit Weight: 120 lb/ft3
Cohesion: 80 psf
Friction Angle: 28.4 degrees
Material: Clay
Unit Weight: 106.5 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Silt _Sand
Unit Weight: 123 lb/ft3
Cohesion: 1 psf
Friction Angle: 29 degrees
Material: Sand _Silt
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Material: Sand
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: Clay (Lower)
Unit Weight: 132.7 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Sand _Gravel
Unit Weight: 138 lb/ft3
Cohesion: 1 psf
Friction Angle: 34 degrees
Material: Sand (SW)
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: Sand (Lower)
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
1.595
Intermediate Cover
Clay Liner
Upper Dry Ash
Lower Dry Ash
W
W
el. 565
el. 482
el. 466
el. 450
el. 428.5
el. 416
el. 386
Sand _Gravel
Sand (Lower)
Clay
Silt _Sand
Sand _Silt
Sand
Clay (Lower)
Sand (SW)
Ameren: Labadie UWL
Temporary CCP Berm
Drained, Sliding Block Analysis
900
800
700
600
500
400
300
-400
-300
-200
-100
0
100
200
300
400

Slide Analysis Information

Document Name

File Name: Ash Berm Sliding Block.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
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 corrected
Spencer

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

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): -85
Right Projection Angle (End Angle): 85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: Lower Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner
Strength Type: Mohr-Coulomb

Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Intermediate Cover
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 80 psf
Friction Angle: 28.4 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay
Strength Type: Mohr-Coulomb
Unit Weight: 106.5 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Silt & Sand
Strength Type: Mohr-Coulomb
Unit Weight: 123 lb/ft3
Cohesion: 1 psf
Friction Angle: 29 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand & Silt
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay (Lower)
Strength Type: Mohr-Coulomb
Unit Weight: 132.7 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand & Gravel
Strength Type: Mohr-Coulomb
Unit Weight: 138 lb/ft3

Cohesion: 1 psf
Friction Angle: 34 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand (SW)
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand (Lower)
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Limestone
Strength Type: Infinite strength
Unit Weight: 120 lb/ft3

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.586580
Axis Location: 138.815, 845.570
Left Slip Surface Endpoint: -125.443, 561.018
Right Slip Surface Endpoint: 207.903, 463.432
Resisting Horizontal Force=383790 lb
Driving Horizontal Force=241897 lb

Method: spencer
FS: 1.594970
Axis Location: 138.815, 845.570
Left Slip Surface Endpoint: -125.443, 561.018
Right Slip Surface Endpoint: 207.903, 463.432
Resisting Moment=1.60404e+008 lb-ft
Driving Moment=1.00568e+008 lb-ft
Resisting Horizontal Force=355228 lb
Driving Horizontal Force=222717 lb

Valid / Invalid Surfaces

Method: janbu corrected

Number of Valid Surfaces: 4482
Number of Invalid Surfaces: 518
Error Codes:
Error Code -105 reported for 483 surfaces
Error Code -108 reported for 7 surfaces
Error Code -111 reported for 9 surfaces
Error Code -112 reported for 19 surfaces

Method: spencer
Number of Valid Surfaces: 4168
Number of Invalid Surfaces: 832
Error Codes:
Error Code -105 reported for 483 surfaces
Error Code -108 reported for 157 surfaces
Error Code -111 reported for 152 surfaces
Error Code -112 reported for 40 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope
intersections with no valid slip surface.

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Material Boundary

-134.500	564.000
-135.500	563.000
111.500	482.000
141.200	482.000
183.200	468.000
183.200	466.000
195.000	466.000
196.000	465.000
200.000	465.000
206.000	463.000
209.200	463.000

Material Boundary

-400.000	463.000

98.200 463.000
104.200 461.000
144.200 461.000
150.200 463.000
206.000 463.000

Material Boundary
-400.000 465.000
98.200 465.000
104.200 463.000
144.200 463.000
150.200 465.000
196.000 465.000

Material Boundary
-400.000 466.000
63.500 466.000
98.200 466.000
104.200 463.982
144.200 463.982
150.200 466.000
183.200 466.000

Material Boundary
63.500 466.000
111.500 482.000

Material Boundary
-400.000 450.000
-75.000 449.000
125.000 457.000
400.000 457.000

Material Boundary
-400.000 435.000
-75.000 435.000
125.000 434.000
400.000 434.000

Material Boundary
-400.000 428.500
-75.000 428.500
125.000 430.500
400.000 430.500

Material Boundary
-400.000 420.000
400.000 420.000

Material Boundary
-400.000 416.000
400.000 416.000

Material Boundary
-400.000 386.000
400.000 386.000

Material Boundary

-400.000	375.500
400.000	375.500

Material Boundary

-400.000	359.000
400.000	359.000

Material Boundary

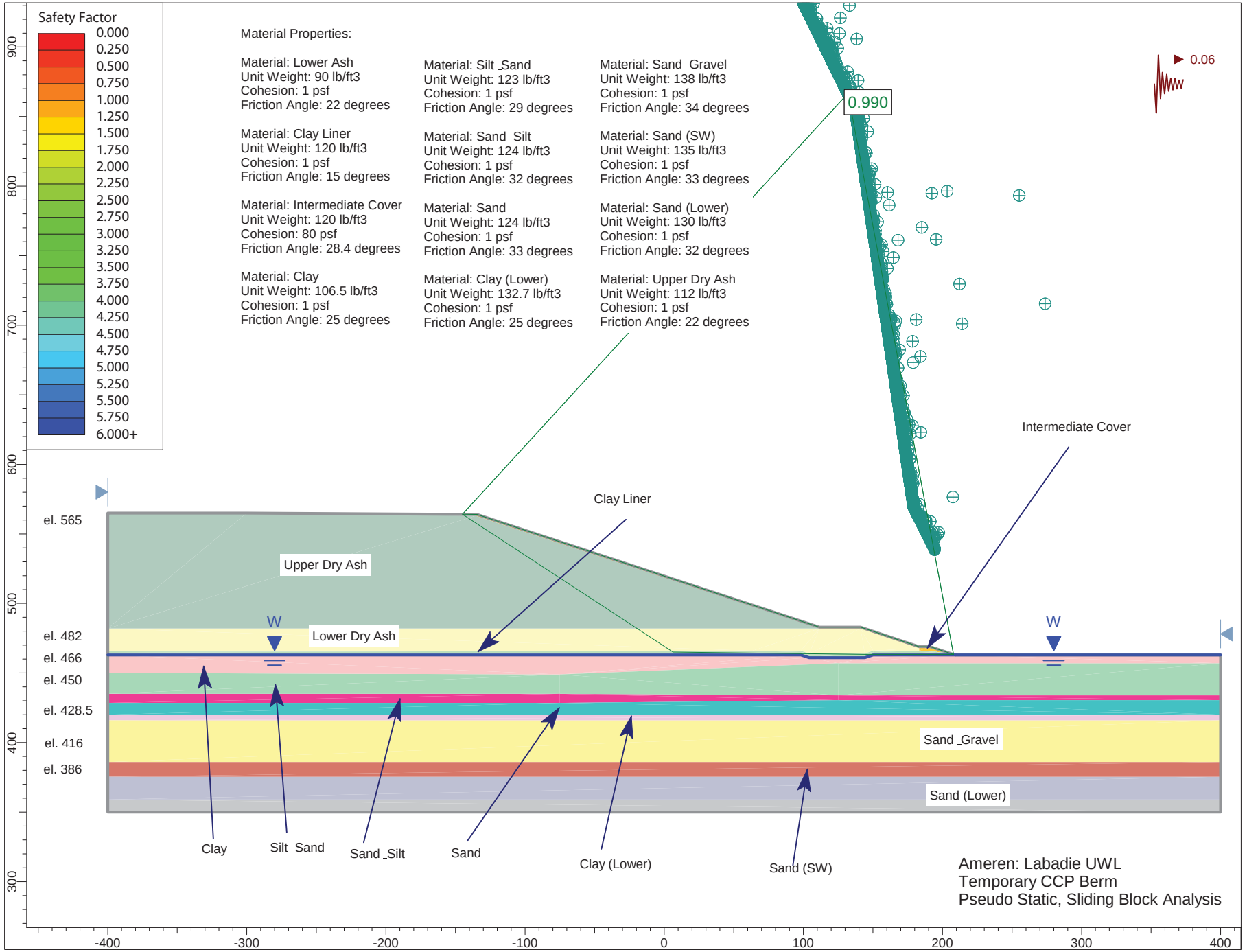
-400.000	482.000
111.500	482.000

External Boundary

209.200	463.000
191.200	469.000
183.200	469.000
141.200	483.000
111.500	483.000
-134.500	564.000
-300.000	565.000
-400.000	565.000
-400.000	482.000
-400.000	466.000
-400.000	465.000
-400.000	463.000
-400.000	450.000
-400.000	435.000
-400.000	428.500
-400.000	420.000
-400.000	416.000
-400.000	386.000
-400.000	375.500
-400.000	359.000
-400.000	350.000
400.000	350.000
400.000	359.000
400.000	375.500
400.000	386.000
400.000	416.000
400.000	420.000
400.000	430.500
400.000	434.000
400.000	457.000
400.000	463.000

Water Table

-400.000	463.000
98.200	463.000
104.200	461.000
144.200	461.000
150.200	463.000
206.000	463.000
400.000	463.000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0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Lower Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 22 degrees
Material: Clay Liner
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 15 degrees
Material: Intermediate Cover
Unit Weight: 120 lb/ft3
Cohesion: 80 psf
Friction Angle: 28.4 degrees
Material: Clay
Unit Weight: 106.5 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Silt _Sand
Unit Weight: 123 lb/ft3
Cohesion: 1 psf
Friction Angle: 29 degrees
Material: Sand _Silt
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Material: Sand
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: Clay (Lower)
Unit Weight: 132.7 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: Sand _Gravel
Unit Weight: 138 lb/ft3
Cohesion: 1 psf
Friction Angle: 34 degrees
Material: Sand (SW)
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: Sand (Lower)
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 22 degrees
0.990
0.06
Intermediate Cover
Clay Liner
el. 565
Upper Dry Ash
W
el. 482
Lower Dry Ash
el. 466
el. 450
el. 428.5
el. 416
el. 386
Sand _Gravel
Sand (Lower)
Clay
Silt _Sand
Sand _Silt
Sand
Clay (Lower)
Sand (SW)
Ameren: Labadie UWL
Temporary CCP Berm
Pseudo Static, Sliding Block Analysis
900
800
700
600
500
400
300
-400
-300
-200
-100
0
100
200
300
400

Slide Analysis Information

Document Name

File Name: Ash Berm Pseudostatic Sliding Block.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
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 corrected
Spencer

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

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): -85
Right Projection Angle (End Angle): 85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.06

Material Properties

Material: Lower Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 22 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Clay Liner
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Intermediate Cover
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 80 psf
Friction Angle: 28.4 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay
Strength Type: Mohr-Coulomb
Unit Weight: 106.5 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Silt & Sand
Strength Type: Mohr-Coulomb
Unit Weight: 123 lb/ft3
Cohesion: 1 psf
Friction Angle: 29 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand & Silt
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay (Lower)
Strength Type: Mohr-Coulomb
Unit Weight: 132.7 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand & Gravel
Strength Type: Mohr-Coulomb
Unit Weight: 138 lb/ft3
Cohesion: 1 psf
Friction Angle: 34 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand (SW)
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Sand (Lower)
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Limestone
Strength Type: Infinite strength
Unit Weight: 120 lb/ft3

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 0.984554
Axis Location: 133.565, 863.640
Left Slip Surface Endpoint: -141.998, 564.045
Right Slip Surface Endpoint: 207.903, 463.432
Resisting Horizontal Force=300440 lb
Driving Horizontal Force=305153 lb

Method: spencer
FS: 0.990260
Axis Location: 132.052, 866.712
Left Slip Surface Endpoint: -145.062, 564.064
Right Slip Surface Endpoint: 207.903, 463.432
Resisting Moment=1.24732e+008 lb-ft
Driving Moment=1.25959e+008 lb-ft
Resisting Horizontal Force=281922 lb
Driving Horizontal Force=284695 lb

Valid / Invalid Surfaces

Method: janbu corrected
Number of Valid Surfaces: 4503
Number of Invalid Surfaces: 497
Error Codes:
Error Code -105 reported for 483 surfaces
Error Code -108 reported for 4 surfaces
Error Code -111 reported for 4 surfaces
Error Code -112 reported for 6 surfaces

Method: spencer
Number of Valid Surfaces: 3728
Number of Invalid Surfaces: 1272
Error Codes:
Error Code -105 reported for 483 surfaces
Error Code -108 reported for 401 surfaces
Error Code -111 reported for 381 surfaces
Error Code -112 reported for 7 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope
intersections with no valid slip surface.

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Material Boundary

-134.500	564.000
-135.500	563.000
111.500	482.000
141.200	482.000
183.200	468.000
183.200	466.000
195.000	466.000
196.000	465.000
200.000	465.000
206.000	463.000
209.200	463.000

Material Boundary

-400.000 463.000
98.200 463.000
104.200 461.000
144.200 461.000
150.200 463.000
206.000 463.000

Material Boundary
-400.000 465.000
98.200 465.000
104.200 463.000
144.200 463.000
150.200 465.000
196.000 465.000

Material Boundary
-400.000 466.000
63.500 466.000
98.200 466.000
104.200 463.982
144.200 463.982
150.200 466.000
183.200 466.000

Material Boundary
63.500 466.000
111.500 482.000

Material Boundary
-400.000 450.000
-75.000 449.000
125.000 457.000
400.000 457.000

Material Boundary
-400.000 435.000
-75.000 435.000
125.000 434.000
400.000 434.000

Material Boundary
-400.000 428.500
-75.000 428.500
125.000 430.500
400.000 430.500

Material Boundary
-400.000 420.000
400.000 420.000

Material Boundary
-400.000 416.000
400.000 416.000

Material Boundary
-400.000 386.000
400.000 386.000

Material Boundary

-400.000	375.500
400.000	375.500

Material Boundary

-400.000	359.000
400.000	359.000

Material Boundary

-400.000	482.000
111.500	482.000

External Boundary

209.200	463.000
191.200	469.000
183.200	469.000
141.200	483.000
111.500	483.000
-134.500	564.000
-300.000	565.000
-400.000	565.000
-400.000	482.000
-400.000	466.000
-400.000	465.000
-400.000	463.000
-400.000	450.000
-400.000	435.000
-400.000	428.500
-400.000	420.000
-400.000	416.000
-400.000	386.000
-400.000	375.500
-400.000	359.000
-400.000	350.000
400.000	350.000
400.000	359.000
400.000	375.500
400.000	386.000
400.000	416.000
400.000	420.000
400.000	430.500
400.000	434.000
400.000	457.000
400.000	463.000

Water Table

-400.000	463.000
98.200	463.000
104.200	461.000
144.200	461.000
150.200	463.000
206.000	463.000
400.000	463.000

ANALYSIS AND DESIGN OF VENEER COVER SOILS

Based on ASCE Webinar by R.M. Koerner - Geosynthetic Institute

Project: Ameren Labadie UWL — Date: 5/30/2012

By: J.Fouse — Checked:

Angle of Slope		β =	18.435	degrees (	3 :1)
Vertical Height Between Benches		H =	40	feet	
Length of Slope		L =	120.0	feet	
Thickness of Soil Cover		h =	2	feet	
Properties of Soil Cover	Moist Unit Weight	γ_m =	116	PCF	
	Sat. Unit Weight	γ_s =	122	PCF	
	Friction Angle	ϕ =	25	degrees	
	Cohesion	c =	0	PSF	
Minimum Interface Shear Properties	Friction Angle	δ =	15	degrees	Cover/textured HDPE
	Adhesion	a =	246	PSF	
Weight of Active Block		Wa =	26371	LBS/FT	
Weight of Passive Block		Wp =	773	LBS/FT	
Normal Force of Active Block		Na =	25017	LBS/FT	
Adhesion Force to HDPE		Ca =	28044	LBS/FT	
Cohesive Shear Base Passive Block		C =	0	LBS/FT	
		a =	2502	LBS/FT	
		b =	-10927	LBS/FT	
		c =	1620	LBS/FT	
Factor of Safety - Gravitational Forces		FS =	4.21		
Seismic Force Coefficient (Horz.)		Cs =	0.179	g	
		a =	12115	LBS/FT	
		b =	-33477	LBS/FT	
		c =	4861	LBS/FT	
Factor of Safety With Seismic		FS =	2.61		
Seepage Parallel to Slope, Depth		h_w =	2.00	feet	
Factor of Safety with Parallel Seepage		FS =	3.78		

(This calculation ignores passive block. Based on Stark & MDNR, 1998.)

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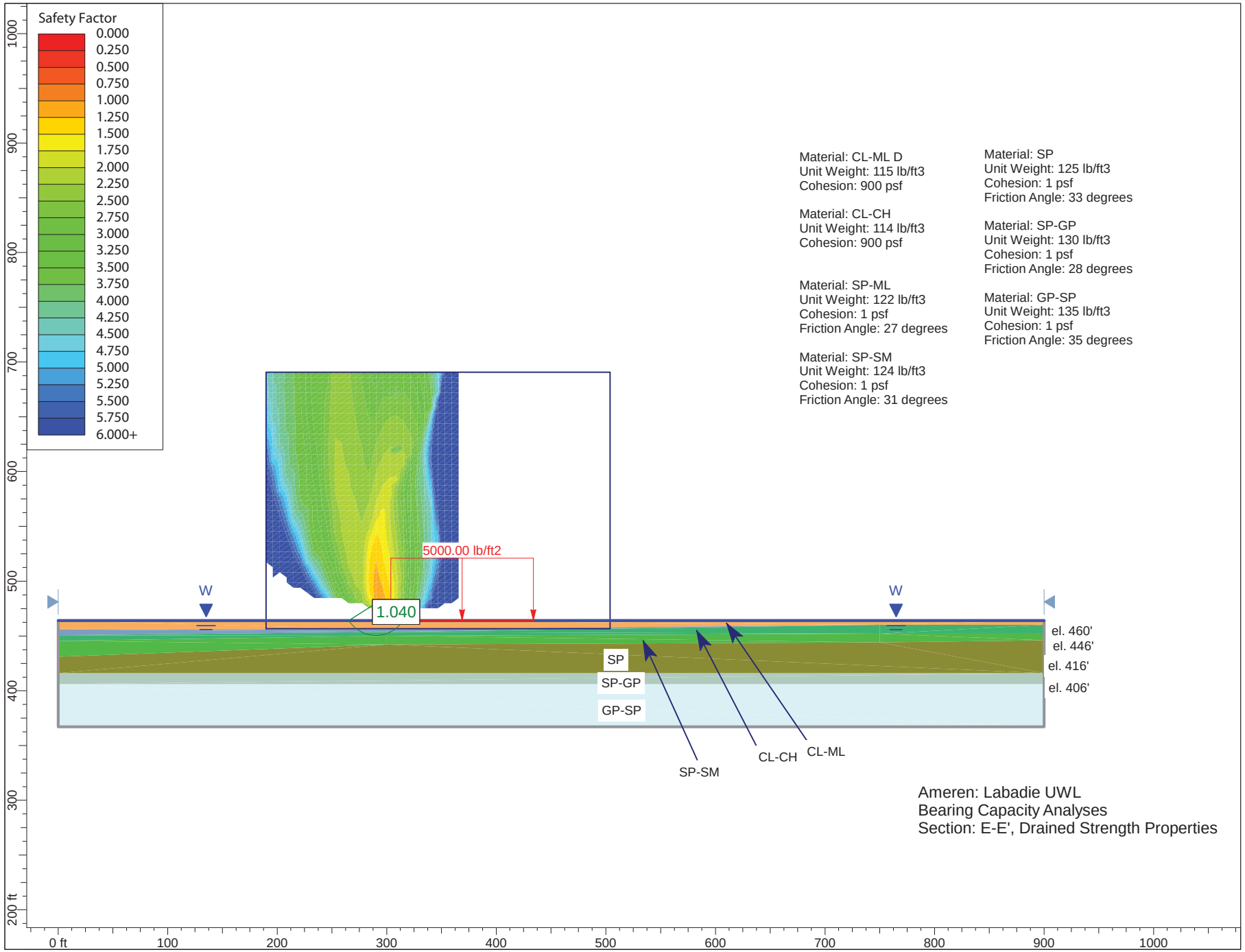

Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material: CL-ML D
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
5000.00 lb/ft2
1.040
W
W
SP
SP-GP
GP-SP
el. 460'
el. 446'
el. 416'
el. 406'
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Bearing Capacity Analyses
Section: E-E', Drained Strength Properties
200 ft
300
400
500
600
700
800
900
1000
0 ft
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section EE Full Drained 10192012 (undrained props).sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Normal to boundary, Magnitude: 5000 lb/ft2

Material Properties

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.040280
Center: 290.159, 479.881
Radius: 29.617
Left Slip Surface Endpoint: 265.160, 464.000
Right Slip Surface Endpoint: 315.157, 464.000
Resisting Moment=1.15633e+006 lb-ft

Driving Moment=1.11155e+006 lb-ft
Resisting Horizontal Force=31057.3 lb
Driving Horizontal Force=29854.7 lb

Method: gle/morgenstern-price
FS: 1.042170
Center: 290.159, 479.881
Radius: 29.617
Left Slip Surface Endpoint: 265.160, 464.000
Right Slip Surface Endpoint: 315.157, 464.000
Resisting Moment=1.15842e+006 lb-ft
Driving Moment=1.11155e+006 lb-ft
Resisting Horizontal Force=31202.3 lb
Driving Horizontal Force=29939.9 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 6712
Number of Invalid Surfaces: 21899
Error Codes:
Error Code -103 reported for 15836 surfaces
Error Code -107 reported for 3615 surfaces
Error Code -108 reported for 1849 surfaces
Error Code -111 reported for 138 surfaces
Error Code -112 reported for 461 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 6742
Number of Invalid Surfaces: 21869
Error Codes:
Error Code -103 reported for 15836 surfaces
Error Code -107 reported for 3615 surfaces
Error Code -108 reported for 1822 surfaces
Error Code -111 reported for 135 surfaces
Error Code -112 reported for 461 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

-108 = Total driving moment
or total driving force < 0.1. This is to

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

189.657	456.455
503.725	456.455
503.725	690.716
189.657	690.716

Material Boundary

0.000	456.000
300.000	456.000
750.000	460.000
900.000	460.000

Material Boundary

0.000	450.500
300.000	453.500
750.000	460.000

Material Boundary

0.000	445.500
300.000	450.000
750.000	452.000
900.000	452.000

Material Boundary

0.000	431.000
300.000	442.000
750.000	444.000
900.000	446.000

Material Boundary

0.000	416.000
900.000	416.000

Material Boundary

0.000	406.000
900.000	406.000

External Boundary

0.000	464.000
0.000	456.000
0.000	450.500

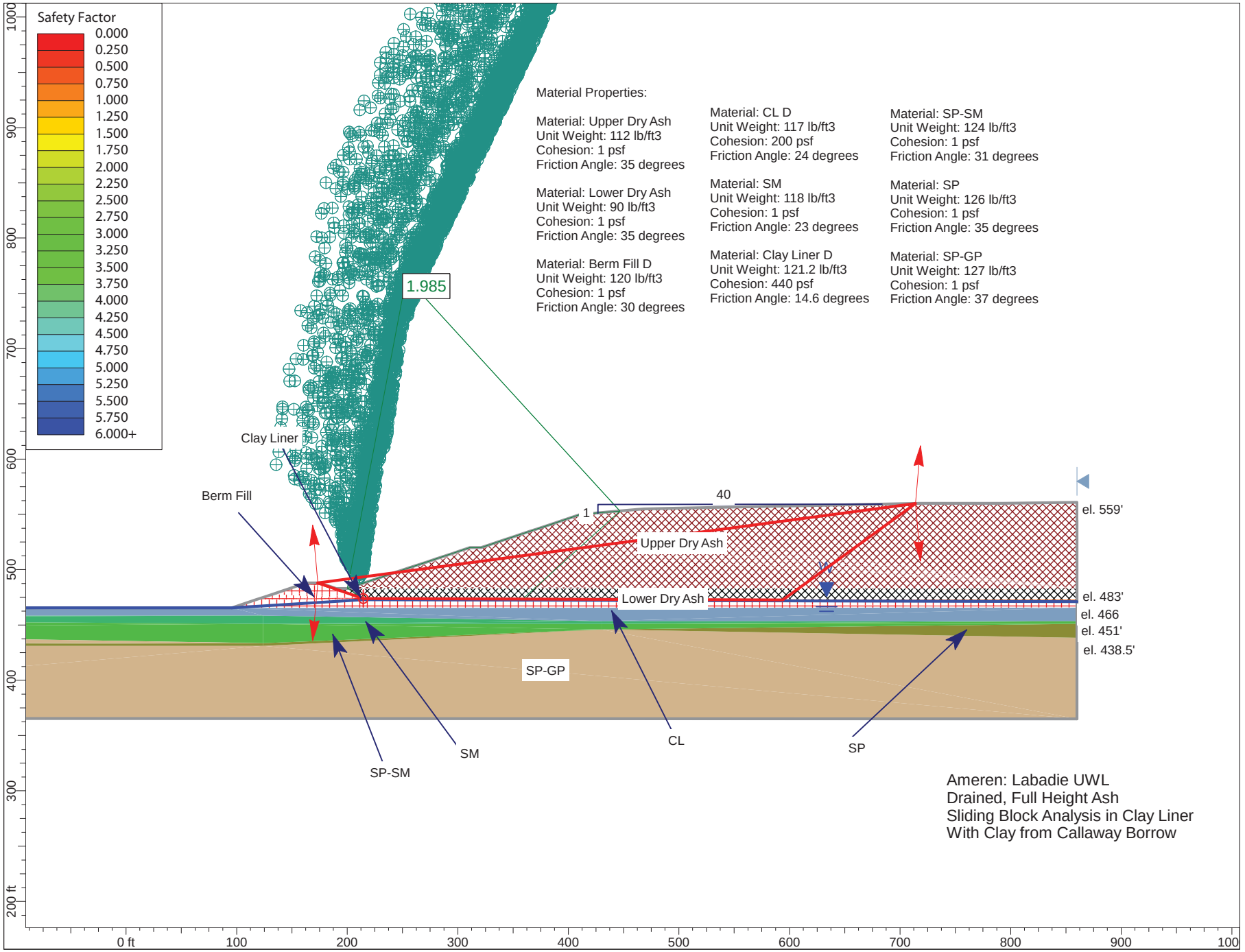
0.000	445.500
0.000	431.000
0.000	416.000
0.000	406.000
0.000	367.000
900.000	367.000
900.000	406.000
900.000	416.000
900.000	446.000
900.000	452.000
900.000	460.000
900.000	464.000
300.000	464.000

Water Table

0.000	464.000
433.806	464.000
900.000	464.000

Distributed Load

433.832	464.000
303.589	464.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: CL D
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: Clay Liner D
Unit Weight: 121.2 lb/ft3
Cohesion: 440 psf
Friction Angle: 14.6 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
1.985
Clay Liner
Berm Fill
40
1
Upper Dry Ash
Lower Dry Ash
SP-GP
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Drained, Full Height Ash
Sliding Block Analysis in Clay Liner
With Clay from Callaway Borrow
1000
900
800
700
600
500
400
300
200 ft
0 ft
100
200
300
400
500
600
700
800
900
100

Slide Analysis Information

Document Name

File Name: Section BB Full Drained Sliding Block cal.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): -85
Right Projection Angle (End Angle): 85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb

Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 121.2 lb/ft3
Cohesion: 440 psf
Friction Angle: 14.6 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL D
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3

Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.984940
Axis Location: 253.389, 764.456
Left Slip Surface Endpoint: 200.228, 483.076
Right Slip Surface Endpoint: 446.596, 553.099
Resisting Moment=1.28785e+008 lb-ft
Driving Moment=6.48809e+007 lb-ft

Method: spencer
FS: 2.081750
Axis Location: 253.389, 764.456
Left Slip Surface Endpoint: 200.228, 483.076
Right Slip Surface Endpoint: 446.596, 553.099
Resisting Moment=1.25861e+008 lb-ft
Driving Moment=6.04593e+007 lb-ft
Resisting Horizontal Force=382217 lb
Driving Horizontal Force=183604 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 3856
Number of Invalid Surfaces: 1144
Error Codes:
Error Code -105 reported for 154 surfaces
Error Code -107 reported for 1 surface
Error Code -108 reported for 81 surfaces
Error Code -111 reported for 26 surfaces
Error Code -112 reported for 882 surfaces

Method: spencer
Number of Valid Surfaces: 3428
Number of Invalid Surfaces: 1572
Error Codes:
Error Code -105 reported for 154 surfaces
Error Code -107 reported for 1 surface
Error Code -108 reported for 296 surfaces
Error Code -111 reported for 213 surfaces
Error Code -112 reported for 908 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope
intersections with no valid slip surface.

-107 = Total driving moment or
total driving force is negative. This will occur

if the wrong failure direction is specified,
or if high external or anchor loads are applied
against the failure direction.

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500
430.000	446.000
860.009	450.998

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
200.000 483.000
860.013 482.998

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998
860.021 560.896
792.394 560.000
718.434 560.000
500.172 555.635
468.434 555.000
461.429 554.390
411.000 550.000
401.743 546.914
396.000 545.000
386.646 541.882
381.000 540.000
371.552 536.851
366.000 535.000
356.462 531.821
351.000 530.000
341.374 526.791
336.000 525.000
329.925 522.975
321.000 520.000
315.050 520.000
311.000 520.000
302.030 517.010
296.000 515.000
286.965 511.988

281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

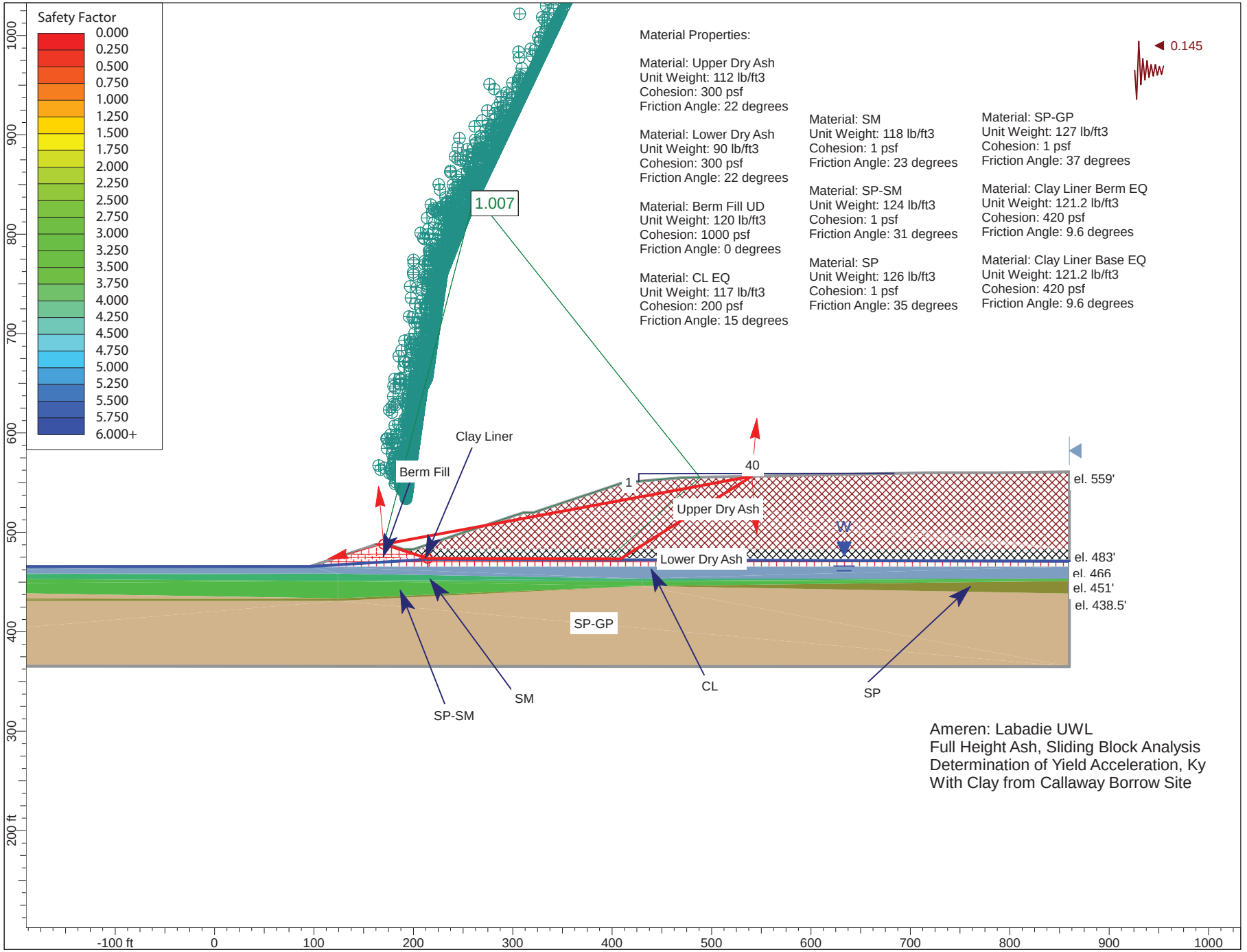
-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Focus/Block Search Window

173.371	487.992
214.462	473.823
593.955	472.634
713.918	559.910

Focus/Block Search Point

214.462	473.823


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: Berm Fill UD
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Material: CL EQ
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: Clay Liner Berm EQ
Unit Weight: 121.2 lb/ft3
Cohesion: 420 psf
Friction Angle: 9.6 degrees
Material: Clay Liner Base EQ
Unit Weight: 121.2 lb/ft3
Cohesion: 420 psf
Friction Angle: 9.6 degrees
0.145
1.007
Clay Liner
Berm Fill
40
1
Upper Dry Ash
W
Lower Dry Ash
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Full Height Ash, Sliding Block Analysis
Determination of Yield Acceleration, Ky
With Clay from Callaway Borrow Site
1000
900
800
700
600
500
400
300
200 ft
-100 ft
0
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section BB Full Pseudo Static Sliding Block cal.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Janbu corrected
Spencer

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

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 195
Right Projection Angle (Start Angle): -85
Right Projection Angle (End Angle): 85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.145

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL EQ
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 15 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Berm EQ
Strength Type: Mohr-Coulomb
Unit Weight: 121.2 lb/ft3
Cohesion: 420 psf
Friction Angle: 9.6 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner Base EQ
Strength Type: Mohr-Coulomb
Unit Weight: 121.2 lb/ft3
Cohesion: 420 psf
Friction Angle: 9.6 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 0.997465
Axis Location: 261.668, 839.746
Left Slip Surface Endpoint: 170.055, 487.977
Right Slip Surface Endpoint: 488.115, 555.394
Resisting Horizontal Force=403195 lb
Driving Horizontal Force=404220 lb

Method: spencer
FS: 1.007200
Axis Location: 261.668, 839.746
Left Slip Surface Endpoint: 170.055, 487.977
Right Slip Surface Endpoint: 488.115, 555.394
Resisting Moment=1.51225e+008 lb-ft
Driving Moment=1.50144e+008 lb-ft
Resisting Horizontal Force=372771 lb
Driving Horizontal Force=370107 lb

Valid / Invalid Surfaces

Method: janbu corrected
Number of Valid Surfaces: 3826
Number of Invalid Surfaces: 1174
Error Codes:
Error Code -105 reported for 1129 surfaces
Error Code -108 reported for 8 surfaces
Error Code -111 reported for 21 surfaces
Error Code -112 reported for 16 surfaces

Method: spencer
Number of Valid Surfaces: 3444
Number of Invalid Surfaces: 1556
Error Codes:
Error Code -105 reported for 1129 surfaces
Error Code -108 reported for 84 surfaces
Error Code -111 reported for 315 surfaces
Error Code -112 reported for 28 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope
intersections with no valid slip surface.

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Material Boundary

-650.000	458.500
124.000	458.500
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500
430.000	446.000
860.009	450.998

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
200.000 483.000
860.013 482.998

External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998
860.021 560.896
792.394 560.000
718.434 560.000
500.172 555.635
468.434 555.000
461.429 554.390
411.000 550.000
401.743 546.914
396.000 545.000
386.646 541.882
381.000 540.000
371.552 536.851
366.000 535.000
356.462 531.821
351.000 530.000
341.374 526.791
336.000 525.000
329.925 522.975
321.000 520.000
315.050 520.000
311.000 520.000
302.030 517.010
296.000 515.000
286.965 511.988

281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

Focus/Block Search Window

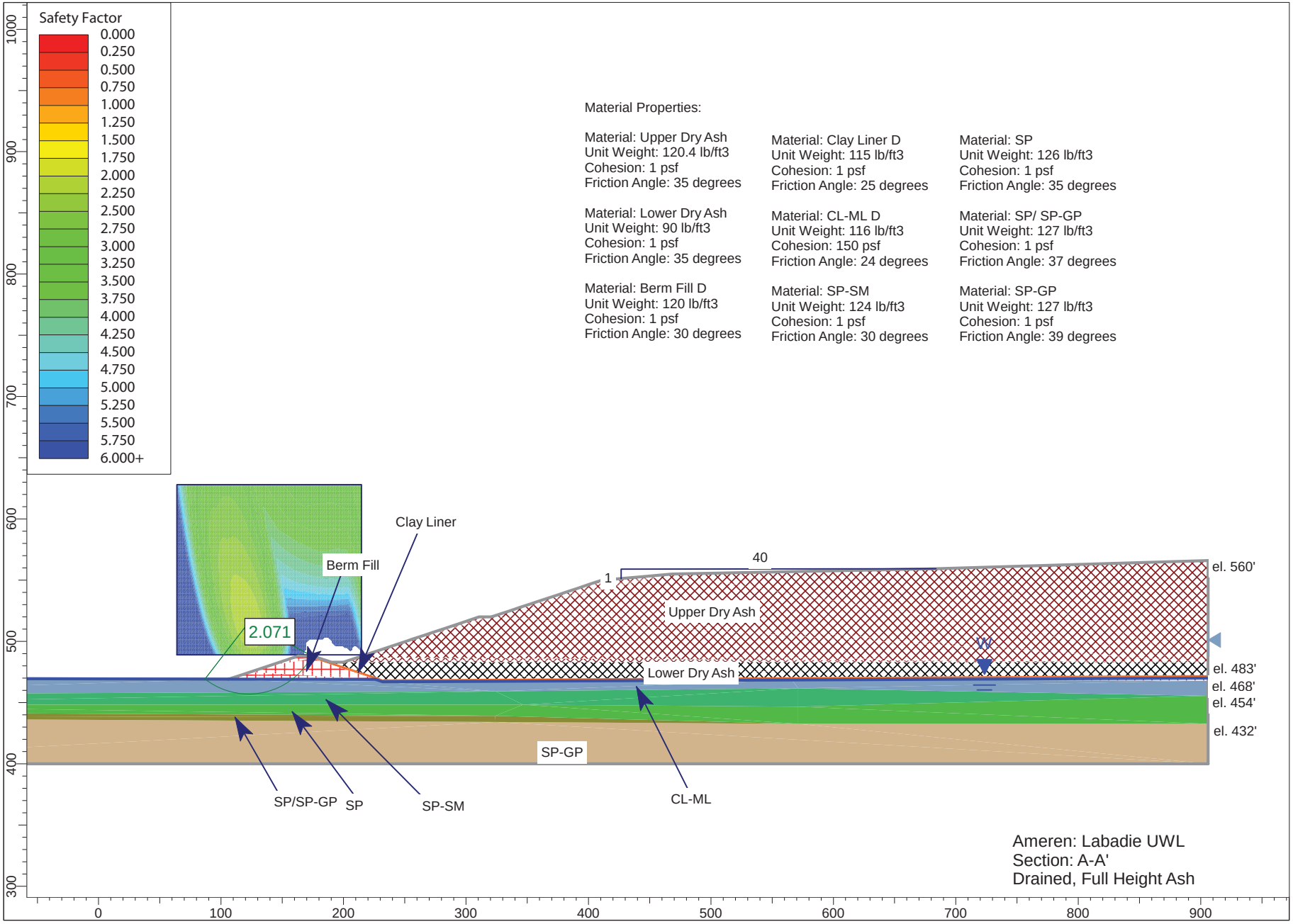
170.055	487.977
214.462	473.808
408.263	473.263
540.567	556.443

Focus/Block Search Point

214.462	473.808

Focus/Block Search Point

170.055	487.977


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-ML D
Unit Weight: 116 lb/ft3
Cohesion: 150 psf
Friction Angle: 24 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Clay Liner
Berm Fill
40
1
Upper Dry Ash
2.071
Lower Dry Ash
el. 560'
el. 483'
el. 468'
el. 454'
el. 432'
SP-GP
SP/SP-GP
SP
SP-SM
CL-ML
Ameren: Labadie UWL
Section: A-A'
Drained, Full Height Ash
1000
900
800
700
600
500
400
300
0
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section AA Full Drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 150 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

List of All Coordinates

Material Boundary
-310.816 456.500
324.184 459.061
571.184 461.561
906.000 455.500

Material Boundary
346.669 448.252
571.184 446.561
906.000 455.500

Material Boundary
-310.816 442.454
323.787 439.064
571.184 432.561

Material Boundary
-310.816 437.454
324.184 434.061

Material Boundary
324.184 434.061
571.184 432.561

Material Boundary
190.000 483.000
232.000 469.000
566.246 468.488
906.000 467.967

Material Boundary
106.184 469.061
225.991 469.003
232.000 469.000

Material Boundary
200.000 483.000
906.000 483.000

Material Boundary
-310.816 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

Material Boundary
232.000 469.000
906.000 472.524

Material Boundary

175.000	488.000
175.000	486.000
225.991	469.003
232.000	467.000
566.246	468.488
906.000	470.000

External Boundary

906.000	566.071
683.709	559.305
468.434	555.000
440.357	552.556
411.000	550.000
398.805	545.935
396.000	545.000
391.110	543.370
381.000	540.000
375.110	538.037
366.000	535.000
359.899	532.966
351.000	530.000
344.696	527.899
336.000	525.000
321.203	520.068
321.000	520.000
320.919	520.000
311.000	520.000
310.751	519.917
296.000	515.000
294.928	514.643
281.000	510.000
271.864	506.955
266.000	505.000
256.681	501.894
251.000	500.000
241.544	496.848
236.000	495.000
226.527	491.842
221.000	490.000
211.527	486.842
206.000	485.000
203.789	484.263
200.000	483.000
196.315	483.000
190.000	483.000
187.789	483.737
184.000	485.000
178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158

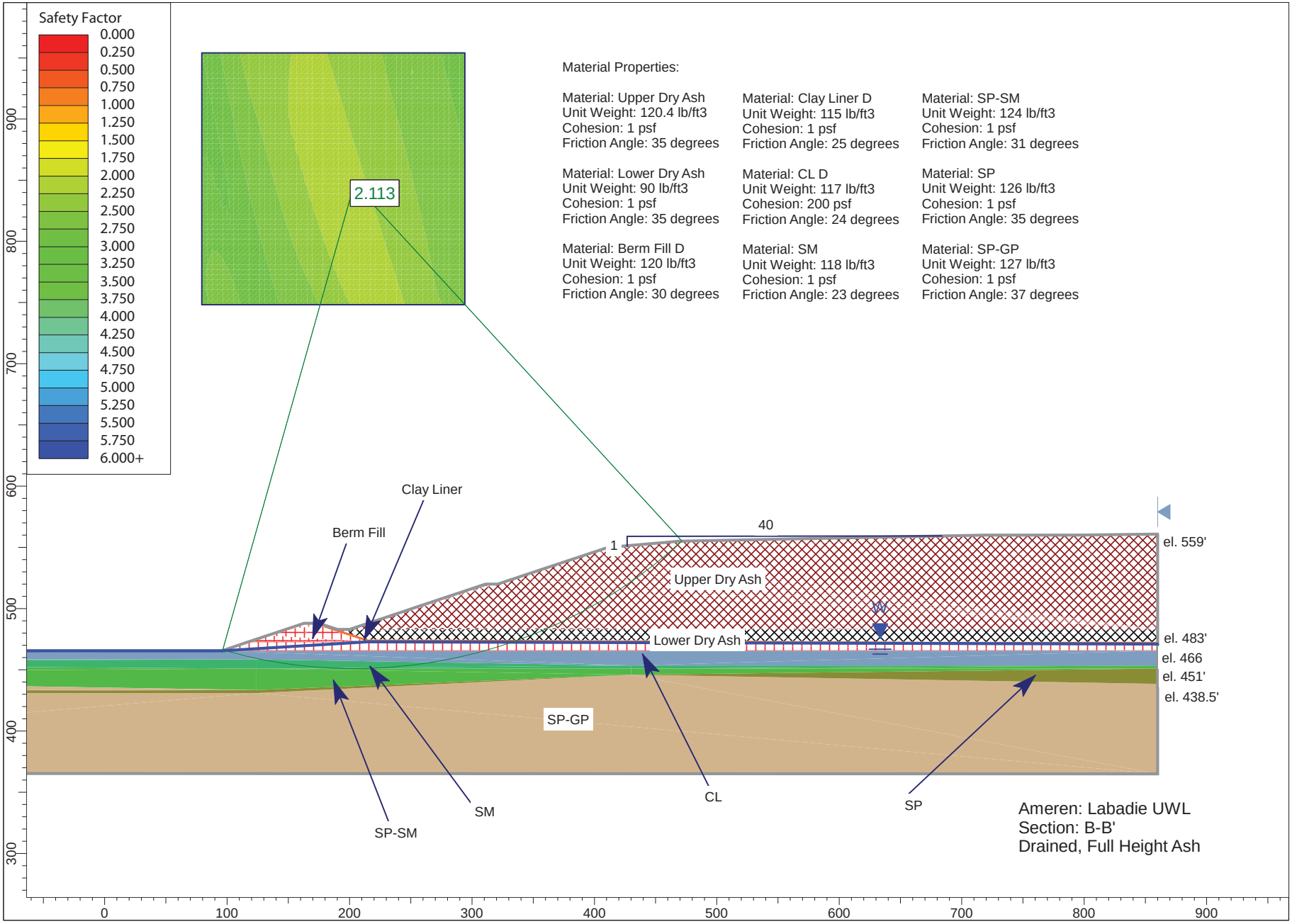
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	456.500
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	455.500
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000

Search Grid

63.910	489.052
214.620	489.052
214.620	627.986
63.910	627.986


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
2.113
Material Properties:
Material: Upper Dry Ash
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL D
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Material: SM
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Clay Liner
Berm Fill
40
1
Upper Dry Ash
Lower Dry Ash
el. 559'
el. 483'
el. 466
el. 451'
el. 438.5'
SP-GP
SP-SM
SM
CL
SP
Ameren: Labadie UWL
Section: B-B'
Drained, Full Height Ash
300
400
500
600
700
800
900
0
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: Section BB Full Drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL D
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 200 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table

Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 2.113250
Center: 203.933, 846.926
Radius: 396.052
Left Slip Surface Endpoint: 96.322, 465.774
Right Slip Surface Endpoint: 471.652, 555.064
Resisting Moment=3.08719e+008 lb-ft
Driving Moment=1.46087e+008 lb-ft

Method: spencer
FS: 2.096060
Center: 203.933, 846.926
Radius: 396.052
Left Slip Surface Endpoint: 96.322, 465.774
Right Slip Surface Endpoint: 471.652, 555.064
Resisting Moment=3.06207e+008 lb-ft
Driving Moment=1.46087e+008 lb-ft
Resisting Horizontal Force=720090 lb
Driving Horizontal Force=343545 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 10351
Number of Invalid Surfaces: 18260
Error Codes:
Error Code -103 reported for 18260 surfaces

Method: spencer
Number of Valid Surfaces: 10351
Number of Invalid Surfaces: 18260
Error Codes:
Error Code -103 reported for 18260 surfaces

Error Codes

The following errors were encountered during the computation:

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

List of All Coordinates

Search Grid

79.355	748.175
294.144	748.175
294.144	953.907

79.355 953.907

Material Boundary
-650.000 458.500
124.000 458.500
430.000 453.500
860.010 453.500

Material Boundary
-650.000 456.000
124.000 451.000
430.000 451.000
860.010 453.500

Material Boundary
-650.000 446.000
124.000 433.500
430.000 446.000
860.009 450.998

Material Boundary
-650.000 433.500
124.000 433.500

Material Boundary
-650.000 431.000
124.000 431.000
430.000 446.000
860.008 438.502

Material Boundary
190.000 483.000
214.462 474.846
491.000 474.000
671.000 473.000
860.012 473.000

Material Boundary
175.000 486.000
175.000 488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
200.000 483.000
860.013 482.998

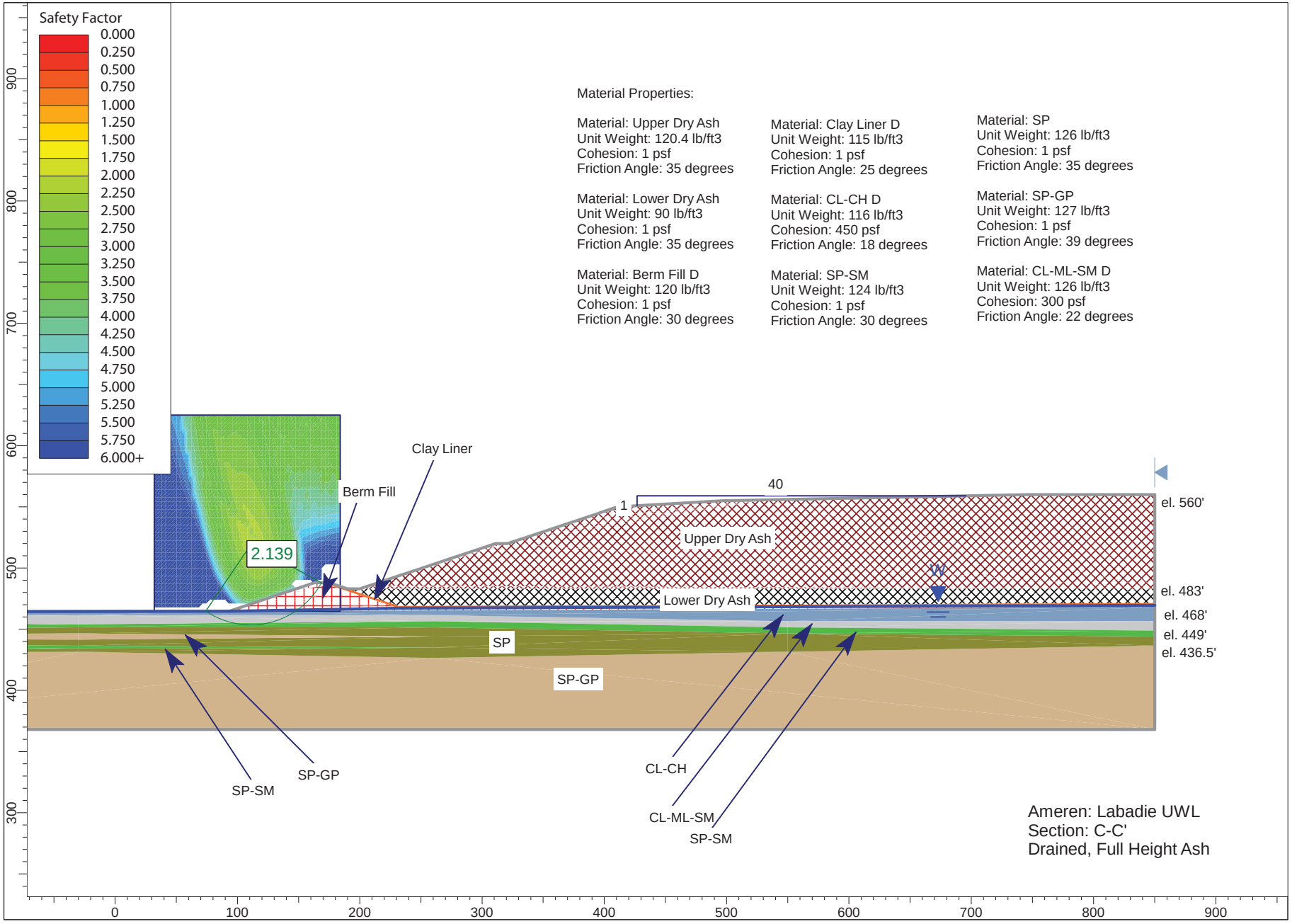
External Boundary

-650.000	365.500
860.000	365.000
860.008	438.502
860.009	450.998
860.010	453.500
860.010	453.500
860.011	465.591
860.011	471.000
860.012	473.000
860.013	482.998
860.021	560.896
792.394	560.000
718.434	560.000
500.172	555.635
468.434	555.000
461.429	554.390
411.000	550.000
401.743	546.914
396.000	545.000
386.646	541.882
381.000	540.000
371.552	536.851
366.000	535.000
356.462	531.821
351.000	530.000
341.374	526.791
336.000	525.000
329.925	522.975
321.000	520.000
315.050	520.000
311.000	520.000
302.030	517.010
296.000	515.000
286.965	511.988
281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972

166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500
-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-CH D
Unit Weight: 116 lb/ft3
Cohesion: 450 psf
Friction Angle: 18 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Material: CL-ML-SM D
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Clay Liner
Berm Fill
2.139
40
1
Upper Dry Ash
Lower Dry Ash
SP
SP-GP
SP-SM
SP-GP
CL-CH
CL-ML-SM
SP-SM
el. 560'
el. 483'
el. 468'
el. 449'
el. 436.5'
Ameren: Labadie UWL
Section: C-C'
Drained, Full Height Ash
900
800
700
600
500
400
300
0
100
200
300
400
500
600
700
800
900

Slide Analysis Information

Document Name

File Name: section CC full drained.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 450 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM D
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table

Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 2.138540
Center: 111.062, 519.105
Radius: 65.861
Left Slip Surface Endpoint: 73.962, 464.688
Right Slip Surface Endpoint: 169.062, 487.902
Resisting Moment=5.2611e+006 lb-ft
Driving Moment=2.46013e+006 lb-ft

Method: spencer
FS: 2.137380
Center: 111.062, 522.312
Radius: 68.772
Left Slip Surface Endpoint: 73.527, 464.687
Right Slip Surface Endpoint: 170.621, 487.927
Resisting Moment=5.57806e+006 lb-ft
Driving Moment=2.60976e+006 lb-ft
Resisting Horizontal Force=72842 lb
Driving Horizontal Force=34080 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 7023
Number of Invalid Surfaces: 21588
Error Codes:
Error Code -103 reported for 20503 surfaces
Error Code -107 reported for 53 surfaces
Error Code -112 reported for 1032 surfaces

Method: spencer
Number of Valid Surfaces: 6801
Number of Invalid Surfaces: 21810
Error Codes:
Error Code -103 reported for 20503 surfaces
Error Code -107 reported for 53 surfaces
Error Code -108 reported for 163 surfaces
Error Code -111 reported for 17 surfaces
Error Code -112 reported for 1074 surfaces

Error Codes

The following errors were encountered during the computation:

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

-107 = Total driving moment or

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

32.043	464.576
184.003	464.576
184.003	624.954
32.043	624.954

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary

190.000	483.000
231.496	469.168
540.000	470.000
740.000	471.000
850.000	471.550

Material Boundary

200.000	483.000
850.000	483.098

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary

175.000	486.000
231.496	467.168
231.496	469.168

Material Boundary

231.496	467.168
850.000	469.550

Material Boundary

-330.000	461.500
-30.000	461.500
260.000	461.500
550.000	456.500
850.000	456.500

Material Boundary

-330.000	456.500
-30.000	454.000
260.000	456.500
550.000	451.500
850.000	449.000

Material Boundary

-330.000	449.000
-30.000	451.500
260.000	451.500
550.000	446.500
850.000	444.000

Material Boundary

-330.000	444.000
-30.000	446.500
260.000	444.000
-30.000	441.500
-330.000	444.000

Material Boundary

-330.000	431.500
-30.000	434.000
260.000	435.000
-30.000	436.500
-330.000	439.000

Material Boundary

-330.000	429.000
-30.000	431.500
260.000	426.500
550.000	431.500
850.000	436.500

External Boundary

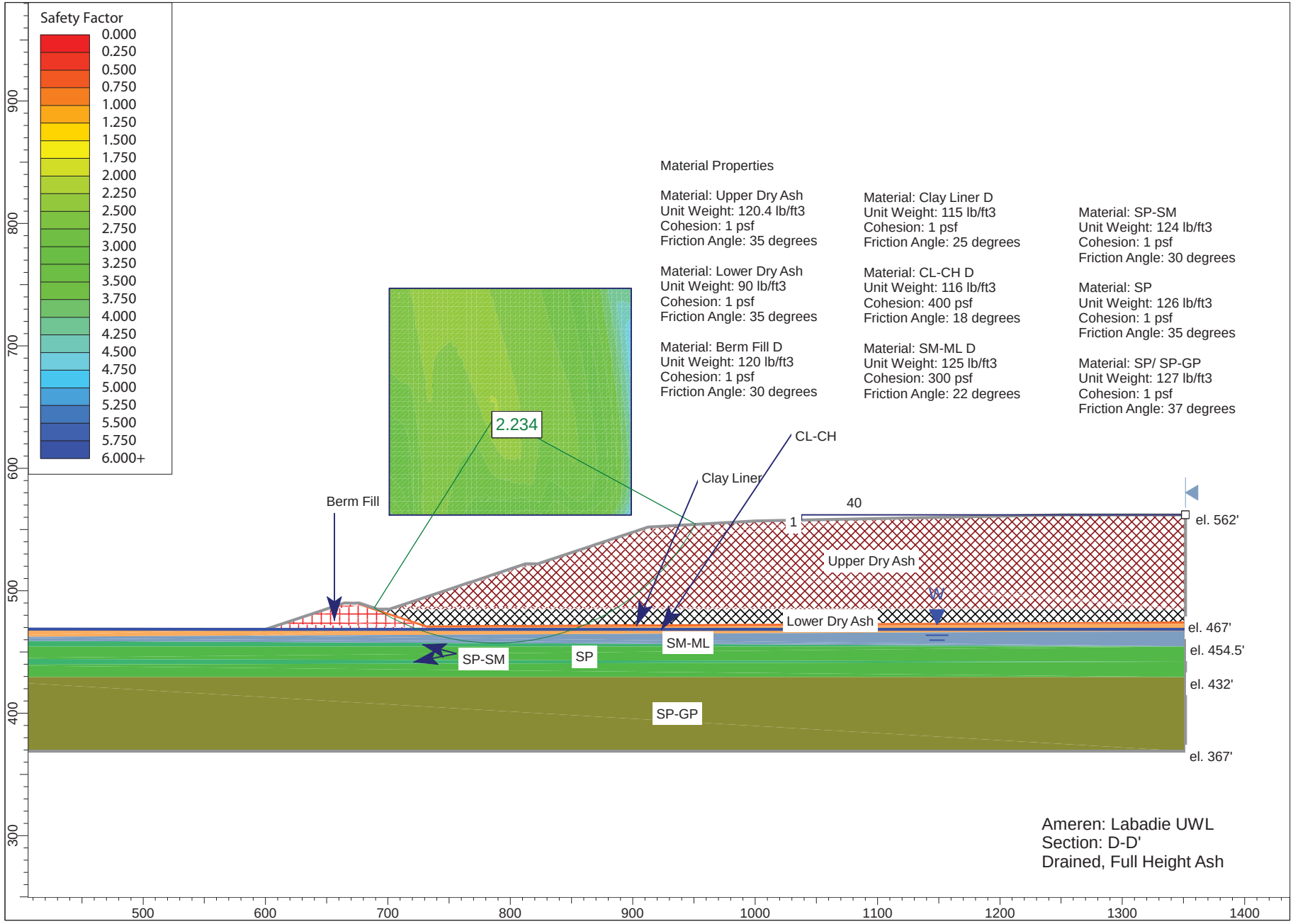
850.000	560.000
746.465	560.000
531.296	555.697
496.414	555.000
428.162	551.003
411.000	550.000
410.785	549.928
396.000	545.000
394.686	544.562
381.000	540.000
378.604	539.201
366.000	535.000
357.068	532.023

351.000	530.000
337.385	525.462
336.000	525.000
321.299	520.100
321.000	520.000
316.824	520.000
311.000	520.000
310.590	519.863
296.000	515.000
294.508	514.503
281.000	510.000
278.441	509.147
266.000	505.000
256.165	501.722
251.000	500.000
249.169	499.390
236.000	495.000
234.321	494.440
221.000	490.000
207.609	485.536
206.000	485.000
205.359	484.786
200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
-330.000	368.000
850.000	368.000
850.000	436.500
850.000	444.000
850.000	449.000
850.000	456.500

850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties
Material: Upper Dry Ash
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-CH D
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 18 degrees
Material: SM-ML D
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: SP
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: SP/ SP-GP
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
2.234
CL-CH
Clay Liner
Berm Fill
40
1
el. 562'
Upper Dry Ash
WL
Lower Dry Ash
el. 467'
SM-ML
el. 454.5'
SP-SM
SP
el. 432'
SP-GP
el. 367'
Ameren: Labadie UWL
Section: D-D'
Drained, Full Height Ash
900
800
700
600
500
400
300
500
600
700
800
900
1000
1100
1200
1300
1400

Slide Analysis Information

Document Name

File Name: Section DD Full Drained 10192012.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH D
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 400 psf
Friction Angle: 18 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 22 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table

Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 2.233920
Center: 788.082, 643.343
Radius: 186.143
Left Slip Surface Endpoint: 688.701, 485.949
Right Slip Surface Endpoint: 951.518, 554.247
Resisting Moment=1.31086e+008 lb-ft
Driving Moment=5.86799e+007 lb-ft

Method: spencer
FS: 2.204720
Center: 788.082, 643.343
Radius: 186.143
Left Slip Surface Endpoint: 688.701, 485.949
Right Slip Surface Endpoint: 951.518, 554.247
Resisting Moment=1.29373e+008 lb-ft
Driving Moment=5.86799e+007 lb-ft
Resisting Horizontal Force=620281 lb
Driving Horizontal Force=281342 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 10521
Number of Invalid Surfaces: 18090
Error Codes:
Error Code -103 reported for 18090 surfaces

Method: spencer
Number of Valid Surfaces: 10512
Number of Invalid Surfaces: 18099
Error Codes:
Error Code -103 reported for 18090 surfaces
Error Code -111 reported for 9 surfaces

Error Codes

The following errors were encountered during the computation:

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

-111 = safety factor equation did not converge

List of All Coordinates

Search Grid

701.058 561.888
898.840 561.888
898.840 747.012
701.058 747.012

Material Boundary
691.524 485.008
731.239 471.770
966.524 473.008
1151.524 474.008
1351.524 475.008

Material Boundary
676.524 488.008
676.524 490.008

Material Boundary
676.524 488.008
731.239 469.770
731.239 471.770

Material Boundary
731.239 469.770
1351.524 473.008

Material Boundary
701.524 485.008
1351.524 484.949

Material Boundary
89.000 459.500
280.000 457.000
320.000 462.000
586.149 463.291
1351.524 467.002

Material Boundary
1351.524 454.500
320.000 459.500
280.000 457.000
320.000 454.500
1351.524 454.500

Material Boundary
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 432.000
89.000 432.000

Material Boundary
0.000 459.500
89.000 459.500

Material Boundary

0.000	454.500
280.000	457.000

Material Boundary

320.000	462.000
1351.524	454.500

Material Boundary

600.000	468.500
731.239	469.770

Material Boundary

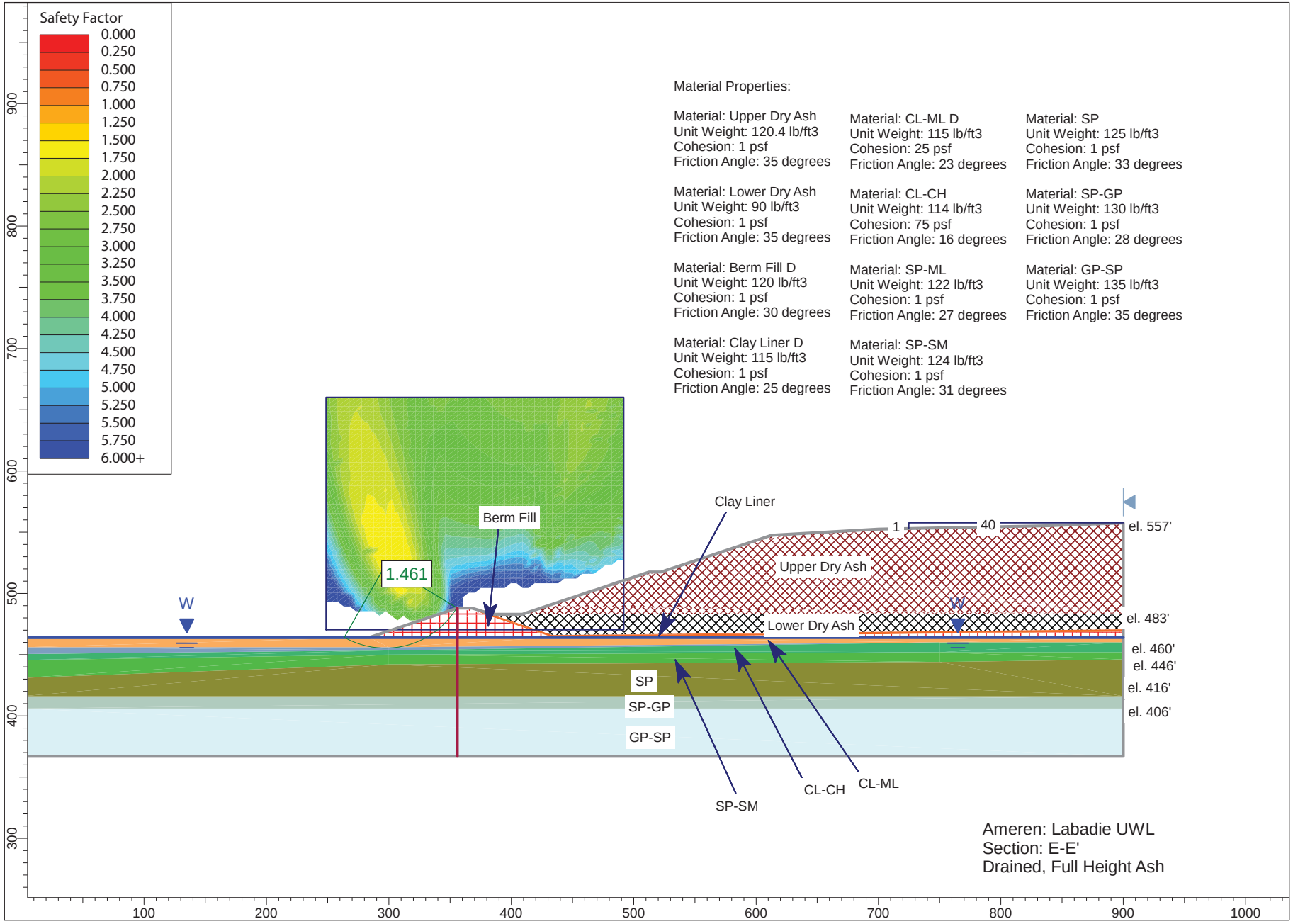
280.000	442.000
330.000	444.500
1351.524	441.961
330.000	439.500
280.000	442.000

External Boundary

-0.000	469.008
0.000	459.500
0.000	454.500
0.000	432.000
-0.000	369.008
1351.524	369.008
1351.524	429.500
1351.524	441.961
1351.524	454.500
1351.524	467.002
1351.524	473.008
1351.524	475.008
1351.524	484.949
1351.524	562.008
1250.221	562.008
1135.274	559.709
1000.182	557.008
935.839	553.357
912.524	552.008
900.658	548.053
897.524	547.008
884.510	542.670
882.524	542.008
868.376	537.292
867.524	537.008
866.146	536.549
852.524	532.008
843.872	529.124
837.524	527.008
827.732	523.744
822.524	522.008
815.418	522.008
812.524	522.008
800.863	518.121
797.524	517.008
784.760	512.753
782.524	512.008

768.670	507.390
767.524	507.008
765.715	506.405
752.524	502.008
744.442	499.314
737.524	497.008
729.376	494.292
722.524	492.008
714.376	489.292
707.524	487.008
704.265	485.922
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table	
-0.000	469.008
600.000	468.500
1351.524	468.500


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Material Properties:
Material: Upper Dry Ash
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Lower Dry Ash
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Material: Berm Fill D
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Material: Clay Liner D
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Material: CL-ML D
Unit Weight: 115 lb/ft3
Cohesion: 25 psf
Friction Angle: 23 degrees
Material: CL-CH
Unit Weight: 114 lb/ft3
Cohesion: 75 psf
Friction Angle: 16 degrees
Material: SP-ML
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Material: SP-SM
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Material: SP
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Material: SP-GP
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Material: GP-SP
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Clay Liner
Berm Fill
1.461
1
40
el. 557'
Upper Dry Ash
W
W
Lower Dry Ash
el. 483'
el. 460'
el. 446'
el. 416'
el. 406'
SP
SP-GP
GP-SP
SP-SM
CL-CH
CL-ML
Ameren: Labadie UWL
Section: E-E'
Drained, Full Height Ash
300
400
500
600
700
800
900
100
200
300
400
500
600
700
800
900
1000

Slide Analysis Information

Document Name

File Name: Section EE Full Drained 7292013 increased ash.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 120.4 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill D
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Liner D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 1 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML D
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 25 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 75 psf
Friction Angle: 16 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.461230
Center: 297.304, 523.511
Radius: 68.431
Left Slip Surface Endpoint: 263.522, 464.000
Right Slip Surface Endpoint: 355.800, 488.000
Resisting Moment=3.01881e+006 lb-ft
Driving Moment=2.06594e+006 lb-ft
Resisting Horizontal Force=39146.2 lb
Driving Horizontal Force=26789.9 lb

Method: gle/morgenstern-price
FS: 1.449120
Center: 297.304, 523.511
Radius: 68.431
Left Slip Surface Endpoint: 263.522, 464.000
Right Slip Surface Endpoint: 355.800, 488.000
Resisting Moment=2.99378e+006 lb-ft
Driving Moment=2.06594e+006 lb-ft
Resisting Horizontal Force=38975.9 lb
Driving Horizontal Force=26896.3 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 19370
Number of Invalid Surfaces: 9241
Error Codes:
Error Code -101 reported for 243 surfaces
Error Code -103 reported for 5972 surfaces
Error Code -107 reported for 278 surfaces
Error Code -108 reported for 56 surfaces
Error Code -111 reported for 81 surfaces
Error Code -112 reported for 2611 surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 19427
Number of Invalid Surfaces: 9184
Error Codes:
Error Code -101 reported for 243 surfaces
Error Code -103 reported for 5972 surfaces
Error Code -107 reported for 278 surfaces
Error Code -108 reported for 29 surfaces
Error Code -111 reported for 65 surfaces
Error Code -112 reported for 2597 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero)
surface / slope intersections.

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

248.639	470.329
491.964	470.329
491.964	660.264
248.639	660.264

Material Boundary

384.014	483.011
433.806	466.000

900.000 470.650

Material Boundary
367.800 488.000
376.524 483.508

Material Boundary
376.524 483.508
433.806 464.000
433.806 466.000

Material Boundary
409.030 483.010
900.000 483.000

Material Boundary
433.806 464.000
900.000 468.650

Material Boundary
283.800 464.000
433.806 464.000
900.000 464.000

Material Boundary
0.000 456.000
300.000 456.000
750.000 460.000
900.000 460.000

Material Boundary
0.000 450.500
300.000 453.500
750.000 460.000

Material Boundary
0.000 445.500
300.000 450.000
750.000 452.000
900.000 452.000

Material Boundary
0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

External Boundary

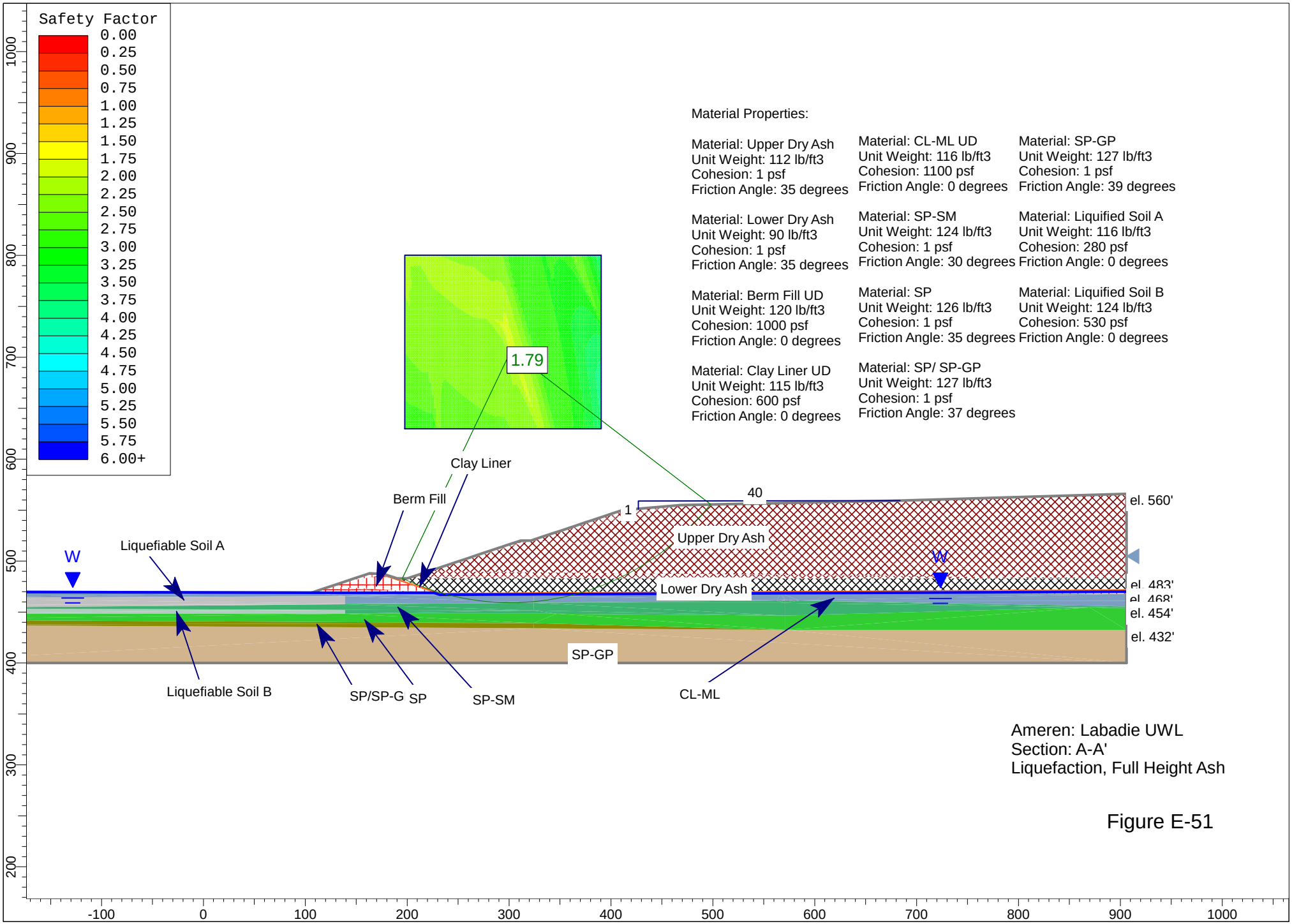
0.000	464.000
0.000	456.000
0.000	450.500
0.000	445.500
0.000	431.000
0.000	416.000
0.000	406.000
0.000	367.000
900.000	367.000
900.000	406.000
900.000	416.000
900.000	446.000
900.000	452.000
900.000	460.000
900.000	464.000
900.000	468.650
900.000	470.650
900.000	483.000
900.000	557.508
835.274	555.209
700.182	552.508
635.839	548.857
612.524	547.508
600.658	543.553
597.524	542.508
584.510	538.170
582.524	537.508
568.376	532.792
567.524	532.508
566.146	532.049
552.524	527.508
543.872	524.624
537.524	522.508
527.732	519.244
522.524	517.508
515.418	517.508
512.524	517.508
500.863	513.621
497.524	512.508
484.760	508.253
482.524	507.508
468.670	502.890
467.524	502.508
465.715	501.905
452.524	497.508
444.442	494.814
437.524	492.508
429.376	489.792
422.524	487.508
414.376	484.792
409.030	483.010
384.014	483.011
380.635	484.137
367.800	488.000
355.800	488.000
283.800	464.000

Water Table

-0.000	464.000
433.805	464.000
900.000	464.000

Focus/Block Search Line

355.800	367.000
355.800	488.000



Ameren: Labadie UWL
Section: A-A'
Liquefaction, Full Height Ash

Figure E-51

Slide Analysis Information

Document Name

File Name: Section AA Full Liquefaction trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquified Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 280 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquified Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 530 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.793830
Center: 301.709, 706.526
Radius: 247.630
Left Slip Surface Endpoint: 195.141, 483.000
Right Slip Surface Endpoint: 498.023, 555.592
Resisting Moment=1.50128e+008 lb-ft
Driving Moment=8.36912e+007 lb-ft

Method: spencer
FS: 1.760750
Center: 301.709, 706.526
Radius: 247.630
Left Slip Surface Endpoint: 195.141, 483.000
Right Slip Surface Endpoint: 498.023, 555.592
Resisting Moment=1.47359e+008 lb-ft
Driving Moment=8.36912e+007 lb-ft
Resisting Horizontal Force=534205 lb
Driving Horizontal Force=303397 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 33047
Number of Invalid Surfaces: 79164
Error Codes:
Error Code -103 reported for 79164 surfaces

Method: spencer
Number of Valid Surfaces: 33047
Number of Invalid Surfaces: 79164
Error Codes:
Error Code -103 reported for 79164 surfaces

Error Codes

The following errors were encountered during the computation:

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

List of All Coordinates

Search Grid

197.646	629.813
390.355	629.813
390.355	800.286
197.646	800.286

Material Boundary

-310.816	456.500
139.040	458.315
324.184	459.061
562.692	461.315
571.184	461.561
584.957	461.312
906.000	455.500

Material Boundary

346.669	448.252
571.184	446.561
869.969	454.538
906.000	455.500

Material Boundary

-310.816	442.454
323.787	439.064
571.184	432.561

Material Boundary

-310.816	437.454
324.184	434.061

Material Boundary

324.184	434.061
571.184	432.561

Material Boundary

190.000	483.000
232.000	469.000
566.246	468.488
906.000	467.967

Material Boundary

106.184	469.061
225.991	469.003
232.000	469.000

Material Boundary
200.000 483.000
906.000 483.000

Material Boundary
-310.816 448.252
139.066 448.252
346.669 448.252

Material Boundary
571.184 432.561
906.000 432.561

Material Boundary
232.000 469.000
906.000 472.524

Material Boundary
175.000 488.000
175.000 486.000
225.991 469.003
232.000 467.000
566.246 468.488
906.000 470.000

Material Boundary
-310.816 463.753
139.040 465.524
324.184 466.253
562.692 461.315
571.184 461.315
584.957 461.312
906.000 461.253

Material Boundary
-310.816 453.702
139.066 452.141
323.787 451.500
571.184 446.561

Material Boundary
-310.816 453.708
139.040 457.457
324.184 459.000
571.184 459.000
869.969 454.538
906.000 454.000

Material Boundary
139.040 457.457
139.040 458.315
139.040 465.524

Material Boundary
139.066 448.252

139.066	452.141

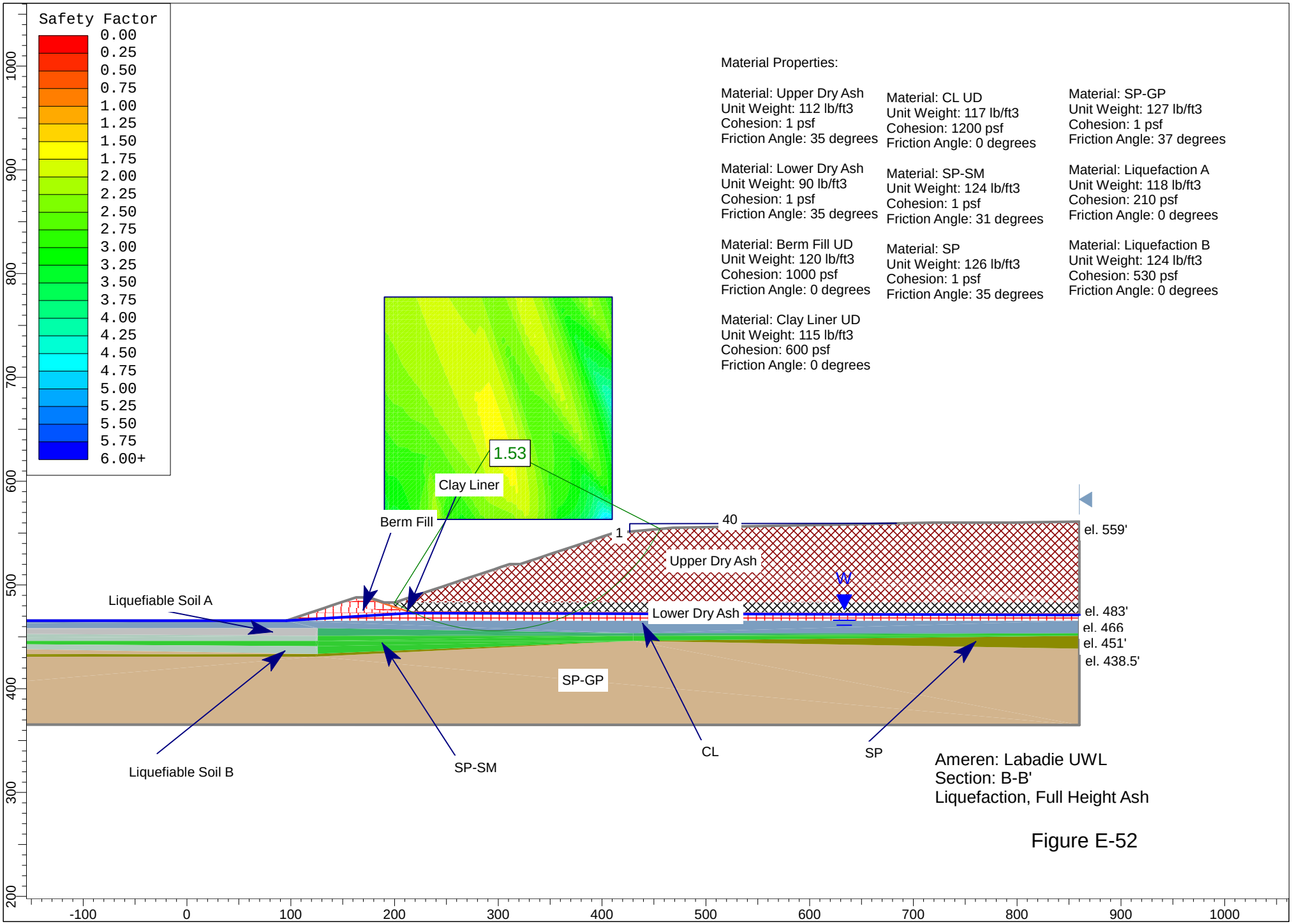
External Boundary

906.000	566.071
683.709	559.305
468.434	555.000
440.357	552.556
411.000	550.000
398.805	545.935
396.000	545.000
391.110	543.370
381.000	540.000
375.110	538.037
366.000	535.000
359.899	532.966
351.000	530.000
344.696	527.899
336.000	525.000
321.203	520.068
321.000	520.000
320.919	520.000
311.000	520.000
310.751	519.917
296.000	515.000
294.928	514.643
281.000	510.000
271.864	506.955
266.000	505.000
256.681	501.894
251.000	500.000
241.544	496.848
236.000	495.000
226.527	491.842
221.000	490.000
211.527	486.842
206.000	485.000
203.789	484.263
200.000	483.000
196.315	483.000
190.000	483.000
187.789	483.737
184.000	485.000
178.316	486.895
175.000	488.000
170.579	487.765
169.000	487.681
166.789	487.798
163.000	488.000
157.316	486.105
154.000	485.000
148.473	483.158
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061

-310.816	469.954
-310.816	463.753
-310.816	456.500
-310.816	453.708
-310.816	453.702
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	454.000
906.000	455.500
906.000	461.253
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

Water Table

-310.816	469.954
106.184	469.061
225.991	469.003
232.000	467.000
906.000	470.000



Ameren: Labadie UWL
Section: B-B'
Liquefaction, Full Height Ash

Figure E-52

Slide Analysis Information

Document Name

File Name: Section BB Full Liquefaction trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL UD
Strength Type: Mohr-Coulomb
Unit Weight: 117 lb/ft3
Cohesion: 1200 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 1 psf
Friction Angle: 23 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquefaction A
Strength Type: Mohr-Coulomb
Unit Weight: 118 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefaction B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 530 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.532240
Center: 295.485, 636.018
Radius: 180.396
Left Slip Surface Endpoint: 199.944, 483.000
Right Slip Surface Endpoint: 456.120, 553.928
Resisting Moment=8.16863e+007 lb-ft
Driving Moment=5.33118e+007 lb-ft

Method: spencer
FS: 1.505000
Center: 295.485, 636.018
Radius: 180.396
Left Slip Surface Endpoint: 199.944, 483.000
Right Slip Surface Endpoint: 456.120, 553.928
Resisting Moment=8.02343e+007 lb-ft
Driving Moment=5.33118e+007 lb-ft
Resisting Horizontal Force=380943 lb
Driving Horizontal Force=253118 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 10920
Number of Invalid Surfaces: 17691
Error Codes:
Error Code -103 reported for 17691 surfaces

Method: spencer
Number of Valid Surfaces: 10920
Number of Invalid Surfaces: 17691
Error Codes:
Error Code -103 reported for 17691 surfaces

Error Codes

The following errors were encountered during the computation:

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

List of All Coordinates

Search Grid

190.079	563.188
409.674	563.188
409.674	777.395
190.079	777.395

Material Boundary

-650.000	458.500
124.000	458.500
125.993	458.467
430.000	453.500
860.010	453.500

Material Boundary

-650.000	456.000
124.000	451.000
125.993	451.000
430.000	451.000
860.010	453.500

Material Boundary

-650.000	446.000
124.000	433.500

Material Boundary

-650.000	433.500
124.000	433.500

Material Boundary

-650.000	431.000
124.000	431.000
430.000	446.000
860.008	438.502

Material Boundary

190.000	483.000
214.462	474.846
491.000	474.000
671.000	473.000
860.012	473.000

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary
175.000 486.000
214.462 472.846
214.462 474.846

Material Boundary
214.462 472.846
860.011 471.000

Material Boundary
95.732 465.577
860.011 465.591

Material Boundary
200.000 483.000
860.013 482.998

Material Boundary
-650.000 446.000
124.000 446.000
125.993 446.000
430.000 446.000
126.006 441.033
124.000 441.000
-650.000 446.000

Material Boundary
124.000 433.500
126.006 433.582
430.000 446.000

Material Boundary
430.000 446.000
860.009 450.998

Material Boundary
125.993 446.000
125.993 451.000
125.993 458.467

Material Boundary
126.006 433.582
126.006 441.033

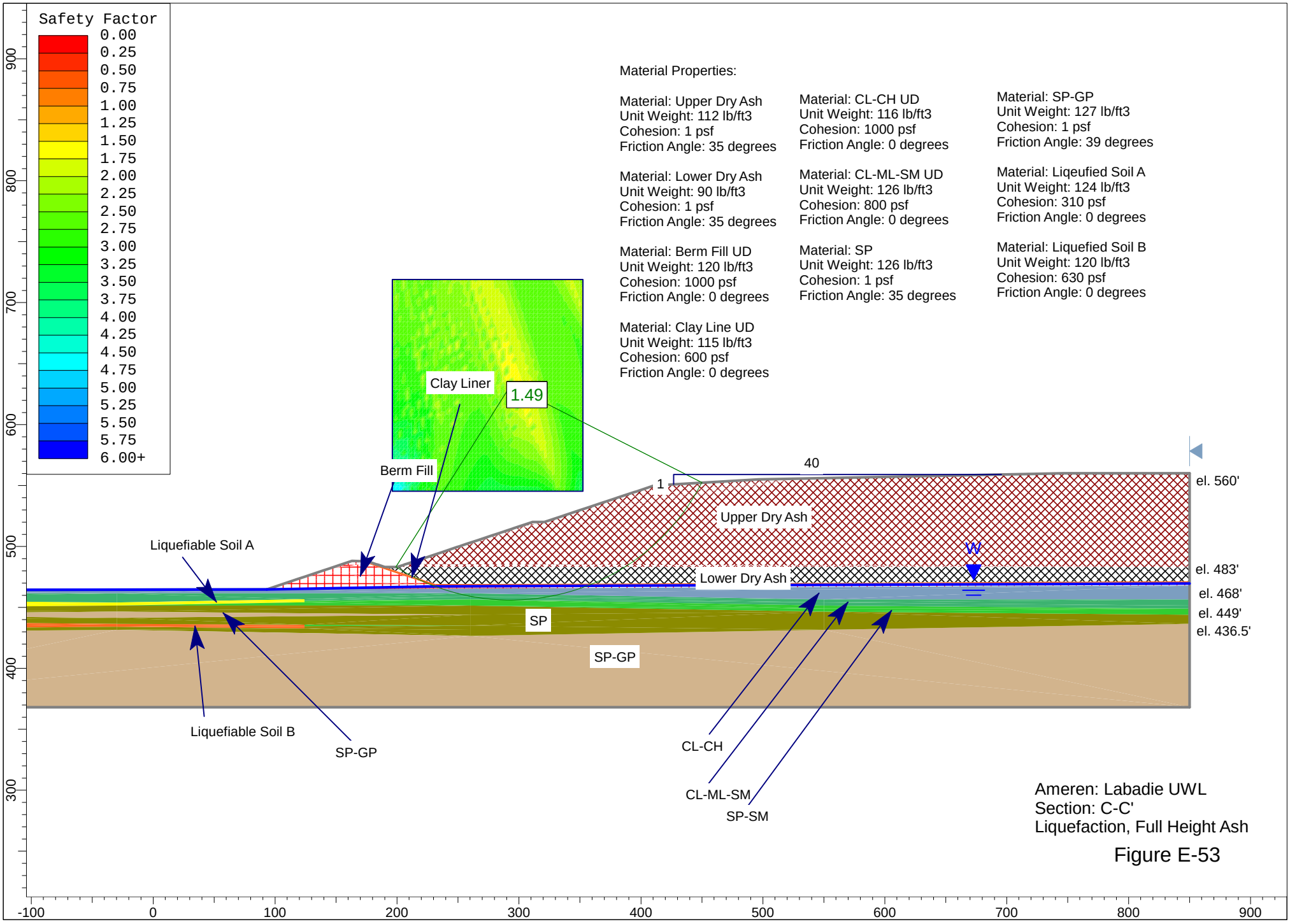
External Boundary
-650.000 365.500
860.000 365.000
860.008 438.502
860.009 450.998
860.010 453.500
860.010 453.500
860.011 465.591
860.011 471.000
860.012 473.000
860.013 482.998

860.021	560.896
792.394	560.000
718.434	560.000
500.172	555.635
468.434	555.000
461.429	554.390
411.000	550.000
401.743	546.914
396.000	545.000
386.646	541.882
381.000	540.000
371.552	536.851
366.000	535.000
356.462	531.821
351.000	530.000
341.374	526.791
336.000	525.000
329.925	522.975
321.000	520.000
315.050	520.000
311.000	520.000
302.030	517.010
296.000	515.000
286.965	511.988
281.000	510.000
271.903	506.968
266.000	505.000
256.842	501.947
251.000	500.000
245.235	498.078
236.000	495.000
230.209	493.070
221.000	490.000
215.184	488.061
206.000	485.000
203.665	484.222
200.000	483.000
196.100	483.000
190.000	483.000
187.654	483.782
184.000	485.000
180.474	486.175
175.000	488.000
170.055	487.977
169.000	487.972
166.542	487.983
163.000	488.000
159.335	486.778
154.000	485.000
147.892	482.964
139.000	480.000
132.892	477.964
124.000	475.000
117.892	472.964
95.732	465.577
-650.000	465.500

-650.000	458.500
-650.000	456.000
-650.000	446.000
-650.000	433.500
-650.000	431.000

Water Table

-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000



Ameren: Labadie UWL
Section: C-C'
Liquefaction, Full Height Ash

Figure E-53

Slide Analysis Information

Document Name

File Name: section CC full liquefaction trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: 4

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML-SM UD
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 800 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 39 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liqeufied Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 310 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 630 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.489100
Center: 293.035, 632.077
Radius: 176.242
Left Slip Surface Endpoint: 199.028, 483.000
Right Slip Surface Endpoint: 450.184, 552.293
Resisting Moment=7.50122e+007 lb-ft
Driving Moment=5.03741e+007 lb-ft

Method: spencer
FS: 1.457850
Center: 293.035, 632.077
Radius: 176.242
Left Slip Surface Endpoint: 199.028, 483.000
Right Slip Surface Endpoint: 450.184, 552.293
Resisting Moment=7.34381e+007 lb-ft
Driving Moment=5.03741e+007 lb-ft
Resisting Horizontal Force=353627 lb
Driving Horizontal Force=242567 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 9261
Number of Invalid Surfaces: 19350
Error Codes:
Error Code -103 reported for 19350 surfaces

Method: spencer
Number of Valid Surfaces: 9252
Number of Invalid Surfaces: 19359
Error Codes:
Error Code -103 reported for 19350 surfaces
Error Code -108 reported for 1 surface
Error Code -111 reported for 8 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

-111 = safety factor equation did not converge

List of All Coordinates

Search Grid

196.036	545.266
352.486	545.266
352.486	718.889
196.036	718.889

Material Boundary

93.161	464.720
850.000	468.000

Material Boundary

190.000	483.000
231.496	469.168
540.000	470.000
740.000	471.000
850.000	471.550

Material Boundary

200.000	483.000
850.000	483.098

Material Boundary

175.000	486.000
175.000	488.000

Material Boundary

175.000	486.000
231.496	467.168
231.496	469.168

Material Boundary

231.496	467.168
850.000	469.550

Material Boundary

-330.000	461.500
-30.000	461.500
260.000	461.500
550.000	456.500
850.000	456.500

Material Boundary

-330.000	456.500
-30.000	454.000
124.000	455.328
260.000	456.500
550.000	451.500
850.000	449.000

Material Boundary

-330.000	449.000
-30.000	451.500
260.000	451.500
550.000	446.500
850.000	444.000

Material Boundary

-330.000	444.000
-30.000	446.500
260.000	444.000
-30.000	441.500
-330.000	444.000

Material Boundary

-330.000	431.500
-30.000	434.000
124.060	434.531
260.000	435.000
124.060	435.703
-30.000	436.500
-330.000	439.000

Material Boundary

-330.000	429.000
-30.000	431.500
260.000	426.500
550.000	431.500
850.000	436.500

Material Boundary

-30.000	454.000
124.000	456.655
260.000	459.000
550.000	454.000
850.000	451.500

Material Boundary

-30.000	451.500
124.000	454.155
260.000	456.500

550.000 449.000
850.000 449.000

Material Boundary
-30.000 434.000
124.060 432.672
260.000 431.500
550.000 431.500
260.000 435.000

Material Boundary
124.000 454.155
124.000 455.328
124.000 456.655

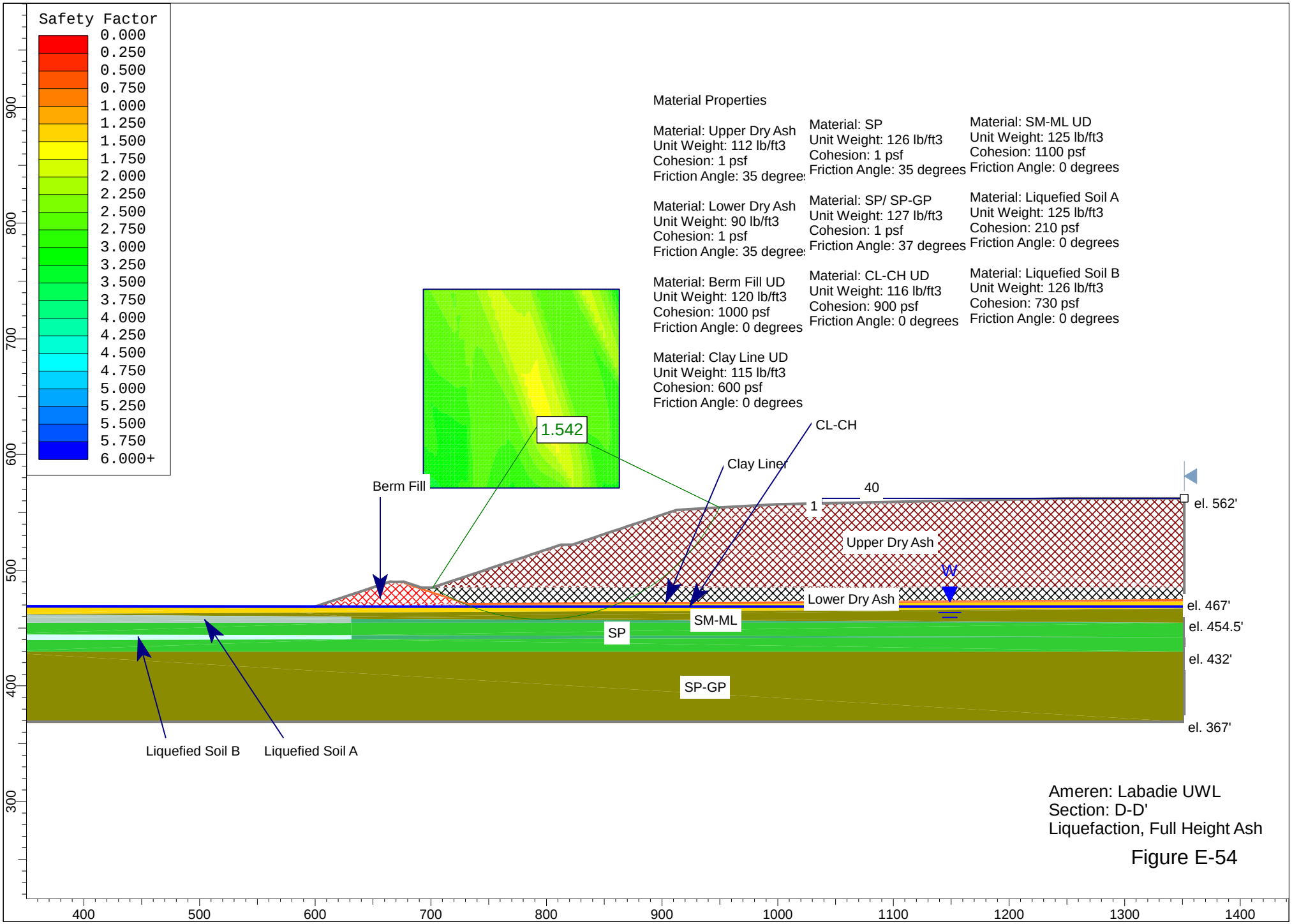
Material Boundary
124.060 432.672
124.060 434.531
124.060 435.703

External Boundary
850.000 560.000
746.465 560.000
531.296 555.697
496.414 555.000
428.162 551.003
411.000 550.000
410.785 549.928
396.000 545.000
394.686 544.562
381.000 540.000
378.604 539.201
366.000 535.000
357.068 532.023
351.000 530.000
337.385 525.462
336.000 525.000
321.299 520.100
321.000 520.000
316.824 520.000
311.000 520.000
310.590 519.863
296.000 515.000
294.508 514.503
281.000 510.000
278.441 509.147
266.000 505.000
256.165 501.722
251.000 500.000
249.169 499.390
236.000 495.000
234.321 494.440
221.000 490.000
207.609 485.536
206.000 485.000
205.359 484.786

200.000	483.000
198.942	483.000
190.000	483.000
189.375	483.208
184.000	485.000
183.073	485.309
175.000	488.000
174.160	487.986
172.299	487.955
169.000	487.901
168.082	487.916
163.000	488.000
157.036	486.012
154.000	485.000
144.060	481.687
139.000	480.000
129.060	476.687
124.000	475.000
118.940	473.313
93.161	464.720
-330.000	464.000
-330.000	461.500
-330.000	456.500
-330.000	449.000
-330.000	444.000
-330.000	439.000
-330.000	431.500
-330.000	429.000
-330.000	368.000
850.000	368.000
850.000	436.500
850.000	444.000
850.000	449.000
850.000	451.500
850.000	456.500
850.000	468.000
850.000	469.550
850.000	471.550
850.000	483.098

Water Table

-330.000	464.000
93.161	464.720
231.496	467.168
850.000	469.550



Ameren: Labadie UWL
Section: D-D'
Liquefaction, Full Height Ash

Figure E-54

Slide Analysis Information

Document Name

File Name: Section DD Full liquefaction10192012 trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
Bishop simplified
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP/ SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 127 lb/ft3
Cohesion: 1 psf
Friction Angle: 37 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH UD
Strength Type: Mohr-Coulomb
Unit Weight: 116 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML UD
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Liquefied Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 210 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 126 lb/ft3
Cohesion: 730 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.542230
Center: 795.258, 629.507
Radius: 172.083
Left Slip Surface Endpoint: 701.713, 485.071
Right Slip Surface Endpoint: 949.968, 554.159
Resisting Moment=7.53614e+007 lb-ft
Driving Moment=4.88651e+007 lb-ft

Method: spencer
FS: 1.505590
Center: 795.258, 629.507
Radius: 172.083
Left Slip Surface Endpoint: 701.713, 485.071
Right Slip Surface Endpoint: 949.968, 554.159
Resisting Moment=7.35709e+007 lb-ft
Driving Moment=4.88651e+007 lb-ft
Resisting Horizontal Force=364772 lb
Driving Horizontal Force=242278 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 9730
Number of Invalid Surfaces: 18881
Error Codes:
Error Code -103 reported for 18881 surfaces

Method: spencer
Number of Valid Surfaces: 9730
Number of Invalid Surfaces: 18881
Error Codes:
Error Code -103 reported for 18881 surfaces

Error Codes

The following errors were encountered during the computation:

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

List of All Coordinates

Search Grid

693.479	571.138
863.111	571.138
863.111	742.812
693.479	742.812

Material Boundary

691.524	485.008
731.239	471.770
966.524	473.008
1151.524	474.008
1351.524	475.008

Material Boundary

676.524	488.008
676.524	490.008

Material Boundary

676.524	488.008
731.239	469.770
731.239	471.770

Material Boundary

600.000	468.500
731.239	469.770
1351.524	473.008

Material Boundary

701.524	485.008
1351.524	484.949

Material Boundary

0.000	459.500
89.000	459.500
280.000	457.000
320.000	462.000
586.149	463.291
1351.524	467.002

Material Boundary

1351.524	454.500
630.976	457.993
320.000	459.500
280.000	457.000

320.000 454.500
630.976 454.500
1351.524 454.500

Material Boundary
0.000 432.000
89.000 432.000
280.000 432.000
320.000 429.500
1351.524 429.500

Material Boundary
0.000 454.500
280.000 457.000

Material Boundary
320.000 462.000
630.976 459.739
1351.524 454.500

Material Boundary
280.000 442.000
320.000 444.500
631.373 443.790
1351.524 442.149
631.373 440.300
320.000 439.500
280.000 442.000

Material Boundary
630.976 454.500
630.976 457.993
630.976 459.739

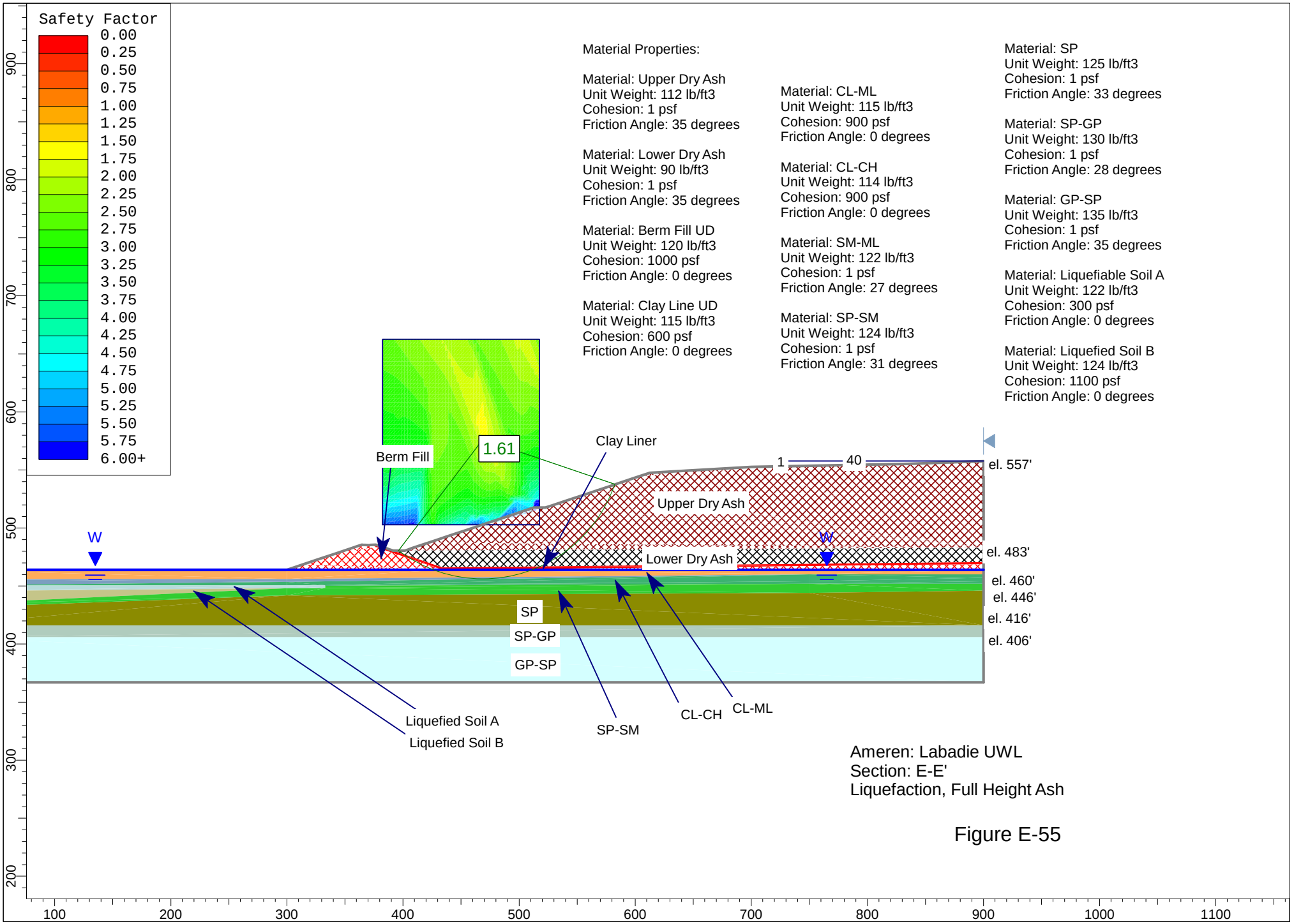
Material Boundary
631.373 440.300
631.373 443.790

External Boundary
-0.000 469.008
0.000 459.500
0.000 454.500
0.000 432.000
-0.000 369.008
1351.524 369.008
1351.524 429.500
1351.524 442.149
1351.524 454.500
1351.524 467.002
1351.524 473.008
1351.524 475.008
1351.524 484.949
1351.524 562.008
1250.221 562.008
1135.274 559.709
1000.182 557.008

935.839	553.357
912.524	552.008
900.658	548.053
897.524	547.008
884.510	542.670
882.524	542.008
868.376	537.292
867.524	537.008
866.146	536.549
852.524	532.008
843.872	529.124
837.524	527.008
827.732	523.744
822.524	522.008
815.418	522.008
812.524	522.008
800.863	518.121
797.524	517.008
784.760	512.753
782.524	512.008
768.670	507.390
767.524	507.008
765.715	506.405
752.524	502.008
744.442	499.314
737.524	497.008
729.376	494.292
722.524	492.008
714.376	489.292
707.524	487.008
704.265	485.922
701.524	485.008
696.092	485.008
691.524	485.008
688.265	486.094
685.524	487.008
680.635	488.637
676.524	490.008
671.846	489.835
670.524	489.787
667.488	489.899
665.657	489.966
664.524	490.008
660.789	488.763
655.524	487.008
643.630	483.043
640.524	482.008
628.630	478.043
625.524	477.008
613.630	473.043
600.000	468.500

Water Table

-0.000	469.008
600.000	468.500
1351.524	468.500



Ameren: Labadie UWL
Section: E-E'
Liquefaction, Full Height Ash

Figure E-55

Slide Analysis Information

Document Name

File Name: Section EE Full Liquefaction 10192012 trial.sli

Project Settings

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

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Spencer

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

Surface Options

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

Material Properties

Material: Upper Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 112 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Lower Dry Ash
Strength Type: Mohr-Coulomb
Unit Weight: 90 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees

Water Surface: Water Table
Custom Hu value: 1

Material: Berm Fill UD
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Clay Line UD
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 600 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-ML
Strength Type: Mohr-Coulomb
Unit Weight: 115 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: CL-CH
Strength Type: Mohr-Coulomb
Unit Weight: 114 lb/ft3
Cohesion: 900 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SM-ML
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 1 psf
Friction Angle: 27 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP-SM
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1 psf
Friction Angle: 31 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: SP
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 1 psf
Friction Angle: 33 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: SP-GP
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft3
Cohesion: 1 psf
Friction Angle: 28 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: GP-SP
Strength Type: Mohr-Coulomb
Unit Weight: 135 lb/ft3
Cohesion: 1 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefiable Soil A
Strength Type: Mohr-Coulomb
Unit Weight: 122 lb/ft3
Cohesion: 300 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Liquefied Soil B
Strength Type: Mohr-Coulomb
Unit Weight: 124 lb/ft3
Cohesion: 1100 psf
Friction Angle: 0 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: spencer
FS: 1.607590
Center: 468.794, 576.286
Radius: 120.274
Left Slip Surface Endpoint: 396.046, 480.508
Right Slip Surface Endpoint: 582.660, 537.553
Resisting Moment=3.21609e+007 lb-ft
Driving Moment=2.00056e+007 lb-ft
Resisting Horizontal Force=223727 lb
Driving Horizontal Force=139169 lb

Method: gle/morgenstern-price
FS: 1.587840
Center: 471.496, 573.090
Radius: 116.536
Left Slip Surface Endpoint: 400.720, 480.508
Right Slip Surface Endpoint: 582.459, 537.486
Resisting Moment=3.00767e+007 lb-ft
Driving Moment=1.89419e+007 lb-ft
Resisting Horizontal Force=214922 lb

Driving Horizontal Force=135355 lb

Valid / Invalid Surfaces

Method: spencer
Number of Valid Surfaces: 10955
Number of Invalid Surfaces: 17656
Error Codes:
Error Code -103 reported for 17335 surfaces
Error Code -107 reported for 20 surfaces
Error Code -108 reported for 41 surfaces
Error Code -111 reported for 28 surfaces
Error Code -112 reported for 232 surfaces

Method: gle/morgenstern-price
Number of Valid Surfaces: 10982
Number of Invalid Surfaces: 17629
Error Codes:
Error Code -103 reported for 17335 surfaces
Error Code -107 reported for 20 surfaces
Error Code -108 reported for 35 surfaces
Error Code -111 reported for 23 surfaces
Error Code -112 reported for 216 surfaces

Error Codes

The following errors were encountered during the computation:

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

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

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

-111 = safety factor equation did not converge

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

List of All Coordinates

Search Grid

382.348	502.783
517.420	502.783
517.420	662.572
382.348	662.572

Material Boundary

391.524	480.508
433.806	466.000
900.000	470.650

Material Boundary

376.524	483.508
376.524	485.508

Material Boundary

376.524	483.508
433.806	464.000
433.806	466.000

Material Boundary

401.524	480.508
900.000	483.000

Material Boundary

433.806	464.000
900.000	468.650

Material Boundary

300.000	464.000
433.806	464.000
900.000	464.000

Material Boundary

0.000	456.000
300.000	456.000
750.000	460.000
900.000	460.000

Material Boundary

0.000	450.500
300.000	453.500
750.000	460.000

Material Boundary

0.000	445.500
300.000	450.000
332.923	450.146
750.000	452.000
900.000	452.000

Material Boundary

0.000 431.000
300.000 442.000
750.000 444.000
900.000 446.000

Material Boundary
0.000 416.000
900.000 416.000

Material Boundary
0.000 406.000
900.000 406.000

Material Boundary
0.000 450.500
300.073 450.500
332.923 450.756
750.000 454.000
900.000 457.000

Material Boundary
750.000 452.000
900.000 454.000

Material Boundary
0.000 445.500
300.000 448.000
332.923 448.293
750.000 452.000

Material Boundary
0.000 434.000
300.000 448.000

Material Boundary
332.923 448.293
332.923 450.146
332.923 450.756

External Boundary
0.000 464.000
0.000 456.000
0.000 450.500
0.000 445.500
0.000 434.000
0.000 431.000
0.000 416.000
0.000 406.000
0.000 367.000
900.000 367.000
900.000 406.000
900.000 416.000
900.000 446.000
900.000 452.000
900.000 454.000

900.000	457.000
900.000	460.000
900.000	464.000
900.000	468.650
900.000	470.650
900.000	483.000
900.000	557.508
835.274	555.209
700.182	552.508
635.839	548.857
612.524	547.508
600.658	543.553
597.524	542.508
584.510	538.170
582.524	537.508
568.376	532.792
567.524	532.508
566.146	532.049
552.524	527.508
543.872	524.624
537.524	522.508
527.732	519.244
522.524	517.508
515.418	517.508
512.524	517.508
500.863	513.621
497.524	512.508
484.760	508.253
482.524	507.508
468.670	502.890
467.524	502.508
465.715	501.905
452.524	497.508
444.442	494.814
437.524	492.508
429.376	489.792
422.524	487.508
414.376	484.792
407.524	482.508
404.265	481.422
401.524	480.508
396.092	480.508
391.524	480.508
388.265	481.594
385.524	482.508
380.635	484.137
376.524	485.508
371.846	485.335
370.524	485.287
367.488	485.399
365.657	485.466
364.524	485.508
360.789	484.263
355.524	482.508
343.630	478.543

340.524	477.508
328.630	473.543
325.524	472.508
313.630	468.543
300.000	464.000

Water Table

0.000	464.000
433.806	464.000
900.000	464.000

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Appendix F

RESULTS OF SETTLEMENT ANALYSES
Revised August 2013

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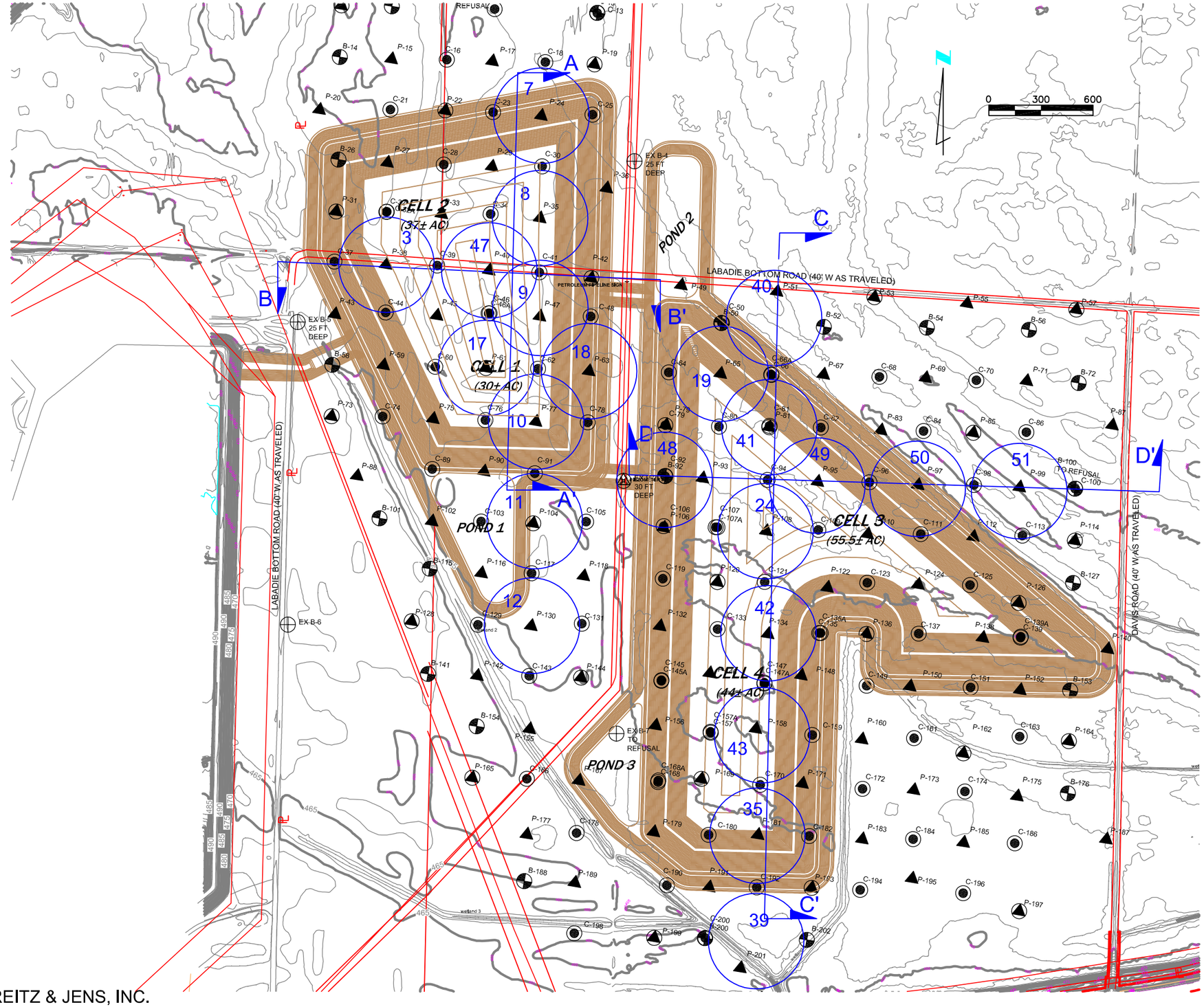
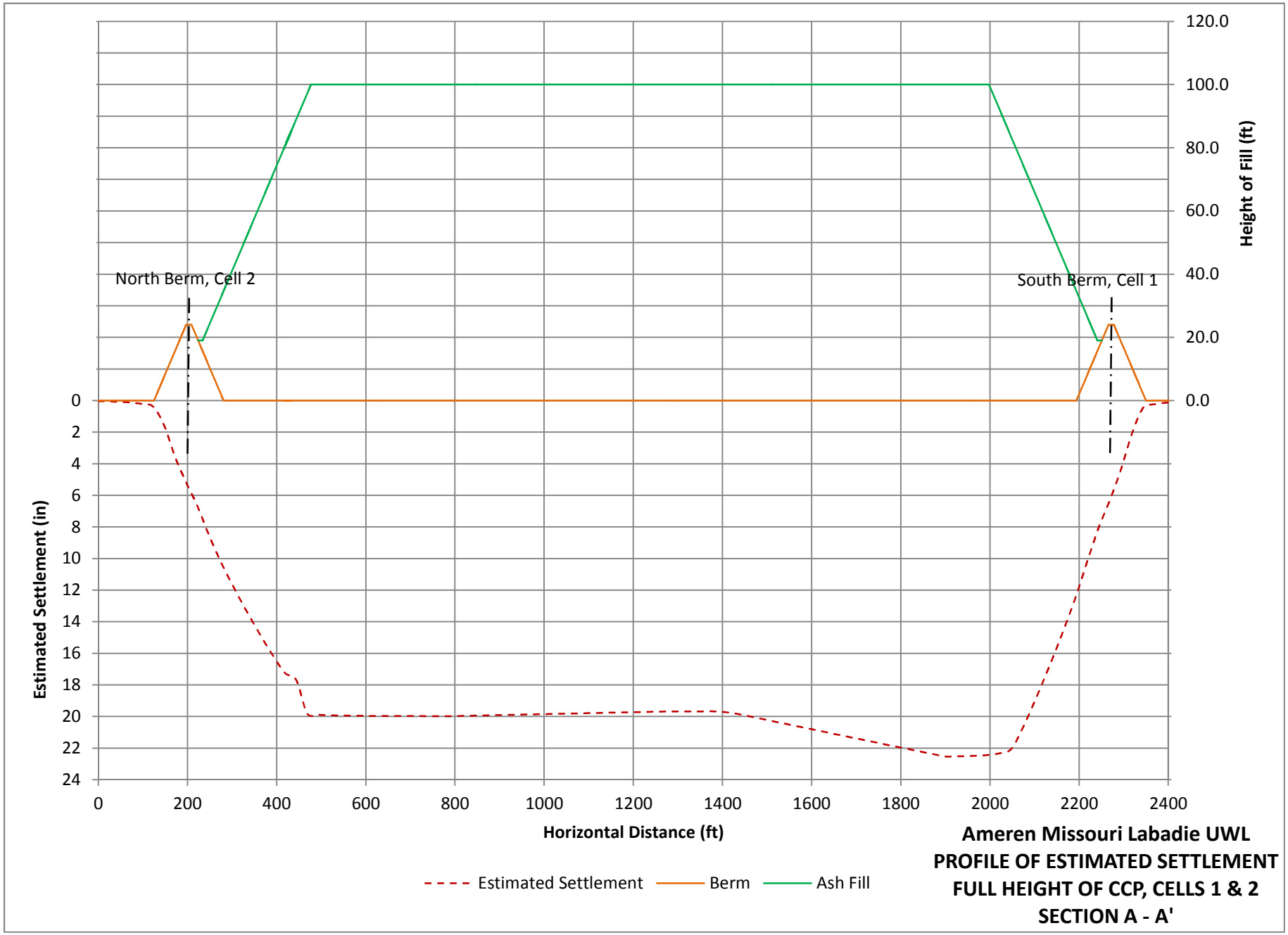


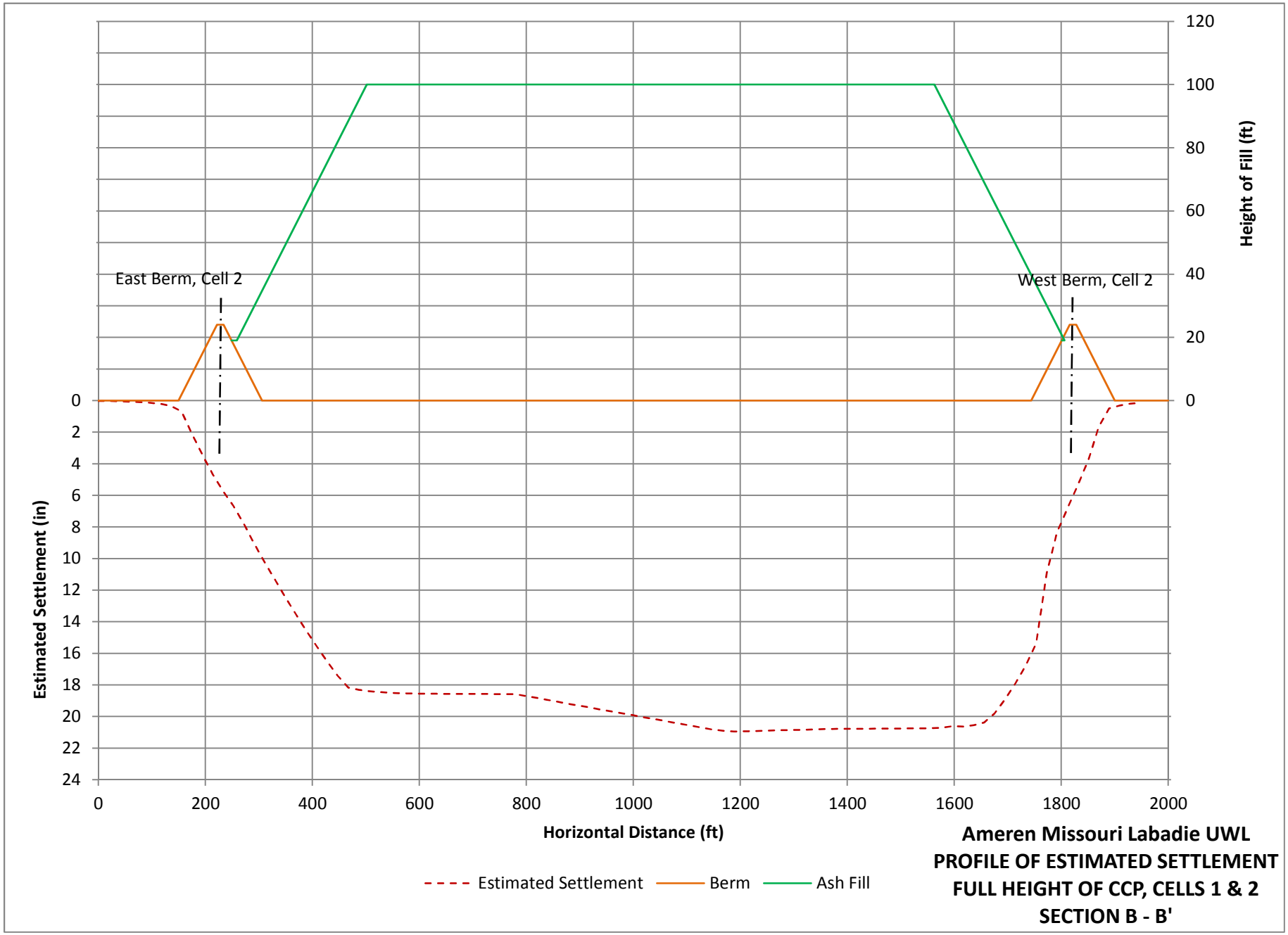
Ameren Missouri Labadie UWL
LOCATIONS OF SETTLEMENT CALCULATIONS
AND PROFILES OF ESTIMATED SETTLEMENT

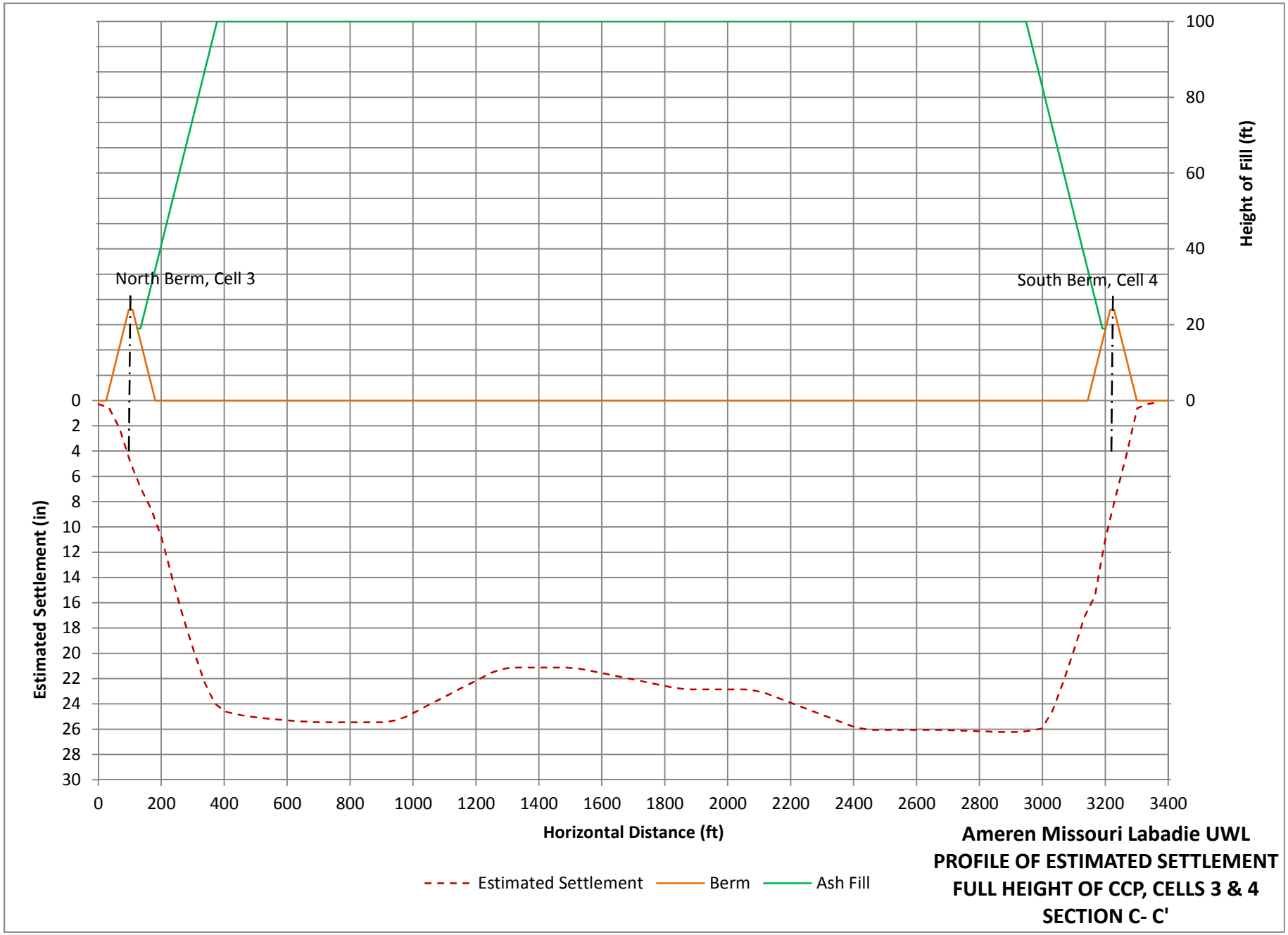
REITZ & JENS, INC.

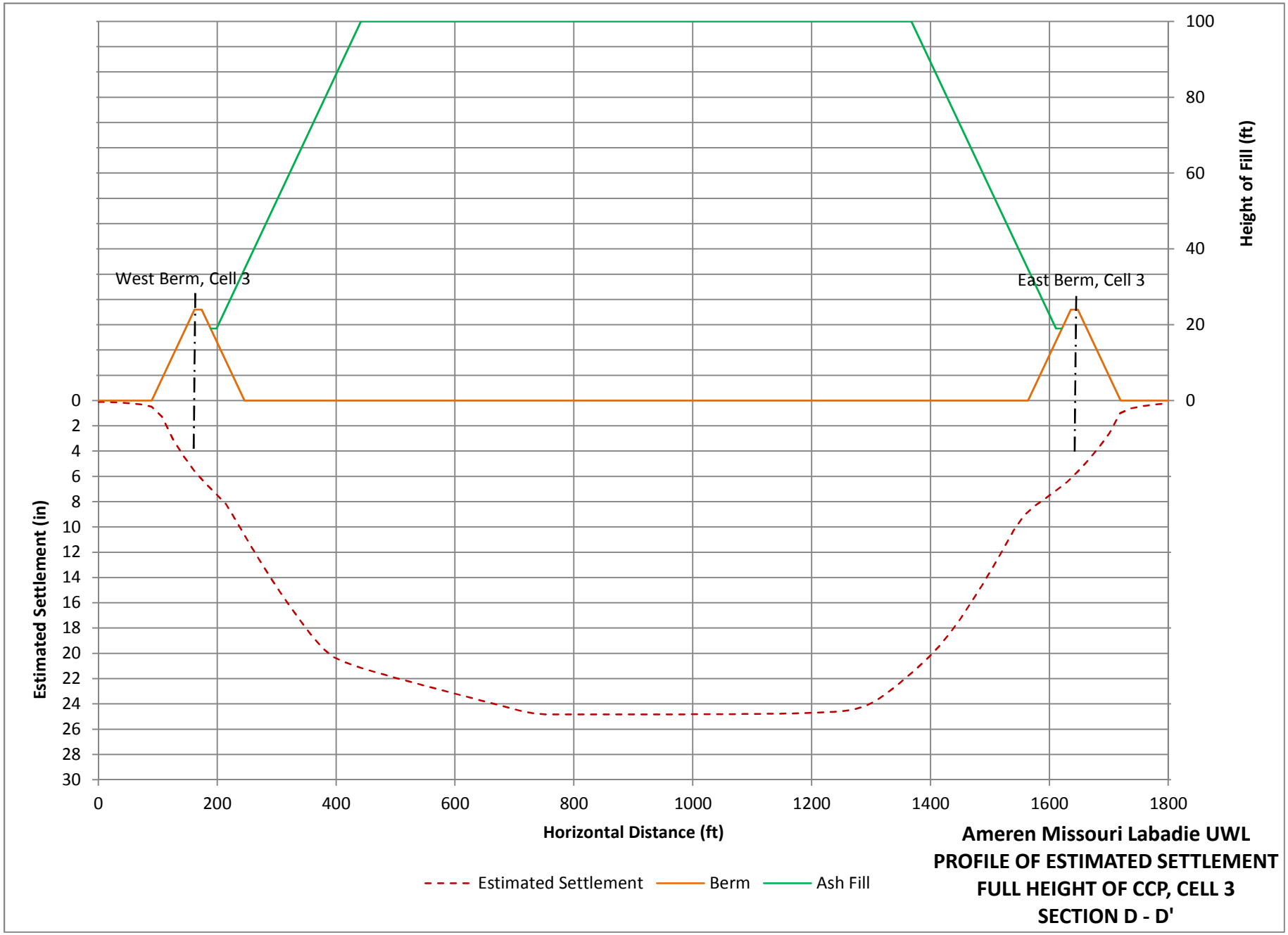
Figure F-1
SCHEDULE CJG-ST1

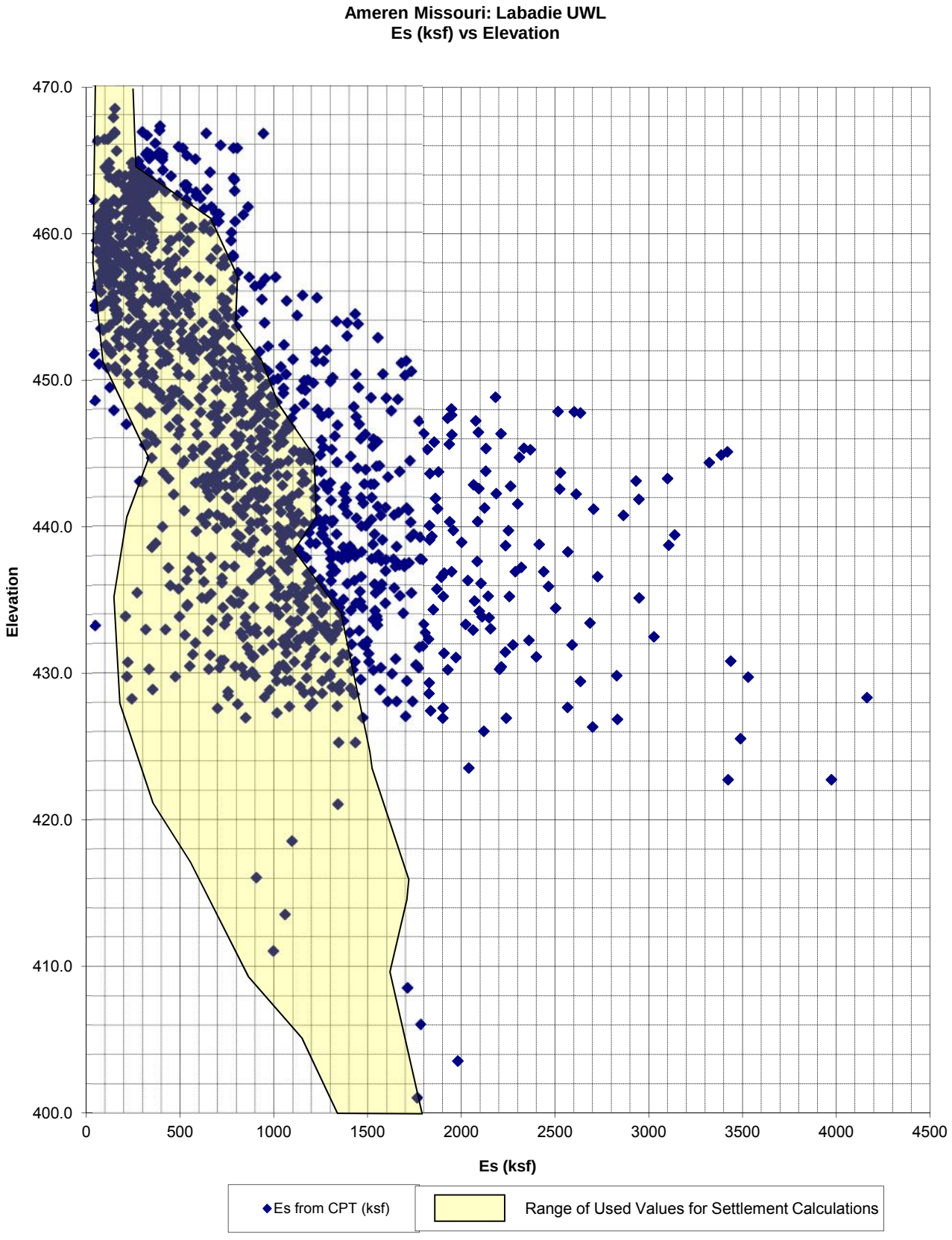
SCHEDULE CJG-ST1

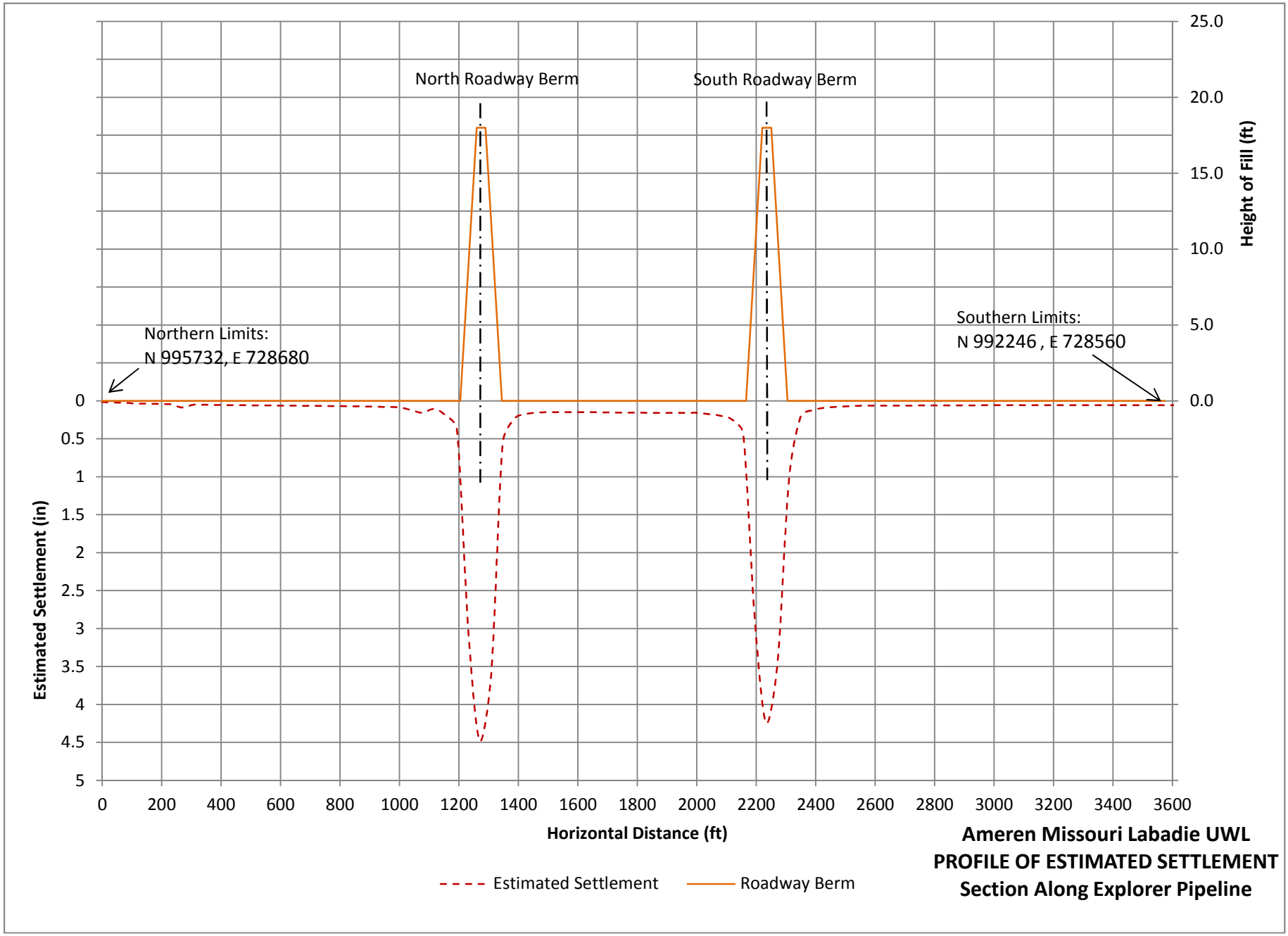

North Berm, Cell 2
South Berm, Cell 1
Estimated Settlement (in)
Height of Fill (ft)
Horizontal Distance (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
120.0
100.0
80.0
60.0
40.0
20.0
0.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
Estimated Settlement
Berm
Ash Fill
Ameren Missouri Labadie UWL
PROFILE OF ESTIMATED SETTLEMENT
FULL HEIGHT OF CCP, CELLS 1 & 2
SECTION A - A'

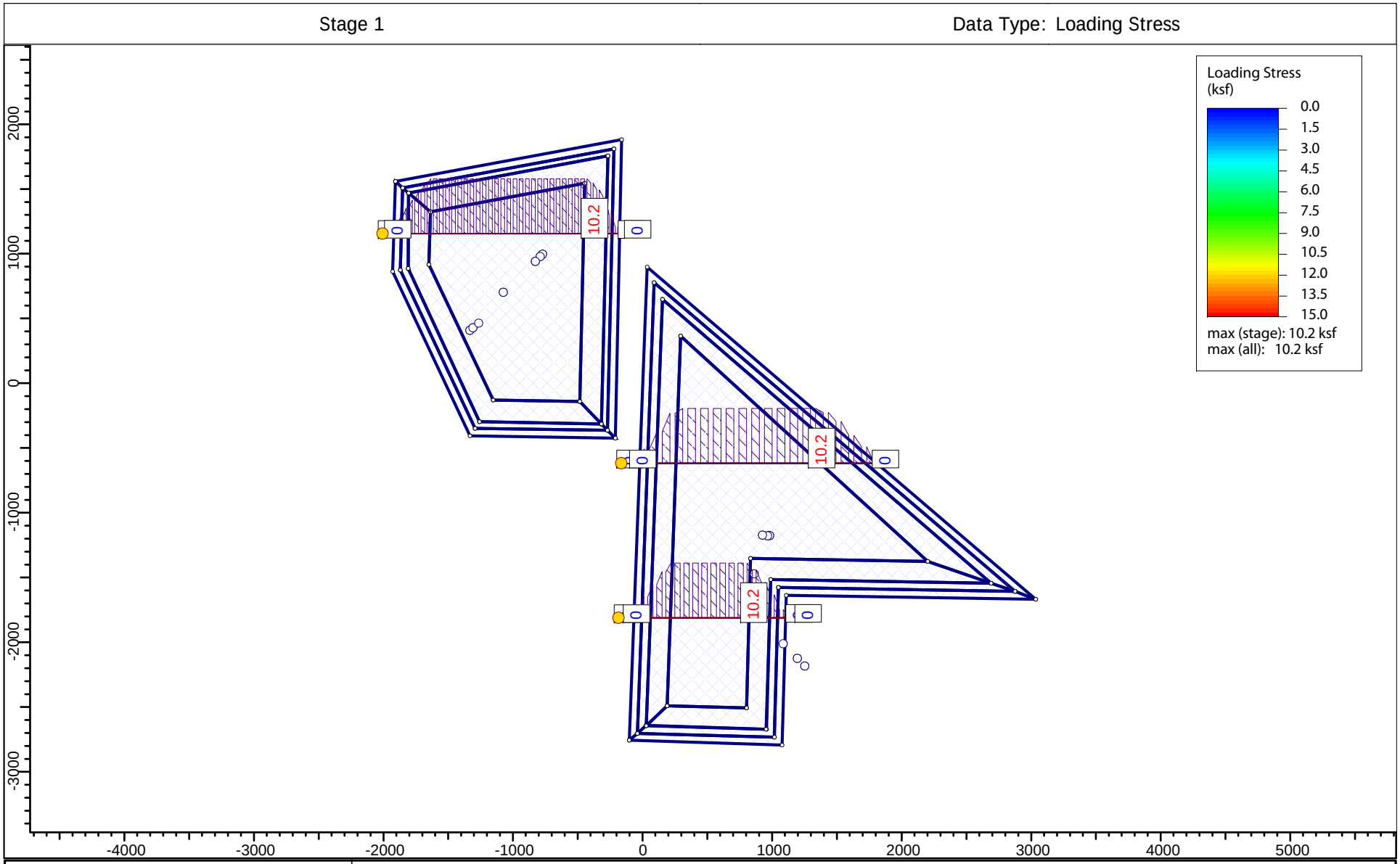

East Berm, Cell 2
West Berm, Cell 2
Estimated Settlement (in)
Height of Fill (ft)
Horizontal Distance (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
120
100
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Estimated Settlement
Berm
Ash Fill
Ameren Missouri Labadie UWL
PROFILE OF ESTIMATED SETTLEMENT
FULL HEIGHT OF CCP, CELLS 1 & 2
SECTION B - B'


North Berm, Cell 3
South Berm, Cell 4
Estimated Settlement (in)
Height of Fill (ft)
Horizontal Distance (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
100
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
Estimated Settlement
Berm
Ash Fill
Ameren Missouri Labadie UWL
PROFILE OF ESTIMATED SETTLEMENT
FULL HEIGHT OF CCP, CELLS 3 & 4
SECTION C- C'


West Berm, Cell 3
East Berm, Cell 3
Estimated Settlement (in)
Height of Fill (ft)
Horizontal Distance (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
100
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
1600
1800
Estimated Settlement
Berm
Ash Fill
Ameren Missouri Labadie UWL
PROFILE OF ESTIMATED SETTLEMENT
FULL HEIGHT OF CCP, CELL 3
SECTION D - D'


Ameren Missouri: Labadie UWL
Es (ksf) vs Elevation
470.0
460.0
450.0
440.0
430.0
420.0
410.0
400.0
Elevation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Es (ksf)
Es from CPT (ksf)
Range of Used Values for Settlement Calculations


North Roadway Berm
South Roadway Berm
Northern Limits:
N 995732, E 728680
Southern Limits:
N 992246 , E 728560
Estimated Settlement (in)
Height of Fill (ft)
Horizontal Distance (ft)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
25.0
20.0
15.0
10.0
5.0
0.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
Estimated Settlement
Roadway Berm
Ameren Missouri Labadie UWL
PROFILE OF ESTIMATED SETTLEMENT
Section Along Explorer Pipeline



rocscience	Project: Ameren Labadie UWL		
	Analysis Description: Settlement for Final UWL Configuration		
	Drawn By: Christopher Cook	Company: Reitz & Jens, Inc	
	Date: 10/17/2012, 11:48:36 AM	File Name: Base.s3z	

SETTLE3D 2.016

SCHEDULE CJG-ST1

Figure F-8

REITZ & JENS, INC.
CONSULTING ENGINEERS

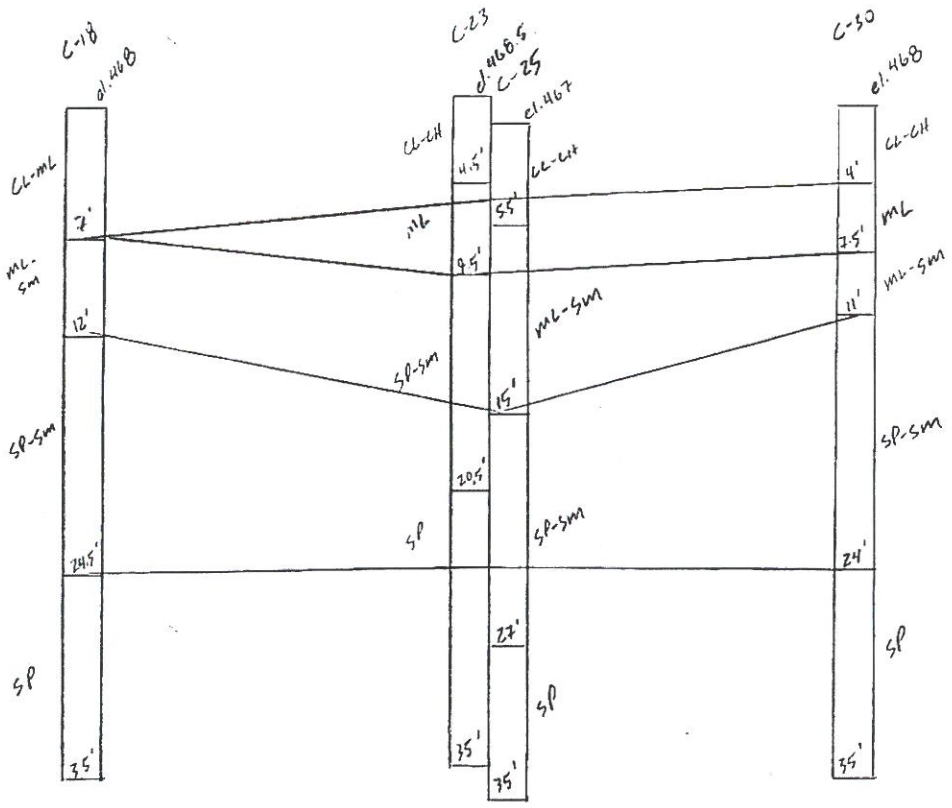
PROJECT LABADIE UWL

SUBJECT

DATE 3-25-2011 BY JDB Proj. Number SHEET OF

SECTION ~~B-B~~ A-A'

CIRCLE 7



SETTLEMENT PROFILE

0 - 5.5' CLAY
γ_T = 113 PCF
C_c = 0.30 C_s = 0.05 e_o = 0.917

5.5 - 9.5' SILT
γ_T = 117 PCF. $E_{s\,top}$ = 180 KSF · $E_{s\,bot.}$ = 350 KSF

9.5 - 20.5' SILT & SAND
γ_T = 120 PCF E_s = 600 KSF

20.5 - 24.5' SAND & SILT
γ_T = 120 PCF E_s = 800 KSF

24.5 - 35' SAND
γ_T = 122 PCF E_s = 1200 KSF

35 - 103' SAND & GRAVEL * ASSUMED FROM P-1
γ_T = 124 PCF E_s = 1400 KSF

SCHEDULE CJG-ST1

REITZ & JENS, INC.
CONSULTING ENGINEERS

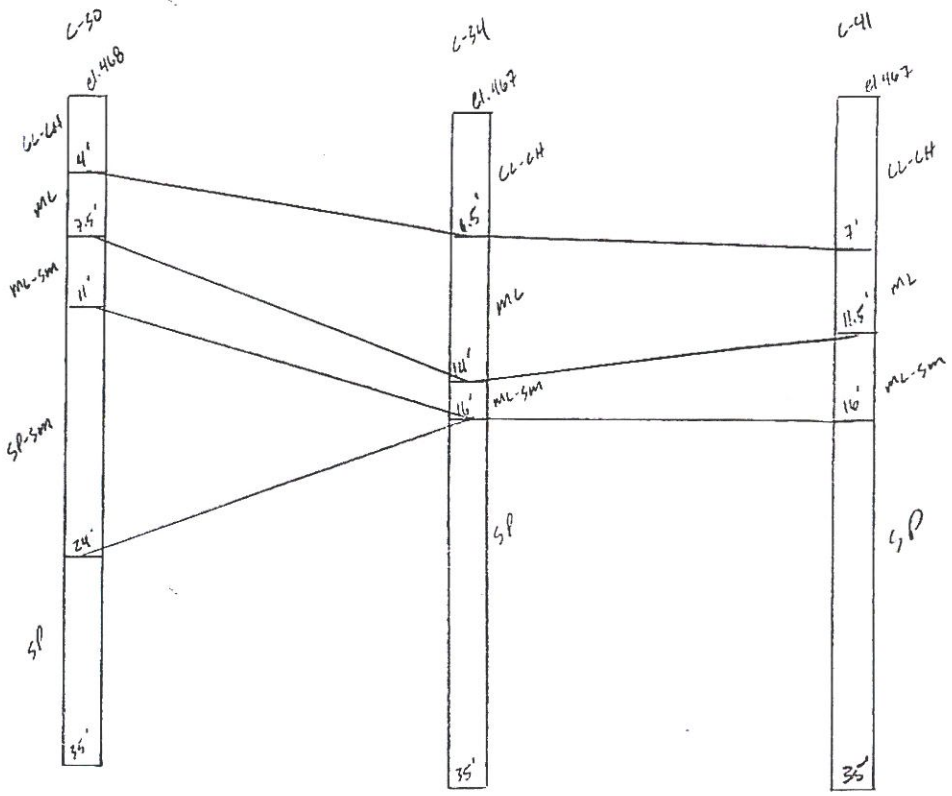
PROJECT LABADIE UWL

SUBJECT

DATE 3-25-2011 BY JDB Proj. Number SHEET OF

SECTION ~~B-B'~~ A-A'

CIRCLE 8



SETTLEMENT PROFILE

0-7' CLAY

$\gamma_T = 113$ PCF

$C_c = 0.30$ $C_s = 0.05$ $e_o = 0.917$

7-14' SILT

$\gamma_T = 117$ PCF $E_s = 250$ KSF

14-24' SILT & SAND

$\gamma_T = 120$ PCF $E_{s\,top} = 600$ KSF $E_{s\,bot.} = 900$ KSF

24-35' SAND

$\gamma_T = 122$ PCF $E_s = 1100$ KSF

35-103' SAND & GRAVEL

$\gamma_T = 124$ PCF $E_s = 1400$ KSF

REITZ & JENS, INC.
CONSULTING ENGINEERS

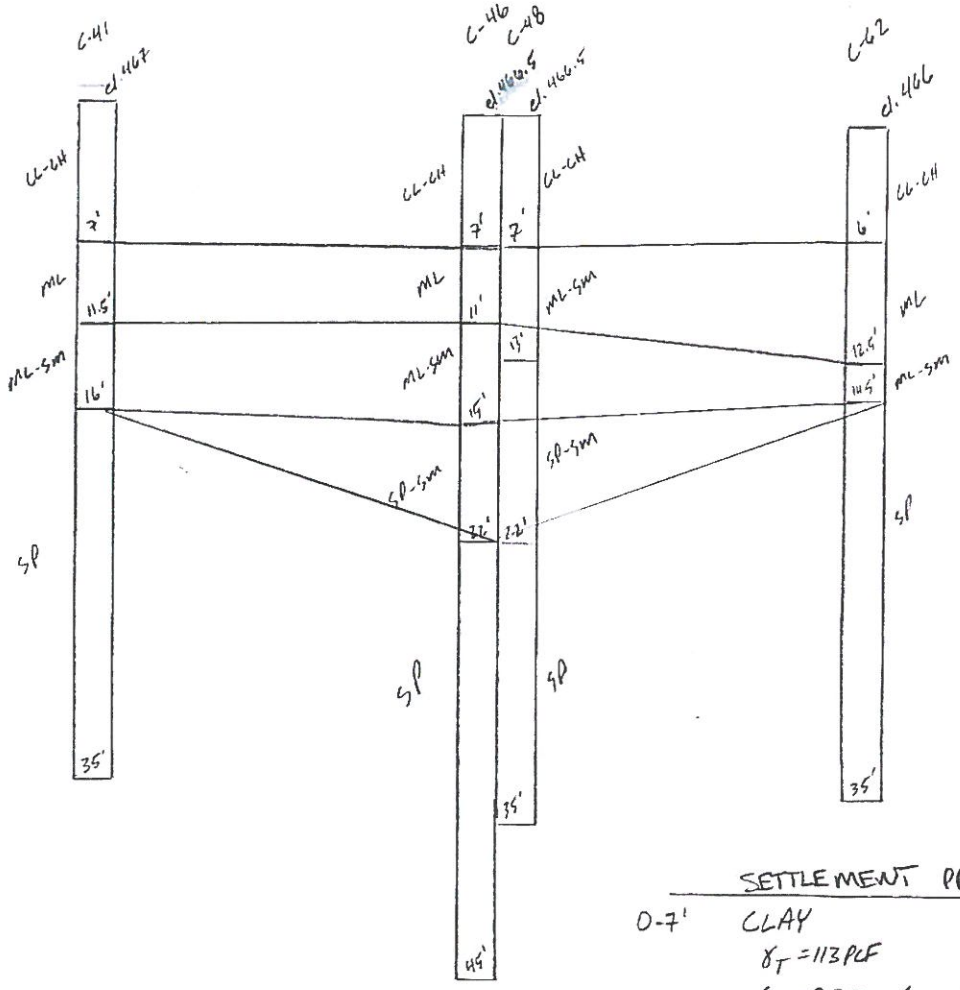
PROJECT LABADIE UWL

SUBJECT

DATE 3-25-2011 BY JDB Proj. Number SHEET ___ OF ___

SECTION ~~B-B'~~ A-A'

CIRCLE 9



SETTLEMENT PROFILE

0-7'	CLAY	
	$\gamma_T = 113$ PCF	
	$C_c = 0.30$ $C_s = 0.05$ $e_o = 0.917$	
7-16'	SILT	
	$\gamma_T = 117$ PCF	$E_s = 300$ KSF
16-22'	SILT & SAND	
	$\gamma_T = 120$ PCF	$E_s = 400$ KSF
22-35'	SAND	
	$\gamma_T = 122$ PCF	$E_s = 1100$ KSF
35-45'	LOWER SAND	
	$\gamma_T = 124$ PCF	$E_s = 1300$ KSF
45-103'	SAND & GRAVEL	*
	$\gamma_T = 124$ PCF	$E_s = 1400$ KSF

* ASSUMED FROM P-1

REITZ & JENS, INC.
CONSULTING ENGINEERS

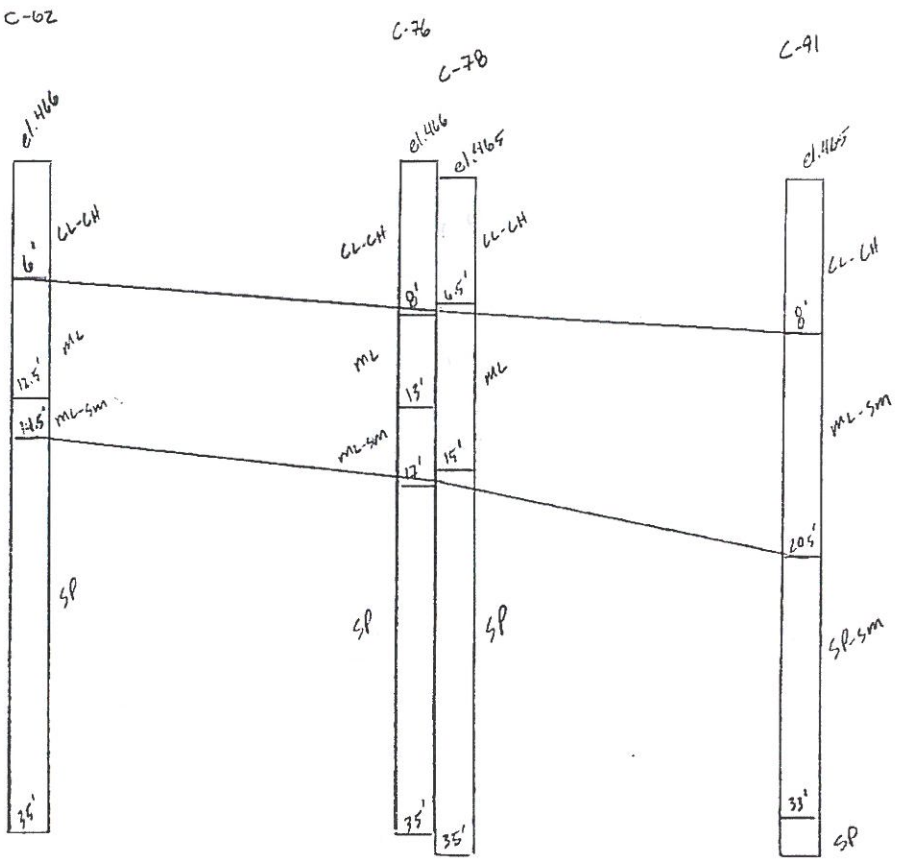
PROJECT LABADIE UWL

SUBJECT

DATE 3-25-2011 BY JDB Proj. Number SHEET OF

SECTION ~~B-B'~~ A-A'

CIRCLE ID



SETTLEMENT PROFILE

0-8' CLAY
γ_T = 118 PCF
C_c = 0.32 C_s = 0.04 e_o = 0.862

8-14.5' SILT
γ_T = 115 PCF E_s = 200 KSF

14.5-33' SILT & SAND
γ_T = 117 PCF E_s = 550 KSF

33-35' SAND
γ_T = 122 PCF E_s = 1300 KSF

45-103' SAND & GRAVEL * ASSUME FROM P-1
γ_T = 124 PCF E_s = 1400 KSF

REITZ & JENS, INC.
CONSULTING ENGINEERS

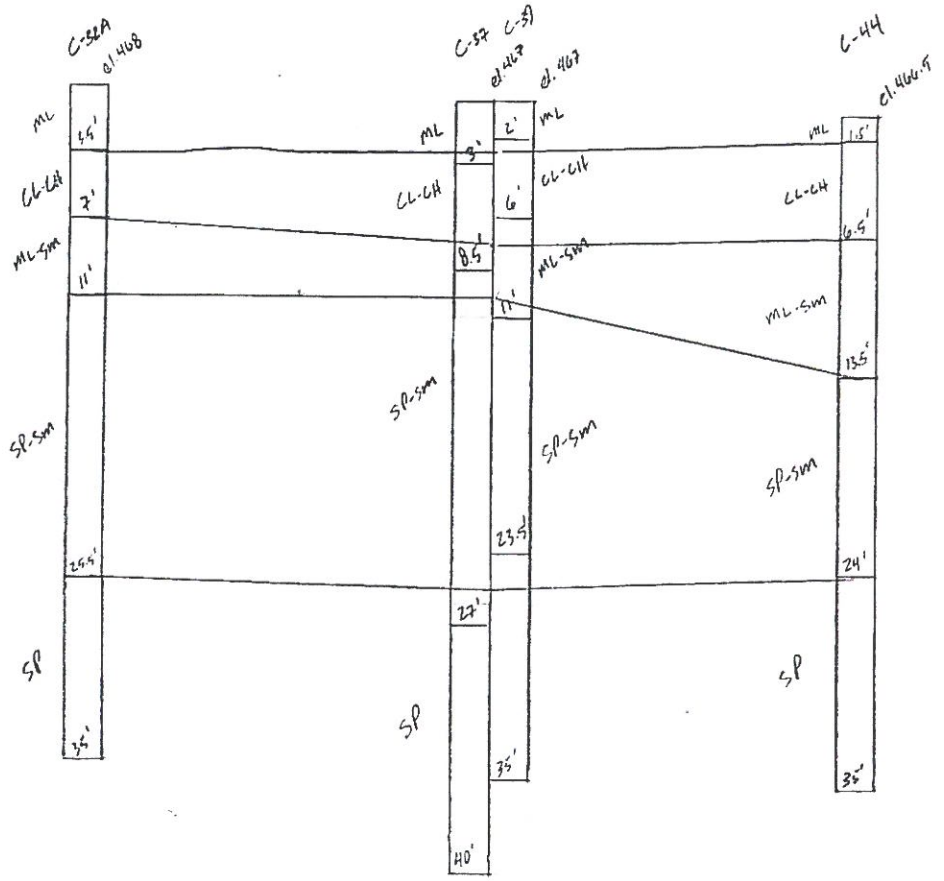
PROJECT LABADIE UWL

SUBJECT

DATE 3-15-2011 BY JDB Proj. Number SHEET OF

SECTION ~~A-A'~~ B-B'

CIRCLE 3



SETTLEMENT PROFILE

0 - 3.5'	SILT	
	γ_T = 115 PCF	E_S = 150 KSF
3.5' - 8.5'	CLAY	
	γ_T = 113 PCF	
	C_L = 0.30 C_S = 0.05 e_o = 0.917	
8.5 - 13.5'	SILT & SAND	
	γ_T = 120 PCF	$E_{S\,top}$ = 300 KSF
		$E_{S\,bot}$ = 500 KSF
13.5' - 27'	SAND & SILT	
	γ_T = 122 PCF	E_S = 700 KSF
27 - 40'	SAND	
	γ_T = 124 PCF	E_S = 1200 KSF
40 - 103	SAND & GRAVEL *	
	γ_T = 125 PCF	E_S = 1400 KSF

* ASSUMED FROM P-1

SCHEDULE CJG-ST1

CHECKED BOOK 4/12/11

REITZ & JENS, INC.
CONSULTING ENGINEERS

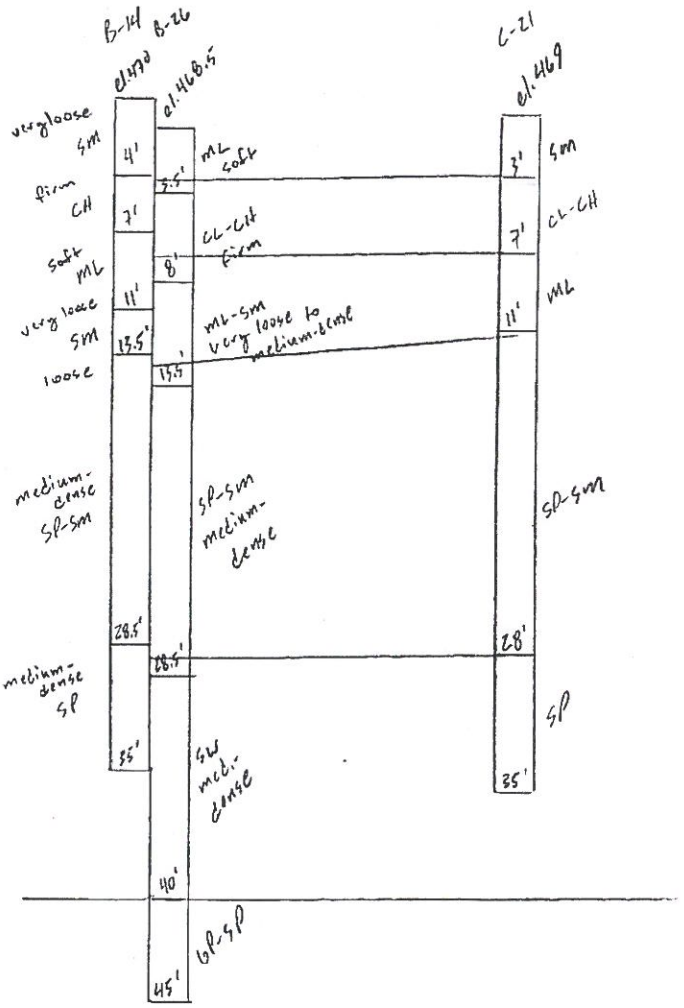
PROJECT LABADIE UWL

SUBJECT

DATE 4-1-2011 BY JDB Proj. Number SHEET OF

SECTION ~~E-E'~~ B-B'

CIRCLE 47



SETTLEMENT PROFILE

0-4' SILT

$\gamma_T = 116$ PCF $E_S = 150$ KSF

4-8' CLAY

$\gamma_T = 113$ PCF

$C_c = 0.30$ $C_s = 0.05$ $e_0 = 0.917$

8-13.5' SILT

$\gamma_T = 119$ PCF $E_{S\,top} = 200$ KSF $E_{S\,bot} = 400$ KSF

13.5-28.5' SAND & SILT

$\gamma_T = 122$ PCF $E_S = 800$ KSF

28.5-40' SAND

$\gamma_T = 122$ PCF $E_S = 950$ KSF

40-103' SAND & GRAVEL

$\gamma_T = 124$ PCF $E_S = 1400$ KSF

SCHEDULE CJG-ST1

CHECKED C 100% 4/12/11

REITZ & JENS, INC.
CONSULTING ENGINEERS

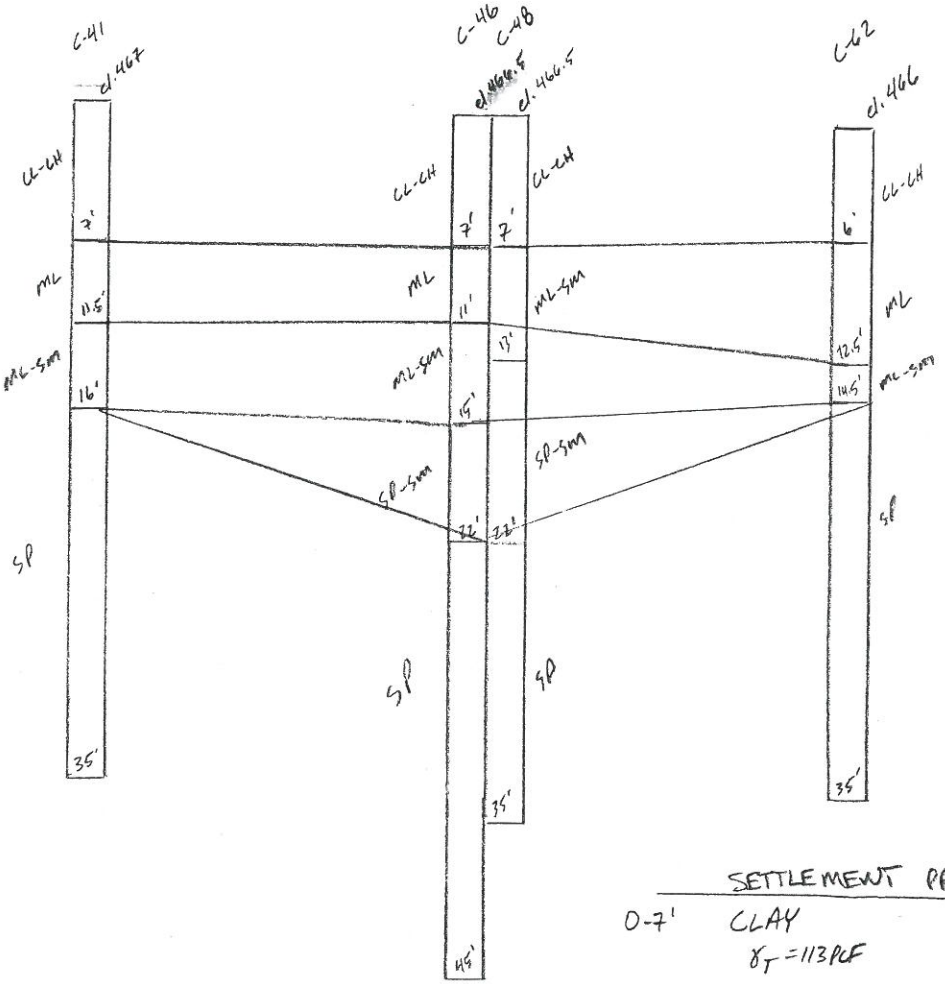
PROJECT LABADIE LWL

SUBJECT

DATE 3-25-2011 BY JDB Proj. Number SHEET ___ OF ___

SECTION B-B'

CIRCLE 9



SETTLEMENT PROFILE

0-7' CLAY
γ_T = 113 PCF
C_c = 0.30 C_s = 0.05 e_o = 0.917

7-16' SILT
γ_T = 117 PCF E_s = ~~300~~ 250 KSF

16-~~22~~ 24' SILT & SAND
γ_T = 120 PCF E_s = ~~900~~ 600 KSF

22-35' SAND
γ_T = 122 PCF E_s = 1100 KSF

35-~~45~~ 58' LOWER SAND
γ_T = 124 PCF E_s = ~~1700~~ 1300 KSF

~~45~~-103' SAND & GRAVEL
58
γ_T = 124 PCF E_s = 1400 KSF *

* ASSUMED FROM P-1

CHECKED:

SCHEDULE C/G-SIT

REITZ & JENS, INC.
CONSULTING ENGINEERS

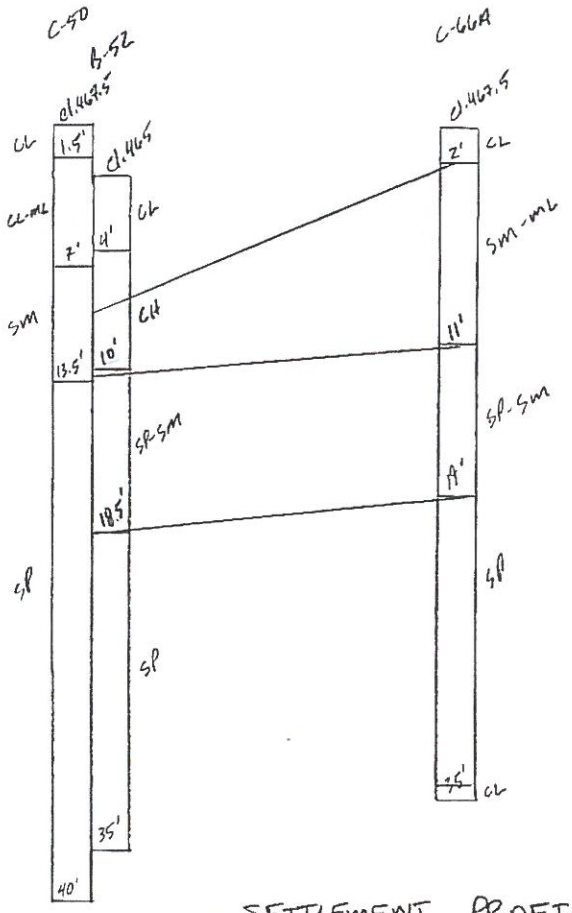
PROJECT LABADIE LWL

SUBJECT

DATE 4-5-2011 BY JDB Proj. Number SHEET OF

SECTION C-C'

CIRCLE 40



SETTLEMENT PROFILE

0-10' CLAY
γ_T = 118 PCF
C_c = 0.32 C_s = 0.04 e_o = 0.862

10-18.5' SILT & SAND
γ_T = 119 PCF E_{s_L} = 200 KSF E_{s_D} = 600 KSF

18.5-32' SAND & SILT
γ_T = 120 PCF E_s = 850 KSF

32-35' SILT & CLAY
γ_T = 120 PCF E_s = 200 KSF

35-42' SAND
γ_T = 122 PCF E_s = 1000 KSF

42-77' SAND & GRAVEL
γ_T = 124 PCF E_s = 1000 KSF *

77-105' SAND (2)
γ_T = 125 PCF E_s = 1200 KSF *

* ASSUMED FROM B-100

SCHEDULE CJC-ST1

CHECKED: C. [illegible] 4/12/11

REITZ & JENS, INC. CONSULTING ENGINEERS

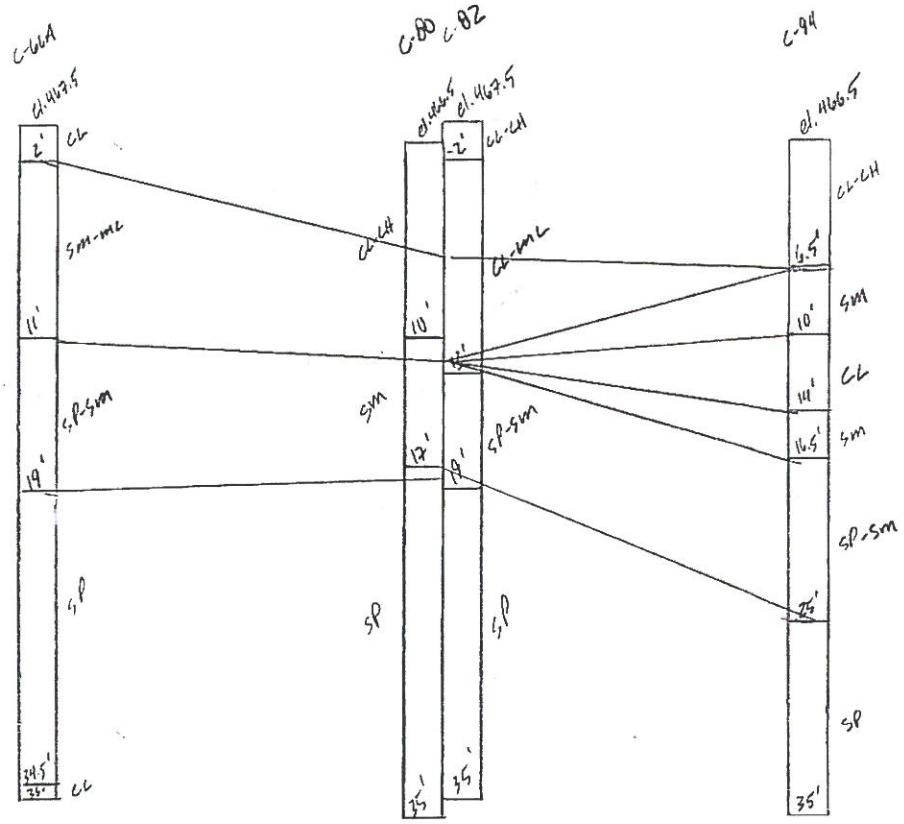
PROJECT LABADIE UWL

SUBJECT

DATE 4-5-2011 BY JDB Proj. Number SHEET OF

SECTION C-C'

CIRCLE 41



SETTLEMENT PROFILE

0 - 11' CLAY

γ_T = 118 PCF

C_c = 0.32 C_s = 0.04 e_o = 0.862

11 - 18' SILT

γ_T = 114 PCF E_s = 500 KSF

18 - 32' SAND

γ_T = 120 PCF E_s = 1000 KSF

32 - 37' SILT & CLAY

γ_T = 120 PCF E_s = 200 KSF

37 - 77' SAND & GRAVEL ✱

γ_T = 124 PCF E_s = 1000 KSF

77 - 105 SAND (2) ✱

γ_T = 125 PCF E_s = 1200 KSF

✱ ASSUMED FROM B-100

CHECKED: SCHEDULE C1G-ST1

REITZ & JENS, INC.
CONSULTING ENGINEERS

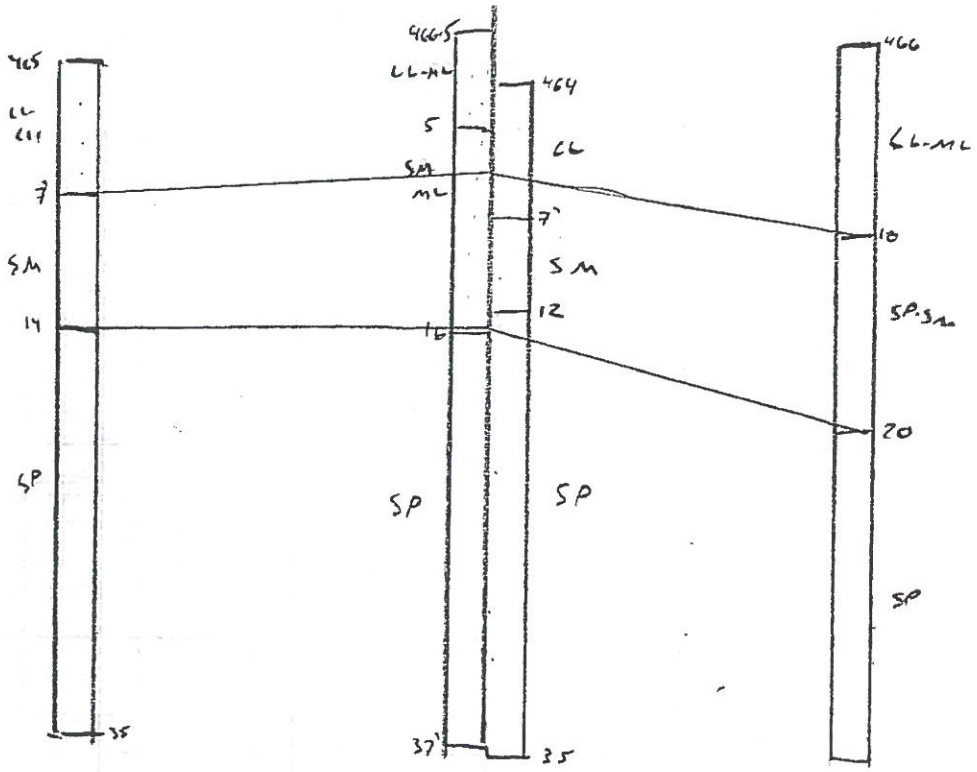
PROJECT LABADIE UWL

SUBJECT

DATE 4-5-2011 BY JDB Proj. Number SHEET OF

SECTION ~~G-G'~~ C-C'
CIRCLE 24

C-107A C-94 C-121 C-109



SETTLEMENT PROFILE

0-10' CLAY
$\gamma_T = 118$ PCF
$C_c = 0.32$ $C_s = 0.04$ $e_o = 0.862$

10-20' SILT & SAND
$\gamma_T = 120$ PCF $E_{s_t} = 300$ KSF $E_{s_b} = 675$ KSF

20-32' SAND
$\gamma_T = 122$ PCF $E_s = 800$ KSF

32-37' SAND (2)
$\gamma_T = 122$ PCF $E_s = 1000$ KSF

37-103' SAND & GRAVEL ★
$\gamma_T = 124$ PCF $E_s = 1400$ KSF

★ ASSUMED FROM B-7

SCHEDULE C/C ST1

REITZ & JENS, INC.
CONSULTING ENGINEERS

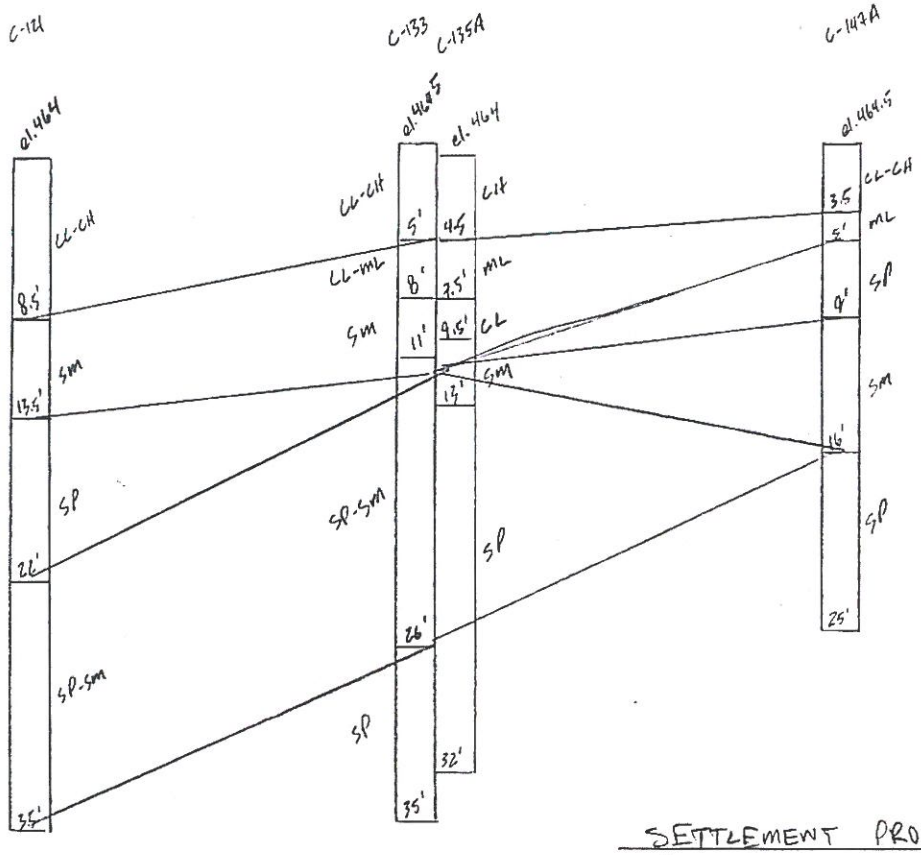
PROJECT LABADIE UWL

SUBJECT

DATE 4-5-2011 BY JDB Proj. Number SHEET OF

SECTION C-C'

CIRCLE 42



SETTLEMENT PROFILE

0-8.5' CLAY
$\gamma_T = 118$ PCF
$C_c = 0.32$ $C_s = 0.04$ $e_o = 0.862$

8.5-13.5' SILT
$\gamma_T = 117$ PCF $E_{s_t} = 100$ KSF $E_{s_b} = 450$ KSF

13.5-22' SILT + SAND
$\gamma_T = 120$ PCF $E_s = 800$ KSF

22-32' SAND
$\gamma_T = 122$ PCF $E_s = 650$ KSF

32-37' SAND (2)
$\gamma_T = 122$ PCF $E_s = 1200$ KSF

37-77' SAND & GRAVEL
$\gamma_T = 124$ PCF $E_s = 1000$ KSF *

77-105' SAND (3)
$\gamma_T = 125$ PCF $E_s = 1200$ KSF *

* ASSUMED FROM B-100

SCHEDULE CJG-S/1

CHECKED BY [illegible] 4/12/11

REITZ & JENS, INC.
CONSULTING ENGINEERS

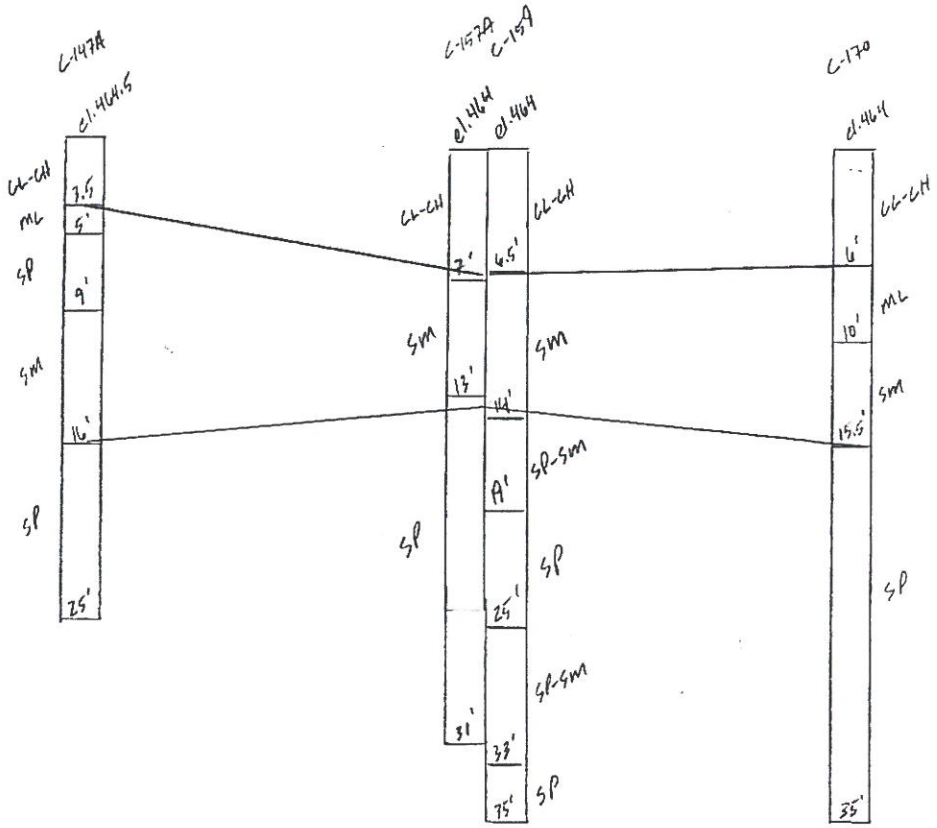
PROJECT LABADIE UWL

SUBJECT

DATE 4-5-2011 BY JDB Proj. Number SHEET OF

SECTION C-C'

CIRCLE 43



SETTLEMENT PROFILE

0-7' CLAY

γ_T = 110 PCF

C_c = 0.37 C_s = 0.07 e_o = 1.092

7-16' SILT

γ_T = 117 PCF $E_{s_{top}}$ = 150 KSF $E_{s_{bot.}}$ = 550 KSF

16-37' SILT & SAND

γ_T = 120 PCF E_s = 750 KSF

37-77' SAND & GRAVEL

γ_T = 124 PCF E_s = 1000 KSF *

77-105' SAND

γ_T = 125 PCF E_s = 1200 KSF *

* ASSUMED FROM B-100

REITZ & JENS, INC. CONSULTING ENGINEERS

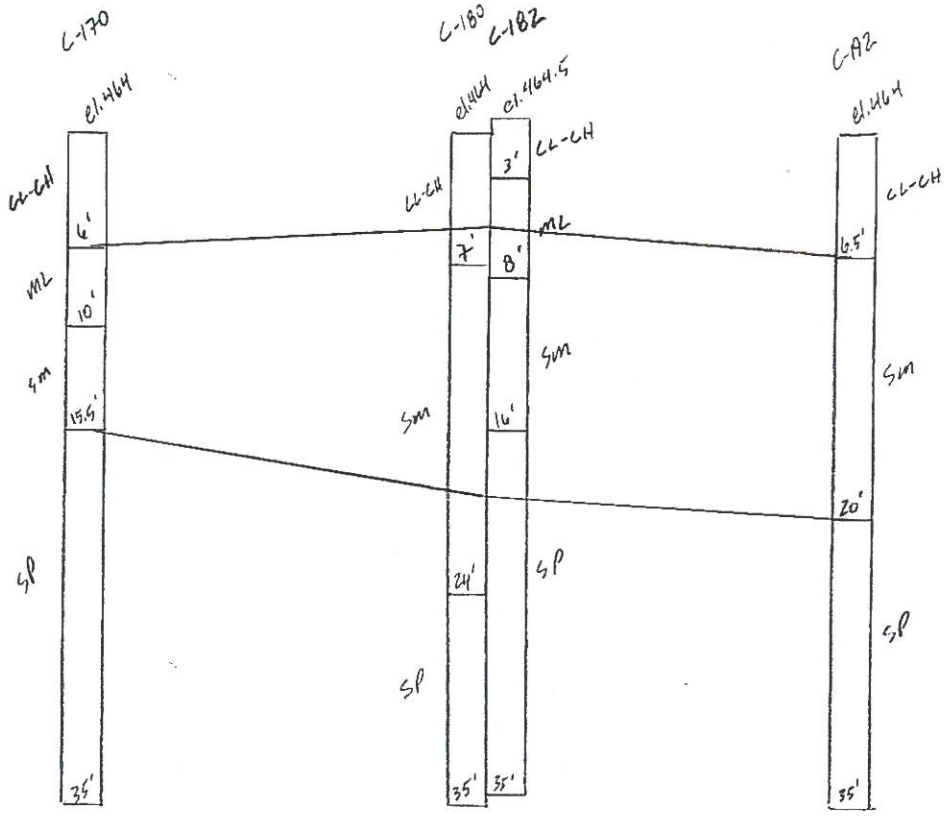
PROJECT LABADIE UWL

SUBJECT

DATE 4-5-2011 BY JDB Proj. Number SHEET OF

SECTION C-C'

CIRCLE 35



SETTLEMENT PROFILE

0-7' CLAY

γ_T = 110 PCF

C_c = 0.37 C_s = 0.07 e_o = 1.092

7-22' SILT & SAND

γ_T = 114 PCF E_s = 300 KSF

22-37' SAND

γ_T = 122 PCF E_s = 1000 KSF

37-77' SAND & GRAVEL

γ_T = 124 PCF E_s = 1000 KSF *

77-105' SAND (2)

γ_T = 125 PCF E_s = 1200 KSF *

* ASSUMED FROM B-100

CHECKED: SCHEDULE C/C-ST1

REITZ & JENS, INC.
CONSULTING ENGINEERS

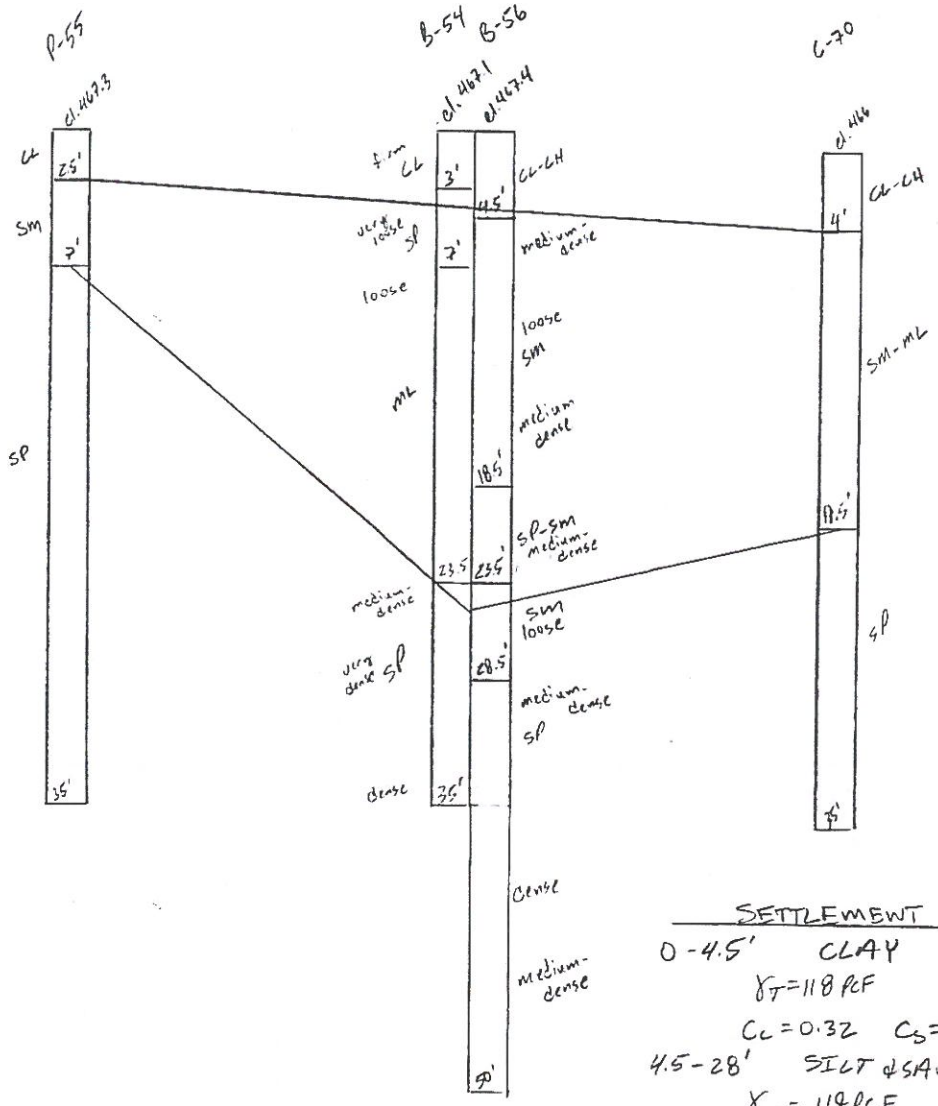
PROJECT LABADIE UWL

SUBJECT

DATE 4-8-2011 BY JOB Proj. Number SHEET OF

SECTION D-D'

CIRCLE 48



SETTLEMENT PROFILE

0-4.5' CLAY

$\gamma_T = 118$ PCF

$C_c = 0.32$ $C_s = 0.04$ $e_o = 0.862$

4.5-28' SILT & SAND

$\gamma_T = 119$ PCF $E_s = 250$ KSF

28-50' SAND

$\gamma_T = 120$ PCF $E_s = 600$ KSF

50-77' SAND & GRAVEL

$\gamma_T = 124$ PCF $E_s = 1000$ KSF *

77-105' SAND (2)

$\gamma_T = 125$ PCF $E_s = 1200$ KSF *

* ASSUMED FROM B-100

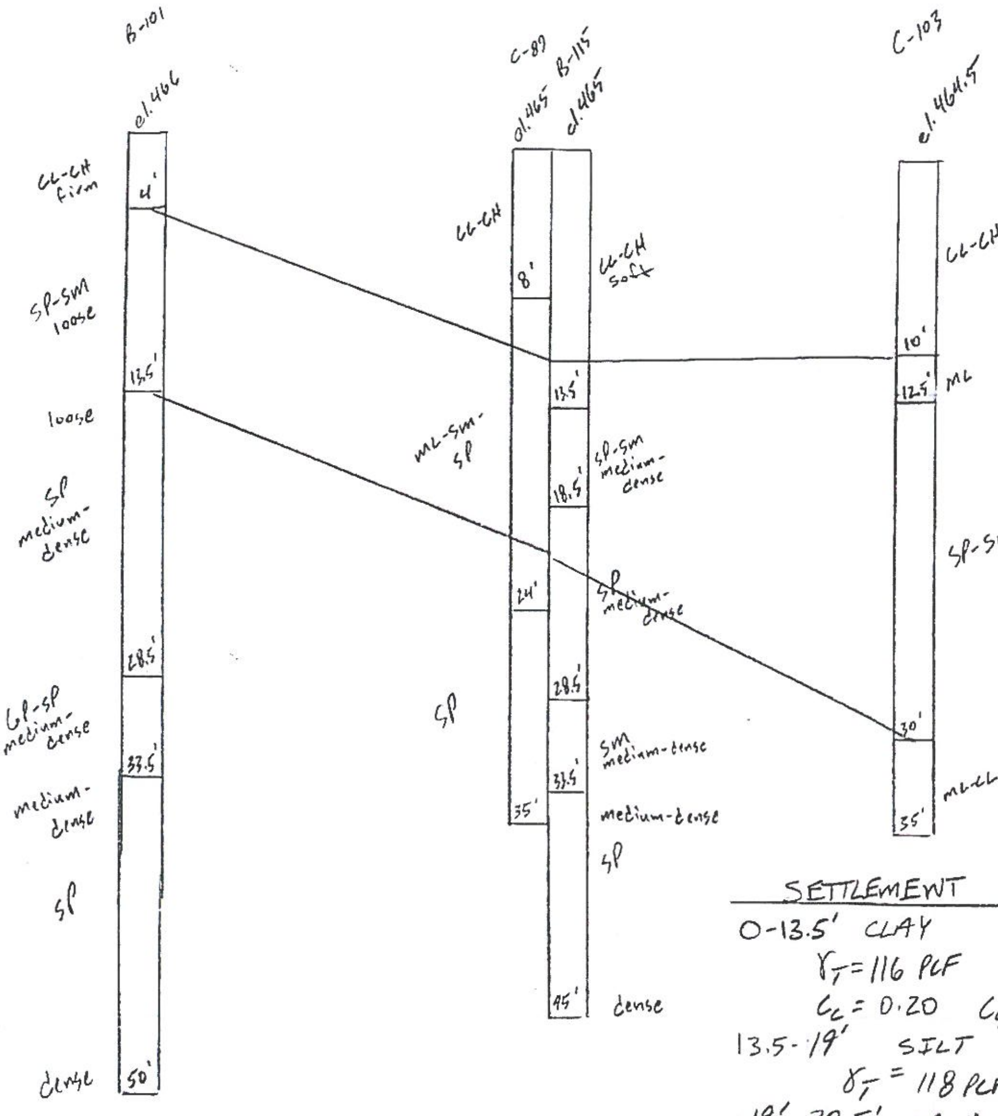
REITZ & JENS, INC.
CONSULTING ENGINEERS

PROJECT: LABADIE UWL
SUBJECT:

DATE: 4-4-2011 BY: JDB Proj. Number: SHEET ___ OF ___

SECTION ~~6-6'~~ D-D'

CIRCLE 49



SETTLEMENT PROFILE

0-13.5' CLAY

$\gamma_T = 116$ PCF

$C_c = 0.20$ $C_s = 0.02$ $e_0 = 0.900$

13.5-19' SILT

$\gamma_T = 118$ PCF $E_s = 350$ KSF

19'-28.5' SAND & SILT

$\gamma_T = 120$ PCF $E_{s_t} = 450$ KSF $E_{s_b} = 850$ KS.

28.5-36' SILT & SAND

$\gamma_T = 119$ PCF $E_s = 250$ KSF

36-45' SAND

$\gamma_T = 122$ PCF $E_s = 600$ KSF

45-103' SAND & GRAVEL *

$\gamma_T = 124$ PCF $E_s = 1400$ KSF

* ASSUMED FROM B-7

SCHEDULE CJG-ST1

CHECKED: C.G.D. 4/12/11

REITZ & JENS, INC.
CONSULTING ENGINEERS

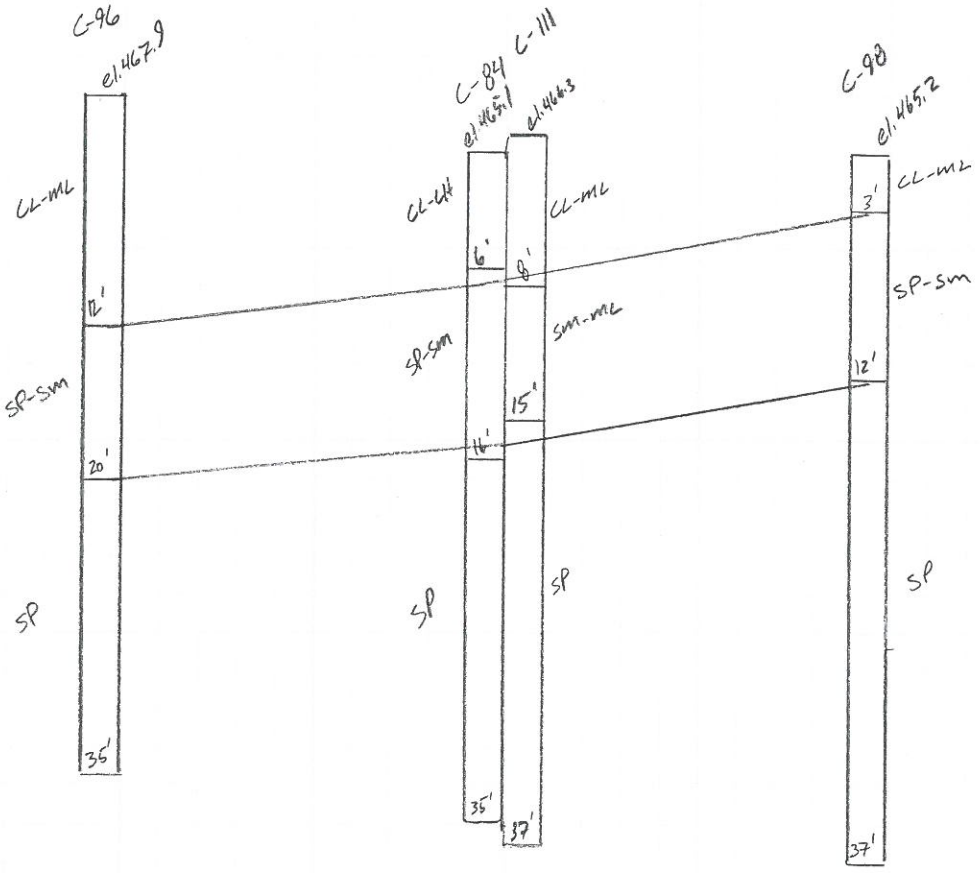
PROJECT LABADIE UWL

SUBJECT

DATE 6/11/2012 BY JDB Proj. Number SHEET OF

SECTION ~~E-E'~~ D-D'

CIRCLE 50



SETTLEMENT PROFILE

0-12' CLAY

γ_T = 118 PCF

C_c = 0.32 C_s = 0.04 e_o = 0.862

12-20' SILT & SAND

γ_T = 120 PCF E_s = 300 KSF (TOP)

E_s = 500 KSF (BOTTOM)

20-37' SAND

γ_T = 122 PCF E_s = 900 KSF

37-77' SAND & GRAVEL

γ_T = 124 PCF E_s = 1000 KSF

77-105' SAND (2)

γ_T = 125 PCF E_s = 1200 KSF

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 3.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	18.586
Consolidation Settlement [in]	0	5.1702
Immediate Settlement [in]	0	13.4187
Loading Stress [ksf]	0	10.3292
Effective Stress [ksf]	0	16.4779
Total Stress [ksf]	0	22.8427
Total Strain	0	0.0883972
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.0503125	16.4464
Over-consolidation Ratio	1	15.2292
Void Ratio	0	0.916999
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

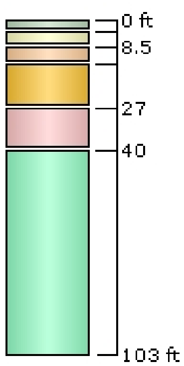
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	SILT	3.5	0
2	CLAY	5	3.5
3	SILT & SAND	5	8.5
4	SAND & SILT	13.5	13.5
5	SAND	13	27
6	SAND & GRAVEL	63	40



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND & SILT	SAND	SAND & GRAVEL
Color						
Unit Weight [kips/ft^3]	0.115	0.115	0.12	0.122	0.125	0.124
Saturated Unit Weight [kips/ft^3]	0.115	0.115	0.12	0.122	0.125	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		150	300	700	1400	1400
Es bottom [ksf]			500			
Esur [ksf]		150	300	700	1400	1400
Esur bottom [ksf]			500			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.3					
Cr	0.05					
e0	0.917					
Pc [ksf]	4.52					
OCR		1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005					
Car/Care	0.005					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-2058.82, 801.176	-110.756, 801.176	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 7.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	17.9701
Consolidation Settlement [in]	0	6.20633
Immediate Settlement [in]	0	11.7765
Loading Stress [ksf]	0	10.3777
Effective Stress [ksf]	0	15.7989
Total Stress [ksf]	0	22.1637
Total Strain	1.6997e-008	0.107355
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.395357	15.7722
Over-consolidation Ratio	1	87.2726
Void Ratio	0	0.917
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

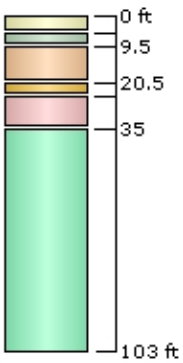
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	5.5	0
2	SILT	4	5.5
3	SILT & SAND	11	9.5
4	SAND & SILT	4	20.5
5	SAND	10.5	24.5
6	SAND & GRAVEL	68	35



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND & SILT	SAND	SAND & GRAVEL
Color						
Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.12	0.122	0.115
Saturated Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.12	0.122	0.115
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		180	600	800	1200	1400
Es bottom [ksf]		350				
Esur [ksf]		180	600	800	1200	1400
Esur bottom [ksf]		350				
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.3					
Cr	0.05					
e0	0.917					
Pc [ksf]	4.52					
OCR		1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005					
Car/Care	0.005					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-767.609, 1911.57	-767.609, -555.741	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 8.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	19.9785
Consolidation Settlement [in]	0	7.74089
Immediate Settlement [in]	0	12.2445
Loading Stress [ksf]	0	10.3777
Effective Stress [ksf]	0	16.3924
Total Stress [ksf]	0	22.7572
Total Strain	2.02229e-008	0.106378
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.471306	16.3611
Over-consolidation Ratio	1	79.9999
Void Ratio	0	0.917
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

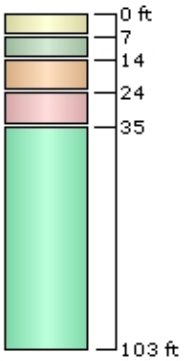
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	7	7
3	SILT & SAND	10	14
4	SAND	11	24
5	SAND & GRAVEL	68	35



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL
Color					
Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124
Saturated Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		250	600	1100	1400
Es bottom [ksf]			900		
Esur [ksf]		250	600	1100	1400
Esur bottom [ksf]			900		
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.3				
Cr	0.05				
e0	0.917				
Pc [ksf]	4.52				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005				
Car/Care	0.005				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-767.609, 1911.57	-767.609, -555.741	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 8&9.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	20.7832
Consolidation Settlement [in]	0	7.77249
Immediate Settlement [in]	0	13.0492
Loading Stress [ksf]	0	10.3292
Effective Stress [ksf]	0	16.3944
Total Stress [ksf]	0	22.7592
Total Strain	1.24418e-008	0.106171
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.471273	16.3625
Over-consolidation Ratio	1	79.9999
Void Ratio	0	0.917
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

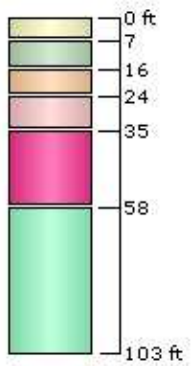
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	9	7
3	SILT & SAND	8	16
4	SAND	11	24
5	LOWER SAND	23	35
6	SAND & GRAVEL	45	58



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL	LOWER SAND
Color						
Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124	0.124
Saturated Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		250	600	1100	1400	1300
Es bottom [ksf]			900			
Esur [ksf]		250	600	1100	1400	1300
Esur bottom [ksf]			900			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.3					
Cr	0.05					
e0	0.917					
Pc [ksf]	4.52					
OCR		1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005					
Car/Care	0.005					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-2058.82, 801.176	-110.756, 801.176	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 9.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	19.675
Consolidation Settlement [in]	0	7.74089
Immediate Settlement [in]	0	11.941
Loading Stress [ksf]	0	10.3777
Effective Stress [ksf]	0	16.3904
Total Stress [ksf]	0	22.7552
Total Strain	2.02229e-008	0.106378
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.471306	16.3589
Over-consolidation Ratio	1	79.9999
Void Ratio	0	0.917
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

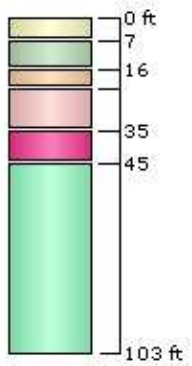
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	9	7
3	SILT & SAND	6	16
4	SAND	13	22
5	LOWER SAND	10	35
6	SAND & GRAVEL	58	45



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL	LOWER SAND
Color						
Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124	0.124
Saturated Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		300	900	1100	1400	1300
Esur [ksf]		300	900	1100	1400	1300
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.3					
Cr	0.05					
e0	0.917					
Pc [ksf]	4.52					
OCR		1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005					
Car/Care	0.005					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-767.609, 1911.57	-767.609, -555.741	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 10.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	22.5594
Consolidation Settlement [in]	0	8.33957
Immediate Settlement [in]	0	14.2226
Loading Stress [ksf]	0	10.3777
Effective Stress [ksf]	0	16.3404
Total Stress [ksf]	0	22.7052
Total Strain	1.59504e-008	0.0994291
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.556189	16.3091
Over-consolidation Ratio	1	80.6778
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

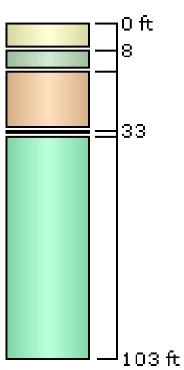
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	8	0
2	SILT	6.5	8
3	SILT & SAND	18.5	14.5
4	SAND	2	33
5	SAND & GRAVEL	68	35



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL
Color					
Unit Weight [kips/ft^3]	0.118	0.115	0.117	0.122	0.124
Saturated Unit Weight [kips/ft^3]	0.118	0.115	0.117	0.122	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		200	550	1300	1400
Esur [ksf]		200	550	1300	1400
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-767.609, 1911.57	-767.609, -555.741	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 24.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	21.1299
Consolidation Settlement [in]	0	10.2799
Immediate Settlement [in]	0	10.8534
Loading Stress [ksf]	0	10.2108
Effective Stress [ksf]	0	16.4296
Total Stress [ksf]	0	22.7944
Total Strain	5.83503e-008	0.0983151
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.676898	16.3985
Over-consolidation Ratio	1	80.6775
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

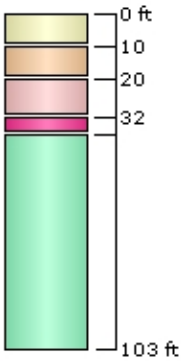
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	10	0
2	SILT & SAND	10	10
3	SAND	12	20
4	SAND (2)	5	32
5	SAND & GRAVEL	66	37



Soil Properties

Property	CLAY	SILT & SAND	SAND	SAND & GRAVEL	SAND (2)
Color					
Unit Weight [kips/ft^3]	0.118	0.12	0.122	0.124	0.122
Saturated Unit Weight [kips/ft^3]	0.118	0.12	0.122	0.124	0.122
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		300	800	1400	1000
Es bottom [ksf]		675			
Esur [ksf]		300	800	1400	1000
Esur bottom [ksf]		675			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	559.525, 509.589	447.919, -2857.73	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: CIRCLE 35.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	26.4523
Consolidation Settlement [in]	0	10.7611
Immediate Settlement [in]	0	15.6947
Loading Stress [ksf]	0	10.2108
Effective Stress [ksf]	0	16.5094
Total Stress [ksf]	0	22.999
Total Strain	9.74964e-008	0.145139
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.452551	16.4764
Over-consolidation Ratio	1	61.4541
Void Ratio	0	1.092
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

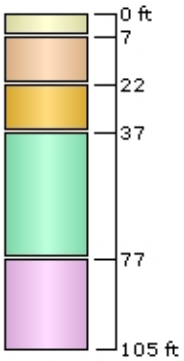
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT & SAND	15	7
3	SAND	15	22
4	SAND & GRAVEL	40	37
5	SAND (3)	28	77



Soil Properties

Property	CLAY	SILT & SAND	SAND	SAND & GRAVEL	SAND (3)
Color					
Unit Weight [kips/ft^3]	0.11	0.119	0.122	0.124	0.125
Saturated Unit Weight [kips/ft^3]	0.11	0.119	0.122	0.124	0.125
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		300	1000	1000	1200
Esur [ksf]		300	1000	1000	1200
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.37				
Cr	0.07				
e0	1.092				
Pc [ksf]	3.38				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.009				
Car/Care	0.009				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	559.525, 509.589	447.919, -2857.73	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 40.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	24.8926
Consolidation Settlement [in]	0	10.2799
Immediate Settlement [in]	0	14.6161
Loading Stress [ksf]	0	10.2108
Effective Stress [ksf]	0	16.5299
Total Stress [ksf]	0	23.0195
Total Strain	5.83503e-008	0.0983151
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.672739	16.4969
Over-consolidation Ratio	1	80.6775
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

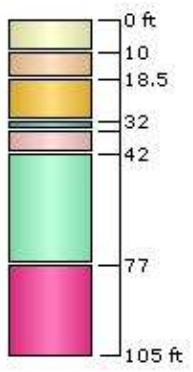
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	10	0
2	SILT & SAND	8.5	10
3	SAND & SILT	13.5	18.5
4	SILT & CLAY	3	32
5	SAND	7	35
6	SAND & GRAVEL	35	42
7	SAND (2)	28	77



Soil Properties

Property	CLAY	SILT & SAND	SAND & SILT	SAND	SAND & GRAVEL	SAND (2)	SILT & CLAY
Color							
Unit Weight [kips/ft^3]	0.118	0.119	0.12	0.122	0.124	0.125	0.12
Saturated Unit Weight [kips/ft^3]	0.118	0.119	0.12	0.122	0.124	0.125	0.12
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		200	850	1000	1000	1200	200
Es bottom [ksf]		600					
Esur [ksf]		200	850	1000	1000	1200	200
Esur bottom [ksf]		600					
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear						
Cc	0.32						
Cr	0.04						
e0	0.862						
Pc [ksf]	4.76						
OCR		1	1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004						
Car/Care	0.004						

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	559.525, 509.589	447.919, -2857.73	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 41.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	25.4632
Consolidation Settlement [in]	0	11.241
Immediate Settlement [in]	0	14.2255
Loading Stress [ksf]	0	10.2108
Effective Stress [ksf]	0	16.5354
Total Stress [ksf]	0	23.025
Total Strain	5.83503e-008	0.0983151
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.73176	16.5024
Over-consolidation Ratio	1	80.6775
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

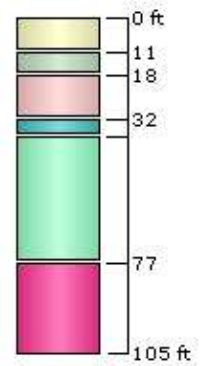
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	11	0
2	.SILT	7	11
3	SAND	14	18
4	SILT & CLAY	5	32
5	SAND & GRAVEL	40	37
6	SAND (2)	28	77



Soil Properties

Property	CLAY	.SILT	SAND	SAND & GRAVEL	SAND (2)	SILT & CLAY
Color						
Unit Weight [kips/ft^3]	0.118	0.119	0.12	0.124	0.125	0.12
Saturated Unit Weight [kips/ft^3]	0.118	0.119	0.12	0.124	0.125	0.12
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		500	1000	1000	1200	200
Esur [ksf]		500	1000	1000	1200	200
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.32					
Cr	0.04					
e0	0.862					
Pc [ksf]	4.76					
OCR		1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004					
Car/Care	0.004					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	559.525, 509.589	447.919, -2857.73	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 42.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	22.8582
Consolidation Settlement [in]	0	8.83069
Immediate Settlement [in]	0	14.0309
Loading Stress [ksf]	0	10.2108
Effective Stress [ksf]	0	16.5624
Total Stress [ksf]	0	23.052
Total Strain	5.29238e-008	0.0988246
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.590182	16.5294
Over-consolidation Ratio	1	85.4232
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

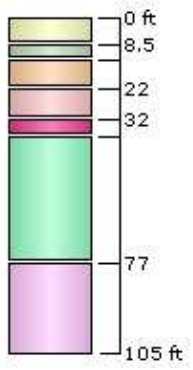
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	8.5	0
2	SILT	5	8.5
3	SILT & SAND	8.5	13.5
4	SAND	10	22
5	SAND (2)	5	32
6	SAND & GRAVEL	40	37
7	SAND (3)	28	77



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL	SAND (2)	SAND (3)
Color							
Unit Weight [kips/ft^3]	0.118	0.117	0.12	0.122	0.124	0.122	0.125
Saturated Unit Weight [kips/ft^3]	0.118	0.117	0.12	0.122	0.124	0.122	0.125
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		100	800	650	1000	1200	1200
Es bottom [ksf]		450					
Esur [ksf]		100	800	650	1000	1200	1200
Esur bottom [ksf]		450					
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear						
Cc	0.32						
Cr	0.04						
e0	0.862						
Pc [ksf]	4.76						
OCR		1	1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004						
Car/Care	0.004						

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	559.525, 509.589	447.919, -2857.73	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 43.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	26.0731
Consolidation Settlement [in]	0	10.7611
Immediate Settlement [in]	0	15.3154
Loading Stress [ksf]	0	10.2108
Effective Stress [ksf]	0	16.4674
Total Stress [ksf]	0	22.957
Total Strain	9.74964e-008	0.145139
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.450551	16.4344
Over-consolidation Ratio	1	61.4541
Void Ratio	0	1.092
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

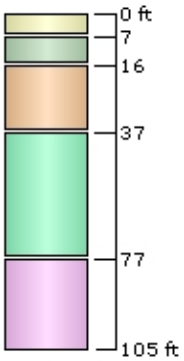
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	9	7
3	SILT & SAND	21	16
4	SAND & GRAVEL	40	37
5	SAND (3)	28	77



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND & GRAVEL	SAND (3)
Color					
Unit Weight [kips/ft^3]	0.11	0.117	0.12	0.124	0.125
Saturated Unit Weight [kips/ft^3]	0.11	0.117	0.12	0.124	0.125
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		100	750	1000	1200
Es bottom [ksf]		550			
Esur [ksf]		100	750	1000	1200
Esur bottom [ksf]		550			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.37				
Cr	0.07				
e0	1.092				
Pc [ksf]	3.38				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.009				
Car/Care	0.009				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	559.525, 509.589	447.919, -2857.73	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 47.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	20.9532
Consolidation Settlement [in]	0	7.85148
Immediate Settlement [in]	0	13.1102
Loading Stress [ksf]	0	10.3292
Effective Stress [ksf]	0	16.4014
Total Stress [ksf]	0	22.7662
Total Strain	0	0.083698
Pore Water Pressure [ksf]	0	6.3648
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.0585001	16.3699
Over-consolidation Ratio	1	9.15019
Void Ratio	0	0.916997
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

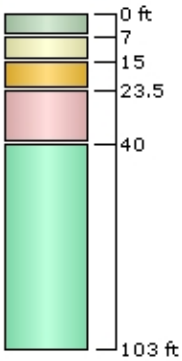
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	SILT	7	0
2	CLAY	8	7
3	SAND & SILT	8.5	15
4	SAND	16.5	23.5
5	SAND & GRAVEL	63	40



Soil Properties

Property	CLAY	SILT	SAND & SILT	SAND	SAND & GRAVEL
Color					
Unit Weight [kips/ft^3]	0.113	0.117	0.122	0.122	0.124
Saturated Unit Weight [kips/ft^3]	0.113	0.117	0.122	0.122	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		200	700	1100	1400
Esur [ksf]		200	700	1100	1400
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.3				
Cr	0.05				
e0	0.917				
Pc [ksf]	4.52				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005				
Car/Care	0.005				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-2058.82, 801.176	-110.756, 801.176	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: CIRCLE 48.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	20.4739
Consolidation Settlement [in]	0	7.35604
Immediate Settlement [in]	0	13.1178
Loading Stress [ksf]	0	10.2043
Effective Stress [ksf]	0	16.5216
Total Stress [ksf]	0	23.0112
Total Strain	3.9992e-008	0.0983004
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.506464	16.4897
Over-consolidation Ratio	1	80.6776
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

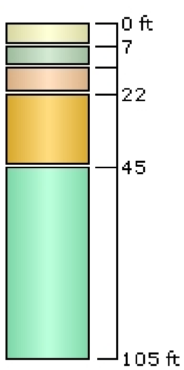
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	7	7
3	SILT & SAND	8	14
4	SAND	23	22
5	SAND & GRAVEL	60	45



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL
Color					
Unit Weight [kips/ft^3]	0.118	0.117	0.12	0.122	0.124
Saturated Unit Weight [kips/ft^3]	0.118	0.117	0.12	0.122	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		150	700	900	1400
Es bottom [ksf]		400			
Esur [ksf]		150	700	900	1400
Esur bottom [ksf]		400			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-119.939, -437.96	1670.82, -437.96	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: CIRCLE 49.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	24.8356
Consolidation Settlement [in]	0	12.1942
Immediate Settlement [in]	0	12.6414
Loading Stress [ksf]	0	10.2043
Effective Stress [ksf]	0	16.5846
Total Stress [ksf]	0	23.0742
Total Strain	3.9992e-008	0.0983004
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.788336	16.5514
Over-consolidation Ratio	1	80.6776
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

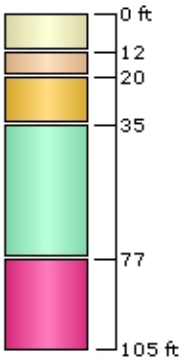
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	12	0
2	SILT & SAND	8	12
3	SAND	15	20
4	SAND & GRAVEL	42	35
5	SAND (2)	28	77



Soil Properties

Property	CLAY	SILT & SAND	SAND	SAND & GRAVEL	SAND (2)
Color					
Unit Weight [kips/ft^3]	0.118	0.12	0.122	0.124	0.125
Saturated Unit Weight [kips/ft^3]	0.118	0.12	0.122	0.124	0.125
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		200	1100	1000	1200
Es bottom [ksf]		500			
Esur [ksf]		200	1100	1000	1200
Esur bottom [ksf]		500			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-119.939, -437.96	1670.82, -437.96	100	101

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: CIRCLE 50.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	24.747
Consolidation Settlement [in]	0	12.1942
Immediate Settlement [in]	0	12.5528
Loading Stress [ksf]	0	10.2043
Effective Stress [ksf]	0	16.5806
Total Stress [ksf]	0	23.0702
Total Strain	3.9992e-008	0.0983004
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.788336	16.5474
Over-consolidation Ratio	1	80.6776
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

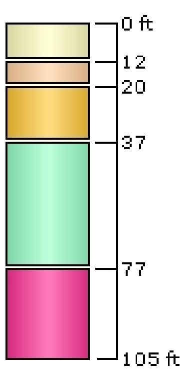
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	12	0
2	SILT & SAND	8	12
3	SAND	17	20
4	SAND & GRAVEL	40	37
5	SAND (2)	28	77



Soil Properties

Property	CLAY	SILT & SAND	SAND	SAND & GRAVEL	SAND (2)
Color					
Unit Weight [kips/ft^3]	0.118	0.12	0.122	0.124	0.125
Saturated Unit Weight [kips/ft^3]	0.118	0.12	0.122	0.124	0.125
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		300	900	1000	1200
Es bottom [ksf]		500			
Esur [ksf]		300	900	1000	1200
Esur bottom [ksf]		500			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-119.939, -437.96	1670.82, -437.96	100	101

SCHEDULE C/O-ST1

Settle3D Analysis Information

Project Settings

Document Name: circle 12 Labadie.s3z
Date Created: 3/15/2011, 2:21:05 PM
Stress Computation Method: Boussinesq
Include buoyancy effect when material settles below water table
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 0 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	0.167998
Consolidation Settlement [in]	0	0.0707617
Immediate Settlement [in]	0	0.142156
Loading Stress [ksf]	0	0.531582
Effective Stress [ksf]	0	6.69012
Total Stress [ksf]	0	13.1166
Total Strain	4.27224e-009	0.00181831
Pore Water Pressure [ksf]	0	6.42712
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	1.13095	6.68765
Over-consolidation Ratio	1	171.223
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2

Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible

Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2

Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10
-447.535	1544.49	10
-485.349	-142.076	10
-317.264	-315.23	5
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2
Depth: 0 ft

Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1649.21	915.592	10.2
-1153.62	-131.529	10.2
-485.349	-142.076	10.2
-447.535	1544.49	10.2
-1637.57	1323.75	10.2

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10
-1153.62	-131.529	10
-1649.21	915.592	10
-1637.57	1323.75	10
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10
293.799	364.216	10
2201.69	-1376.73	10
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10
832.524	-1353.16	10
802.744	-2507.54	10
188.83	-2491.7	10
27.7015	-2645.99	5

14. Polygonal Load

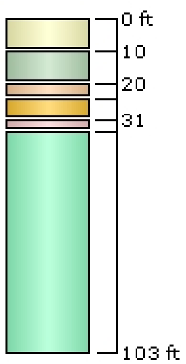
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	10	0
2	SILT	10	10
3	SAND	5	20
4	SILT & SAND	6	25
5	LOWER SAND	4	31
6	SAND & GRAVEL	68	35



Soil Properties

Property	CLAY	SILT	SAND	SILT & SAND	LOWER SAND	SAND & GRAVEL
Color						
Unit Weight [kips/ft^3]	0.118	0.117	0.119	0.12	0.122	0.124
Saturated Unit Weight [kips/ft^3]	0.118	0.117	0.119	0.12	0.122	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		200	800	600	900	1400
Es bottom [ksf]		500				
Esur [ksf]		200	800	600	900	1400
Esur bottom [ksf]		500				
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.32					
Cr	0.04					
e0	0.862					
Pc [ksf]	4.76	4.52				
OCR			1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004					
Car/Care	0.004					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-37, 1887	-188, -1959	100	Auto: 61

Settle3D Analysis Information

Project Settings

Document Name: circle 11 Labadie.s3z
Date Created: 3/15/2011, 2:21:05 PM
Stress Computation Method: Boussinesq
Include buoyancy effect when material settles below water table
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 0 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	0.198016
Consolidation Settlement [in]	0	0.0968068
Immediate Settlement [in]	0	0.148182
Loading Stress [ksf]	0	0.531582
Effective Stress [ksf]	0	6.66916
Total Stress [ksf]	0	13.0956
Total Strain	0	0.00603323
Pore Water Pressure [ksf]	0	6.42712
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	1.1603	6.66669
Over-consolidation Ratio	1	713.429
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2

Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible

Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2

Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10
-447.535	1544.49	10
-485.349	-142.076	10
-317.264	-315.23	5
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2
Depth: 0 ft

Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1649.21	915.592	10.2
-1153.62	-131.529	10.2
-485.349	-142.076	10.2
-447.535	1544.49	10.2
-1637.57	1323.75	10.2

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10
-1153.62	-131.529	10
-1649.21	915.592	10
-1637.57	1323.75	10
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10
293.799	364.216	10
2201.69	-1376.73	10
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10
832.524	-1353.16	10
802.744	-2507.54	10
188.83	-2491.7	10
27.7015	-2645.99	5

14. Polygonal Load

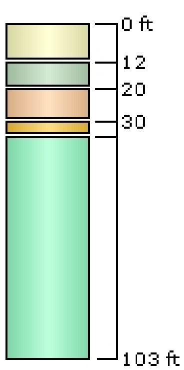
Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	12	0
2	SILT	8	12
3	SILT & SAND	10	20
4	CLAY & SILT	5	30
5	SAND & GRAVEL	68	35



Soil Properties

SCHEDULE CIC-ST1

Property	CLAY	SILT	SILT & SAND	CLAY & SILT	SAND & GRAVEL
Color					
Unit Weight [kips/ft^3]	0.118	0.117	0.118	0.12	0.124
Saturated Unit Weight [kips/ft^3]	0.118	0.117	0.118	0.12	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		400	500	225	1400
Esur [ksf]		400	500	225	1400
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				
Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76	4.52			
OCR			1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-37, 1887	-188, -1959	100	Auto: 59

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: circle 9.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft

Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]

-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2
Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2

-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2

293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

15. Polygonal Load

Load Type: Flexible
Area of Load: 6368.13 ft^2
Load: 2.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-189.163	598.37
24.1777	598.37
25.3044	628.184
-188.546	628.184

16. Polygonal Load

Load Type: Flexible
Area of Load: 36129.2 ft^2
Depth: 0 ft
Installation Stage: Stage 1

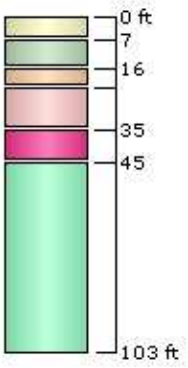
Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-263.883	598.37	0
-190.3	543.421	0
-189.163	598.37	2.2
-188.546	628.184	2.2
25.3044	628.184	2.2
24.1777	598.37	2.2
-189.163	598.37	2.2
-190.3	543.421	0
22.101	543.421	0
100.385	598.37	0
100.385	628.184	0
27.3659	682.733	0
-187.417	682.733	0
-263.883	628.184	0

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	9	7
3	SILT & SAND	6	16
4	SAND	13	22

5	LOWER SAND	10	35
6	SAND & GRAVEL	58	45



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL	LOWER SAND
Color						
Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124	0.124
Saturated Unit Weight [kips/ft^3]	0.113	0.117	0.12	0.122	0.124	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		300	900	1100	1400	1300
Esur [ksf]		300	900	1100	1400	1300
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear					
Cc	0.3					
Cr	0.05					
e0	0.917					
Pc [ksf]	4.52					
OCR		1	1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.005					
Car/Care	0.005					

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-37, 1887	-188, -1959	100	100

Settle3D Analysis Information
Labadie UWL

Project Settings

Document Name: CIRCLE 48.s3z
Project Title: Labadie UWL
Analysis: Settlement
Author: Christopher Cook
Company: Reitz & Jens, Inc
Date Created: 10/17/2012, 11:48:36 AM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses
Groundwater method: Water Table
Water Unit Weight: 0.0624 kips/ft^3
Depth to water table: 1 [ft]

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [in]	0	4.28082
Consolidation Settlement [in]	0	1.93172
Immediate Settlement [in]	0	2.34909
Loading Stress [ksf]	0	2.20022
Effective Stress [ksf]	0	7.76966
Total Stress [ksf]	0	14.2593
Total Strain	2.30708e-009	0.0552686
Pore Water Pressure [ksf]	0	6.4896
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.498421	7.76591
Over-consolidation Ratio	1	806.771
Void Ratio	0	0.862
Hydroconsolidation Settlement [in]	0	0

Loads

1. Polygonal Load

Load Type: Flexible
Area of Load: 183389 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1929.25	862.473	0
-1332.07	-407.189	0
-210.328	-424.303	0
-270.312	-363.597	2.9
-1293.01	-349.297	2.9
-1870.41	874.203	2.9
-1852.31	1508.1	2.9
-1908.21	1557.97	0

2. Polygonal Load

Load Type: Flexible
Area of Load: 234768 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-221.212	1808.9	2.9
-270.312	-363.597	2.9
-210.328	-424.303	0
-162.623	1880.73	0
-1908.21	1557.97	0

3. Polygonal Load

Load Type: Flexible
Area of Load: 156632 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1870.41	874.203	2.9
-1293.01	-349.297	2.9
-270.312	-363.597	2.9
-317.264	-315.23	5
-1259.26	-297.655	5
-1809.13	885.67	5
-1806.79	1469.02	5
-1852.31	1508.1	2.9

4. Polygonal Load

Load Type: Flexible
Area of Load: 171981 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1852.31	1508.1	2.9
-1806.79	1469.02	5
-267.217	1755.15	5
-317.264	-315.23	5
-270.312	-363.597	2.9
-221.212	1808.9	2.9

5. Polygonal Load

Load Type: Flexible
Area of Load: 244557 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-102.643	-2757.4	0
1076.16	-2794.88	0
1109.25	-1637.87	0
3035.41	-1668.34	0
2874.5	-1608.34	2.9
1048.12	-1576.89	2.9
1016.65	-2734.4	2.9
-39.0646	-2705.7	2.9

6. Polygonal Load

Load Type: Flexible
Area of Load: 433982 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0604	-2705.58	2.9
88.9461	776.742	2.9
2874.5	-1608.34	2.9
3035.41	-1668.34	0
35.4746	897.295	0
-102.643	-2757.4	0

7. Polygonal Load

Load Type: Flexible
Area of Load: 451309 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
27.8223	-2642.81	5
153.042	647.667	5
2690.18	-1545.21	5
2874.5	-1608.34	2.9
88.9461	776.742	2.9
-39.0604	-2705.58	2.9

8. Polygonal Load

Load Type: Flexible
Area of Load: 238713 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-39.0644	-2705.7	2.9
1018.23	-2734.44	2.9
1048.12	-1576.89	2.9
2874.5	-1608.34	2.9
2690.18	-1545.21	5
989.752	-1516.32	5
956.638	-2672.65	5
27.8223	-2642.81	5

9. Polygonal Load

Load Type: Flexible
Area of Load: 567821 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-1637.57	1323.75	10.2
-447.535	1544.49	10.2
-485.349	-142.076	10.2
-317.264	-315.23	10.2
-267.217	1755.15	5
-1806.56	1468.98	5

10. Polygonal Load

Load Type: Flexible
Area of Load: 1.5903e+006 ft^2

Load: 10.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-1649.21	915.592
-1153.62	-131.529
-485.349	-142.076
-447.535	1544.49
-1637.57	1323.75

11. Polygonal Load

Load Type: Flexible
Area of Load: 417396 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-485.349	-142.076	10.2
-1153.62	-131.529	10.2
-1649.21	915.592	10.2
-1637.57	1323.75	10.2
-1806.56	1468.98	5
-1809.13	885.67	5
-1259.26	-297.655	5
-317.264	-315.23	5

12. Polygonal Load

Load Type: Flexible
Area of Load: 941302 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
188.83	-2491.7	10.2
293.799	364.216	10.2
2201.69	-1376.73	10.2
2690.18	-1545.21	5
153.042	647.667	5
27.7015	-2645.99	5

13. Polygonal Load

Load Type: Flexible
Area of Load: 551990 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
952.602	-2672.52	5
989.748	-1516.48	5
2690.18	-1545.21	5
2201.69	-1376.73	10.2
832.524	-1353.16	10.2
802.744	-2507.54	10.2
188.83	-2491.7	10.2
27.7015	-2645.99	5

14. Polygonal Load

Load Type: Flexible
Area of Load: 2.38333e+006 ft^2
Depth: 0 ft
Installation Stage: Stage 1

Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
832.524	-1353.16	10.2
2201.69	-1376.73	10.2
293.799	364.216	10.2
188.83	-2491.7	10.2
802.744	-2507.54	10.2

15. Polygonal Load

Load Type: Flexible
Area of Load: 6083.7 ft^2
Load: 2.2 ksf
Depth: 0 ft
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-209.08	-363.999
-12.1921	-363.999
-11.0259	-333.141
-208.441	-333.141

16. Polygonal Load

Load Type: Flexible
Area of Load: 34847 ft^2
Depth: 0 ft
Installation Stage: Stage 1

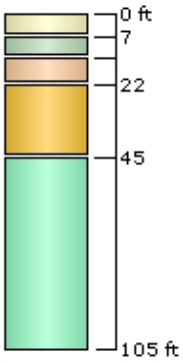
Coordinates and Load

X [ft]	Y [ft]	Load Magnitude [ksf]
-270.312	-363.597	0
-210.328	-424.303	0

-209.08	-363.999	2.2
-208.441	-333.141	2.2
-11.0259	-333.141	2.2
-12.1921	-363.999	2.2
-209.08	-363.999	2.2
-210.328	-424.303	0
-14.4711	-424.303	0
64.675	-363.999	0
64.675	-333.141	0
-8.95688	-278.393	0
-207.308	-278.393	0
-270.312	-333.141	0

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	CLAY	7	0
2	SILT	7	7
3	SILT & SAND	8	14
4	SAND	23	22
5	SAND & GRAVEL	60	45



Soil Properties

Property	CLAY	SILT	SILT & SAND	SAND	SAND & GRAVEL
Color					
Unit Weight [kips/ft^3]	0.118	0.117	0.12	0.122	0.124
Saturated Unit Weight [kips/ft^3]	0.118	0.117	0.12	0.122	0.124
Immediate Settlement	Disabled	Enabled	Enabled	Enabled	Enabled
Es [ksf]		150	700	900	1400
Es bottom [ksf]		400			
Esur [ksf]		150	700	900	1400
Esur bottom [ksf]		400			
Primary Consolidation	Enabled	Disabled	Disabled	Disabled	Disabled
Material Type	Non-Linear				

Cc	0.32				
Cr	0.04				
e0	0.862				
Pc [ksf]	4.76				
OCR		1	1	1	1
Secondary Consolidation	Standard	Disabled	Disabled	Disabled	Disabled
Cae/Ca	0.004				
Car/Care	0.004				

Query Lines

Line #	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	-37, 1887	-188, -1959	100	101
2	-114.933, -268.397	-121.003, -437.214	100	Auto: 61

Appendix G

DESIGN OF FABRIC-FORMED CONCRETE MAT (FCM)
Revised August 2013

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REITZ & JENS, INC. CONSULTING ENGINEERS

PROJECT AMEREN LABADIE UWL

SUBJECT DESIGN OF FABRIC-FORM CONCRETE MAT EROSION PROTECTION

DATE 6/12/2012 BY JLF Proj. Number 2008012455 SHEET 1 OF 1

REVISED JULY 2013

DESIGN OF FABRIC-FORMED CONCRETE MAT (FCM)

FCM IS FOR EROSION PROTECTION OF PERMANENT EXTERIOR SLOPE OF BERMS. FROM FLOODPLAIN ANALYSIS BY CDG, HIGHEST VELOCITIES OCCUR ALONG WEST BERM AT STA. 57.38 (RM),

MAX. VELOCITY = 1.30 TO 1.40 FPS
DEPTH OF FLOW (Y) = EL 481.6 - 465 = 16.6 FT FOR 100-YR FLOOD

FROM FHWA HEC-23, VOL. 2 (SEPT. 2009), CHAPTER 9

$$\text{FACTOR SAFETY (FS)} = \left[\frac{\mu(t)(\gamma_c-\gamma_w)\cos\theta\cos\alpha - \tau_{DES}}{\sqrt{[t(\gamma_c-\gamma_w)\sin\theta]^2+\tau_{DES}^2}}\right]$$

WHERE μ = COEFF. BASE SHEAR = TAN δ
RECOMMENDED δ FOR FCM ON FILTER GEOFABRIC OVER COHESIVE SOIL IS 32.5°
$\therefore \mu = \tan(32.5°) = 0.637$

t = THICKNESS OF FCM, TRY HYDROTEX FILTER POINT (FP) LINER FP220, WHICH IS 2.2" THICK, OR 0.183 FT
γ_c = UNIT WEIGHT OF FINE AGGREGATE CONCRETE
RECOMMENDED γ_c = 130 PCF
γ_w = 62.4 PCF (WATER)
θ = SLOPE ANGLE = 18.435° FOR 1(V)-3(H)
α = SLOPE OF BED, ASSUME 0

$$\text{ASSUME F.S.} = 1.5 = \left[\frac{(0.637)(0.183)(130\text{ PCF}-62.4\text{ PCF})\cos(18.435°)\cos(0°) - \tau_{DES}}{\sqrt{[(0.183')(130-62.4)\sin 18.435]^2+\tau_{DES}^2}}\right]$$

SOLVING, τ_{DES} = 1.294 PSF FOR F.S. = 1.5

DESIGN VELOCITY: $\tau_{DES} = \frac{\gamma_w}{Y^{1/3}}\left(\frac{n V_{DES}}{K_u}\right)^2$ WHERE K_u = 1.486 (ENG. UNITS)
n = MANNING COEFF. FOR FCM

$$1.294\text{ PSF} = \frac{62.4\text{ PCF}}{(16.6')^{1/3}}\left(\frac{0.03\cdot V_{DES}}{1.486}\right)^2$$

n = 0.03 TO 0.025

MAX V_{DES} = 11.4 FPS >> 1.40 FPS ESTIMATED

USE: HYDROTEX FP220 OVER GEOFABRIC OVER COHESIVE BERM FILL

SCHEDULE CJG-ST1

CHECKED BY: JDB 2/14/2013

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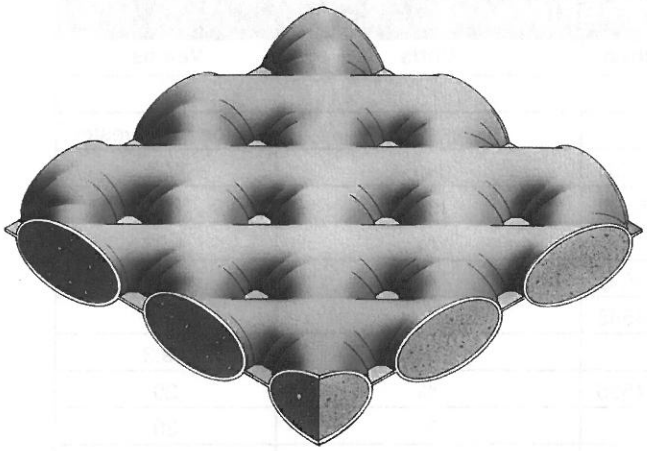

HYDROTEX™

Specification Guideline

Fabric-formed Concrete Erosion Control Systems

Filter Point Lining

Table 1.0 Typical Dimensions and Weights

Filter Point	FP220	FP400	FP600	FP800	FP1000	FP1200
Average Thickness, mm	56	102	152	203	254	305
Mass Per Unit Area, kg/m²	121	220	330	440	550	661
Filter Point Spacing, mm	127	203	254	305	356	406
Area per Filter Point, cm²	12.9	12.9	40.7	40.7	78.7	78.7
Perimeter per Filter Point, mm	165	165	279	279	381	381
Concrete Coverage, m²/m³	16.6	9.1	6.1	4.6	3.6	3.0
Shear Resistance, kg/m²	54	98	146	195	244	293

Note: Values shown are typical and will vary with weight of concrete and field conditions.

Product Description

Filter Point Linings with filtering points (drains) provide an erosion resistant, permeable concrete lining for ditches, channels, canals, streams, rivers, ponds, lakes, reservoirs, marinas, and protected port and harbor areas. Filter Point Linings have a cobbled surface and a relatively high coefficient of hydraulic friction in order to achieve lower flow velocities and to reduce wave run-up. The filter points provide for the relief of hydrostatic uplift pressure, increasing the system's stability.

Filter Point Linings are generally used in lieu of stone rip rap or slope paving due to their lower cost and higher performance. Filter Point Linings have greater stability than conventional slope paving because of several factors – they can mitigate uplift pressure from ground water, reduce hydraulic uplift of flowing water by slowing channel velocities, and conform to soil contours during installation to reduce the potential for underscour.

Filter Point forms are woven from multifilament and textured yarns. The double-layer fabric is joined by interwoven filter points on controlled centers to form a lining with a deeply cobbled appearance. The spacing of the filter points determines the lining's thickness and weight, while the specially designed filter points relieve hydrostatic pressure and reduce applied stress to the fabric during pumping. Filter Point Linings are available in a wide range of thicknesses.

1.0 GENERAL

1.1 Scope of Work: The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all operations in connection with the installation of the proposed Filter Point (FP) Lining in accordance with the lines, grades, design, and dimensions shown on the Contract Drawings and as specified herein.

1.2 Description: The work shall consist of installing an unreinforced concrete lining by positioning specially woven, double-layer synthetic forms on the surface to be protected and filling them with a pumpable, fine aggregate concrete (structural grout) in such a way as to form a stable lining of required thickness, weight and configuration.

2.0 MATERIALS REQUIREMENTS

2.1 Fine Aggregate Concrete: Fine aggregate concrete shall consist of a proportioned mixture of Portland cement, fine aggregate (sand) and water. The consistency of the fine aggregate concrete delivered to the concrete pump shall be proportioned and mixed as to have an efflux time of 9-12 seconds when passed through the 19 mm orifice of the standard flow cone that is described in ASTM C 939. Pozzolan, fluidifier or pumping aid conforming to this Specification may be used at the option of the Contractor. The mix shall exhibit a compressive strength of 13.8 MPa at 28 days, when made and tested in accordance with ASTM C 31 and C 39.

2.1.1 Portland cement shall conform to ASTM C 150, Type I or Type II.

2.1.2 Fine aggregate shall conform to ASTM C 33, except as to grading. Aggregate grading shall be reasonably consistent and shall not exceed the maximum size which can be conveniently handled with available pumping equipment.

PROPERTY REQUIREMENTS - FILTER POINT FABRIC[1, 2]				
Property		**Test Method**	**Units**	**Values**
Physical:				
Composition of Yarns				Nylon or polyester
Mass Per Unit Area (double-layer)		ASTM D 5261	g/m²	403
Thickness		ASTM D 5199	mm	0.6
Mill Width			m	1.92
Mechanical:				
Wide-Width Strip Tensile Strength	- Machine	ASTM D 4595	kN/m	24.5
	- Cross		kN/m	19.3
Elongation at Break	- Machine	ASTM D 4595	%	20
	- Cross		%	30
Trapezoidal Tear Strength	- Machine	ASTM D 4533	N	665
	- Cross		N	445
Hydraulic:				
Apparent Opening Size (AOS)		ASTM D 4751	mm	0.425
Flow Rate		ASTM D 4491	l/min/m²	3665
Flow Rate through Filter Point		ASTM D 4491	l/min/m²	285

Notes:

1. *Conformance of fabric to specification property requirements shall be based on ASTM D 4759, "Practice for Determining the Specification Conformance of Geotextiles."*
2. *All numerical values represent minimum average roll values (i.e., average of test results from any sample roll in a lot shall meet or exceed the minimum values). Lots shall be sampled according to ASTM D 4354, "Practice for Sampling of Geosynthetics for Testing."*

2.1.3 Water for mixing shall be clean and free from injurious amounts of oil, acid, salt, alkali, organic matter or other deleterious substances.

2.1.4 Pozzolan, if used, shall conform to ASTM C 618, Class C, F or N.

2.1.5 Plasticizing and air entraining admixtures, if used, shall conform to ASTM C 494 and ASTM C 260, respectively.

2.2 Fabric Forms: The fabric forms shall be as specified, HYDROTEX™ Filter Point (see Note A) forms as manufactured by Geostar Corporation; 74 Perimeter Center East, Suite 7420; Atlanta, Georgia 30346-1803, Tel: 800.253.0561 (770.399.5051); or approved equal. The fabric forms shall be composed of synthetic yarns formed into a woven fabric. Yarns used in the manufacture of the fabric shall be composed of nylon and/or polyester. Forms shall be woven with a minimum of 50% textured yarns (by weight) to improve adhesion to fine aggregate concrete and to improve filtration. Partially-oriented (POY), draw-textured, and/or staple yarns shall not be used in the manufacture of the fabric. Each layer of fabric shall conform to the physical, mechanical and hydraulic requirements referenced herein. The fabric forms shall be free of defects or flaws which significantly affect their physical, mechanical, or hydraulic properties.

Note A: The engineer shall indicate the Filter Point Lining size required (see Table 1.0). Example: FP400.

2.2.1 Fabric forms shall consist of double-layer woven fabric joined together by spaced, interwoven filter points to form a concrete lining with a finished average thickness of (*see Table 1.0*) mm, a nominal mass per unit area of (*see Table 1.0*) kg/m², and a deeply cobbled surface appearance. After the form has been filled with fine aggregate concrete, the filter points shall be on approximately (*see Table 1.0*) mm spacing when measured along the diagonal. Filter points shall be formed by interweaving the double-layer fabric to form water permeable drains and attachment points for the control of concrete lining thickness. The interweaving of the fabric layers shall form an area of double density, high strength, single-layer fabric with an area of (*see Table 1.0*) cm² and a perimeter of (*see Table 1.0*) mm. All filter points shall be cross shaped and shall have twill weave centers designed to function as drains to relieve hydrostatic uplift pressure.

2.2.2 Mill widths of fabric shall be a minimum of 1.92 meters. Each selvage edge of the top and bottom layers of fabric shall be reinforced for a width of not less than 35 mm by adding a minimum of 6 warp yarns to each selvage construction. Mill width rolls shall be cut to the length required, and the double-layer fabric separately joined, bottom layer to bottom layer and top layer to top layer, by means of sewing thread, to form multiple mill width panels with sewn seams on not less than 182 cm centers.

2.2.3 All factory-sewn seams shall be downward facing as shown on the Contract Drawings. All seams sewn in the factory shall be not less than 15.7 kN/m when tested in accordance with ASTM D 4884. All sewn seams and zipper attachments shall be made using a double line of U.S. Federal Standard Type 401 stitch. All stitches

shall be sewn simultaneously and be parallel to each other, spaced between 6 and 19 mm apart. Each row of stitching shall consist of 4 to 7 stitches per 25.4 mm. Thread used for seaming shall be nylon and/or polyester.

2.2.4 Baffles shall be installed at predetermined mill width intervals to regulate the distance of lateral flow of fine aggregate concrete. The baffle material shall be nonwoven filter fabric. The grab tensile strength of the filter fabric shall be not less than 400 N when tested in accordance with ASTM D 4632.

2.2.5 The fabric forms shall be kept dry and wrapped such that they are protected from the elements during shipping and storage. If stored outdoors, they shall be elevated and protected with a waterproof cover that is opaque to ultraviolet light. The fabric forms shall be labeled as per ASTM D 4873, "Guide for Identification, Storage and Handling of Geosynthetic Rolls."

2.2.6 The Contractor shall submit a manufacturer's certificate that the supplied fabric forms meet the criteria of these Specifications, as measured in full accordance with the test methods and standards referenced herein. The certificates shall include the following information about each fabric form delivered:

Manufacturer's name and current address;
full product name;
style and product code number;
form number(s);
composition of yarns; and
manufacturer's certification statement.

2.3 Filter Fabrics: The filter fabrics shall be composed of synthetic fibers or yarns formed into a nonwoven or woven fabric. Fibers and yarns used in the manufacture of filter fabrics shall be composed of at least 85% by weight of polypropylene, polyester or polyethylene. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages. These materials shall conform to the physical requirements shown below. The filter fabric shall be free of defects or flaws which significantly affect its mechanical or hydraulic properties.

PROPERTY REQUIREMENTS - FILTER FABRIC [1,2]			
Property	**Test Method**	**Units**	**Values**
Grab Tensile Strength	ASTM D 4632	N	400
Elongation at Break	ASTM D 4632	%	15
Trapezoidal Tear Strength	ASTM D 4533	N	130
Permittivity	ASTM D 4491	sec^{-1}	0.5

Notes:

1. *Conformance of filter fabrics to specification property requirements shall be based on ASTM D 4759, "Practice for Determining the Specification Conformance of Geotextiles."*
2. *All numerical values represent minimum average roll values (i.e., average of test results from any sample roll in a lot shall meet or exceed the minimum values). Lots shall be sampled according to ASTM D 4354, "Practice for Sampling of Geosynthetics for Testing."*

3.0 DESIGN REQUIREMENTS

Note B: Select the appropriate pair of paragraphs for the final specification based upon the type of hydraulic application.

The average thickness, mass per unit area and hydraulic resistance of each concrete lining shall withstand the hydraulic loadings (velocity, depth, duration, shear stress, pressure, and frequency of immersion) for the design discharges along the structure(s). The stability analysis for each concrete lining shall be accomplished using a factor-of-safety methodology. A minimum factor of safety of 1.5 shall be required.

The Contractor shall provide to the Engineer calculations and design details, provided by the manufacturer or a professional engineer, attesting to the suitability of each fabric formed concrete lining for the purpose contemplated. Each concrete lining shall be accepted only when accompanied by the documented hydraulic performance characteristics derived from tests performed under controlled flow conditions. Test conditions shall conform to test protocol as documented in "Hydraulic Stability of Fabric Formed Concrete Lining and Mat Systems During Overtopping Flow."

or

The average thickness, mass per unit area and hydraulic resistance of each concrete lining shall withstand the hydraulic loadings (depth, duration, type of wave, wave height and period, and pressure distribution) for the design wave. The stability analysis for the concrete lining shall be accomplished using the factor-of-safety methodology. A minimum factor of safety of 1.5 shall be required.

The Contractor shall provide to the Engineer calculations and design details, provided by the manufacturer or a professional engineer, attesting to the suitability of each fabric formed concrete lining for the purpose contemplated. Each concrete lining shall be accepted only when accompanied by hydraulic stability calculations derived from mathematical models developed specifically for fabric formed concrete linings and for this purpose.

4.0 CONSTRUCTION AND INSTALLATION REQUIREMENTS

4.1 Site Preparation

4.1.1 Areas on which fabric forms are to be placed shall be constructed to the lines, grades, contours, and dimensions shown on the Contract Drawings. All obstructions such as roots and projecting stones shall be removed. Where such areas are below the allowable grades, they shall be brought to grade by placing compacted layers of select material. The thickness of layers and the amount of compaction shall be as specified by the Engineer. Where required by the Contract Specifications, soft and otherwise unsuitable subgrade soils shall be identified, excavated and replaced with select materials in accordance with the Contract Specifications.

4.1.2 Excavation and preparation of aprons as well as anchor, terminal or toe trenches shall be done in accordance with the lines, grades, contours, and dimensions shown on the Contract Drawings.

4.1.3 Immediately prior to placing the fabric forms, the prepared area shall be inspected by the Engineer, and no forms shall be placed thereon until the area has been approved.

4.2 Fabric Form Placement

4.2.1 A filter fabric shall be placed on the graded surface approved by the Engineer.

4.2.2 Fabric forms shall be placed over the filter fabric and within the limits shown on the Contract Drawings. Anchoring of the fabric forms shall be accomplished through the use of anchor, terminal and toe trenches.

4.2.3 Adjacent fabric forms shall be joined before filling with fine aggregate concrete by field sewing or zippering the two bottom layers of fabric together and the two top layers of fabric together. All field seams shall be made using two lines of U.S. Federal Standard Type 101 stitches. All sewn seams shall be downward facing, and all zipper seams shall be fastened as shown on the Contract Drawings, except with the approval of the Engineer.

4.2.4 When conventional joining of fabric forms is impractical or where called for on the Contract Drawings, adjacent forms may be overlapped a minimum of one meter to form a lap joint, pending approval by the Engineer. Based on the predominant flow direction, the downstream edge of the form shall overlap the upstream edge of the next form. In no case shall simple butt joints between forms be permitted.

4.2.5 Expansion joints shall be provided as shown on the Contract Drawings, or as specified by the Engineer.

4.2.6 Immediately prior to filling with fine aggregate concrete, the assembled fabric forms shall be inspected by the Engineer, and no fine aggregate concrete shall be pumped therein until the fabric seams have been approved. At no time shall the unfilled fabric forms be exposed to ultraviolet light (including direct sunlight) for a period exceeding five days.

4.3 Fine Aggregate Concrete Placement

4.3.1 Following the placement of the fabric forms, small slits shall be cut in the top layer of the fabric form to allow the insertion of the filling pipe at the end of the fine aggregate concrete pump hose. These slits shall be of the minimum length to allow proper insertion of the filling pipe. Fine aggregate concrete shall be pumped between the top and bottom layers of fabric, filling the forms to the recommended thickness and configuration.

4.3.2 Fine aggregate concrete shall be pumped in such a way that excessive pressure on the fabric forms and cold joints are avoided. A cold joint is defined as one in which the pumping of the fine aggregate concrete into a given form is discontinued or interrupted for an interval of forty-five or more minutes.

4.3.3 Holes in the fabric forms left by the removal of the filling pipe shall be temporarily closed by inserting a piece of nonwoven fabric or similar material. The nonwoven fabric shall be removed when the concrete is no longer fluid and the concrete surface at the hole shall be cleaned and smoothed by hand. Foot traffic on the filled form shall be restricted to an absolute minimum for one hour after filling.

4.3.4 After the fine aggregate concrete has set, all anchor, terminal and toe trenches shall be backfilled and compacted, as specified by the Engineer.

4.3.5 The Filter Point Lining shall be measured by the number of square meters computed from the payment lines shown on the Contract Drawings or from payment lines established in writing by the Engineer. This includes Filter Point fabric forms, fine aggregate concrete, and filter fabric used in the aprons, overlaps, and anchor, terminal, or toe trenches. Slope preparation, excavation and backfilling, and bedding are separate pay items.

Spec: FP (siu)
Revised December 2001

Call or write for your complete set of HYDROTEX™ and HYDROCAST™ Specification Guidelines. Available as printed specifications, in Adobe® Acrobat® (pdf) format, or in an editable text format. PDF specifications are available for download from our web site at www.geostarcorporation.com.

Hydrotex products are manufactured by:

Geostar Corporation
74 Perimeter Center East, Suite 7420
Atlanta, Georgia 30346-1803
Tel: 1.800.253.0561 or 770.399.5051 Fax: 770.394.5999
www.geostarcorporation.com • e-mail: info@geostarcorporation.com

Appendix H

APPENDIX 2, SUB-APPENDIX D FROM DETAILED SITE INVESTIGATION: ANALYSIS OF CPT SOUNDINGS AND COMPARISON WITH BORINGS

Added November 2013

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Appendix D – Analysis of CPT Soundings and Comparison with Borings

The Cone Penetration Test (CPT) data, which appear in Appendix C, have been processed using the program CPT-Pro by GeoSoft in order for the soundings to be easily interpreted visually. This processing includes smoothing the raw data and interpretation for both geologic and geotechnical parameters. The raw data generated by the cone penetrometer include: the cone tip pressure (q_c), skin friction (f_s), and porewater pressure measured behind the cone tip (u_2). The tip pressure and skin friction are corrected by CPT-Pro to account for static pore water pressure (q_t and f_t respectively).

A smoothing function is used to clean up the raw data, to correct for the sensitivity of the CPT equipment and the normal errors that are generated during penetration. This smoothing function removes any erroneous data, and evens out any micro-scale features such as those caused by individual gravel fragments or thin layering which are beyond the ability of the cone penetrometer to reasonably detect due to the probe geometry. By smoothing the data, we ensure that it represents the soil behavior of a soil stratum and not individual anomalies. This smoothing of the data has been shown to have little impact on the soil stratigraphy that is created from the data.

After the data has been smoothed, interpretations can be made. Based upon the pore water pressure data, the ground water depth is approximated manually. Knowing the depth to ground water, the software calculates the static pore water pressure (u_o). From the smoothed data of q_t and f_t, CPT-Pro automatically calculates the friction ratio (R_f), which is defined as (f_t/q_t) or alternately as (f_s/q_t). In general, a high R_f is indicative of fine-grain and low sensitivity soils. CPT-Pro also calculates the pore pressure ratio (B_q), which is defined as $(u_2-u_0)/(q_t-\sigma_{vo})$. In general, higher pore pressure ratios correspond to more sensitive soils, that is, soils which lose significant undrained shear strength when disturbed. Very sensitive soils are typically found in marine deposits in saltwater environments, not in the St. Louis area.

The soil stratigraphy can be determined with this base information, which is derived solely from the data collected from the cone penetrometer as it is pushed, because there are no soil cuttings or soil samples. The primary classification system that we used is the "R_f and q_t based Robertson 1986", which determines the soil type based upon the corrected cone tip pressure and the friction ratio. The chart used for this method is shown in Figure D-1, which we copied from the CPT-Pro manual. This method is one of 5 that are part of the CPT-Pro program. Coarse-grain soils generally have high q_t and low R_f, and fine-grain soils (silts and clays) have low q_t and high R_f. These relative values are the basis of soil classification under the R_f & q_t method. In order to account for the limits of data acquisition due to probe geometry, a minimum layer thickness of 6 inches was used for soil classification.

In some cases, we used a second classification system where unexpected or anomalous classifications were produced by the R_f & q_t method – specifically where either "sensitive fine grained" or "organic material" classifications were selected by CPT-Pro. The term "sensitive fine grained" was not useful as it does not descriptive of a soil type. A few CPT logs were developed in our initial analyses using the

R_f & q_t method that had very thick layers (greater than 5 feet) of "organic material." None of the standard borings on the site encountered anything more than laminations of organics, so we questioned the validity of this classification. The second classification system employed was "B_q and q_t based Robertson 1986," which determines the soil type based upon the corrected cone tip pressure and the pore pressure ratio. The chart for this classification method is shown in Figure D-2, also from the CPT-Pro manual. A reasonable soil classification resulted using the B_q & q_t method in each case where a questionable classification from the R_f & q_t method was re-analyzed. Our engineering judgment, and CPT soundings correlated with geotechnical borings with soil samples on this project and from other projects, led to our choice of the above two methods of the 5 available in CPT-Pro. We tried the other methods of analyses in the CPT-Pro program, but this yielded the best results.

Five extra temporary geotechnical borings were made next to selected CPT soundings to verify that the CPT sounding produced similar or better results than a standard boring. The pairs of CPT logs and boring logs are depicted in Figures D-3 through D-7. Some logs, specifically C-100 and B-100 in Figure D-6, demonstrate that the CPT probe can detect finer soil layering than a standard geotechnical boring in which soil samples are taken at intervals. In addition to the geotechnical borings, we made CPT soundings next to 3 selected piezometer borings. These are depicted in Figures D-8 through D-10. The general soil classifications in each of these pairs of logs are very similar for practical purposes, with the exception of laminated soils. Laminated soils have been indentified in the CPT logs as an average of the soil types in that interval because of the scale limitations of the probe's size and geometry.

Nine extra confirmation CPT soundings were made next to the planned CPT soundings to demonstrate the repeatability of the results. These comparisons are depicted in Figures D-11 through D-19. The distance in feet between the soundings is shown at the bottom in each figure. The results for each pair are very similar.

Based on the soil type and generated parameters (B_q, R_f, etc.), geotechnical soil parameters were then developed by CPT-Pro. These parameters include: undrained shear strength (s_u), internal effective friction angle (ϕ'), a pseudo corrected SPT blow count (N_{60}), relative density (D_r or I_D), Young's modulus (E_s), and wet unit weight (γ). Some of these are calculated by CPT-Pro using internal equations, and some are calculated with user-input equations from other sources. The references for the equations used are listed below. The data are plotted on the CPT sounding logs and/or are listed in the CPT reports. The CPT reports list the means of data and calculated parameters within each 2.5-foot depth interval. Each CPT report follows the corresponding CPT log in Appendix C.

We noted that the N_{60}-values from the standard borings were drastically different from the N_{60}-values which were calculated by CPT-Pro for the pairs of borings and CPT soundings. Therefore, the N_{60}-values from CPT-Pro have been corrected with factors developed by Reitz & Jens for this site. The factors depend upon the soil type. The corrected N_{60}-values are listed in the CPT reports. The correlations which we used are plotted in Figure D-20.

REFERENCES USED IN ANALYSES

Lunne, T., Robertson P.K. and Powell J.J.M. (1997), *Cone Penetration Testing in Geotechnical Practice*. Blackie Academic & Professional.

Bowles, Joseph (1996), *Foundation Analysis and Design, 5th Ed.* McGraw-Hill.

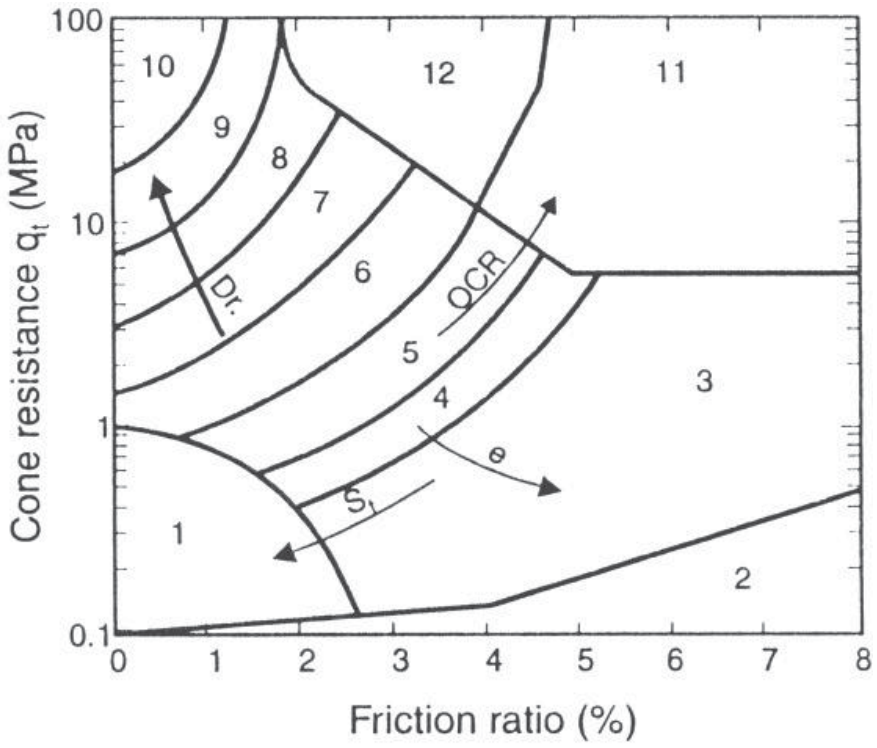
Soil classification method based on R_f and q_t. Robertson 1986.

Source paper.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J.
Use of piezometer cone data.
Proceedings of the ASCE Specialty Conference In Situ '86: Use of In Situ Tests in Geotechnical ***Engineering. ASCE. 1986.***

Also quoted in:

Lunne, T., Robertson P.K. and Powell J.J.M. (1997).
Cone Penetration Testing in Geotechnical Practice.
Blackie Academic & Professional.



Classification system from CPTU data (quoted after Lunne, Robertson and Powell, 1997).

Zone	Soil Behaviour Type	Zone	Soil Behaviour Type
1	Sensitive fine grained	7	Silty sand to silty clay
2	Organic material	8	Sand to silty sand
3	Clay	9	Sand
4	Silty clay to clay	10	Gravely sand to sand
5	Clayey silt to silty clay	11	Very stiff fine grained *
6	Sandy silt to clayey silt	12	Sand to clayey sand *

* Overconsolidated or cemented.

Soil classification method based on B_q and q_t. Robertson 1986.

Source paper.

Robertson, P.K., Campanella, R.G., Gillesie, D. and Greig, J.
Use of piezometer cone data.
Proceedings of the ASCE Specialty Conference In Situ '86: Use of In Situ Tests in Geotechnical ***Engineering. ASCE. 1986***.

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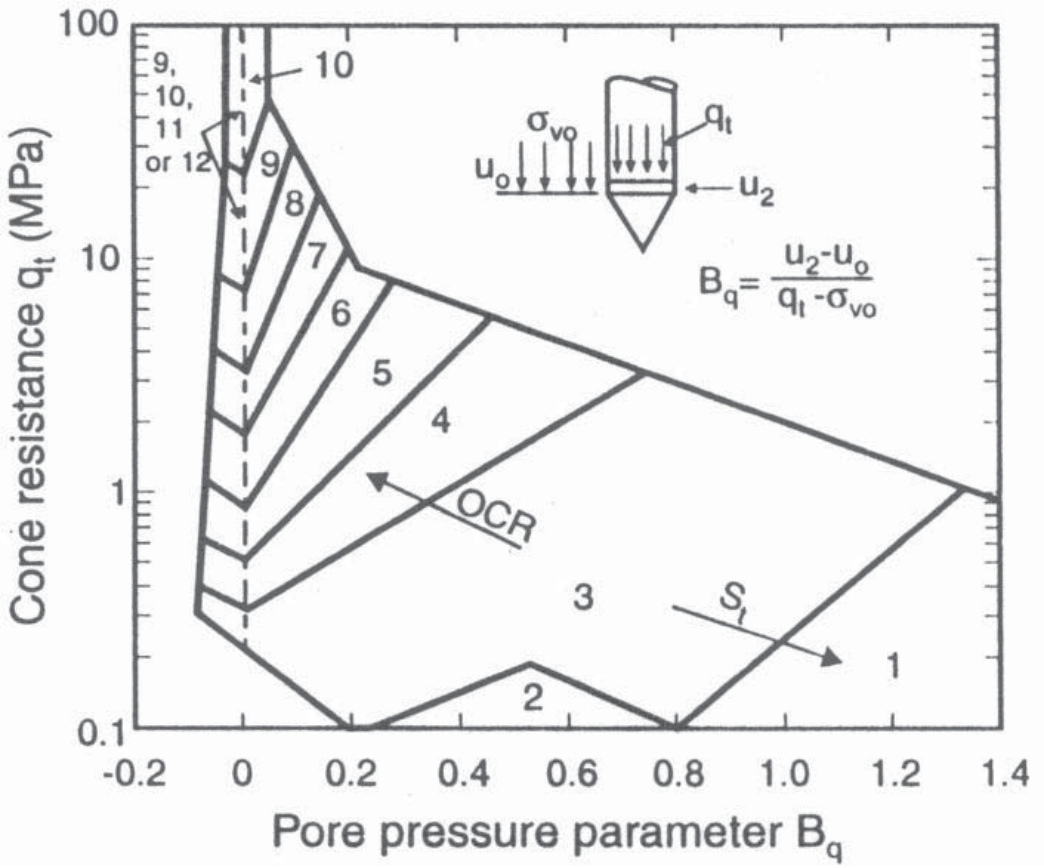

Classification system from CPTU data (quoted after Lunne, Robertson and Powell, 1997).

Zone	Soil Behaviour Type	Zone	Soil Behaviour Type
1	Sensitive fine grained	7	Silty sand to silty clay
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5	Clayey silt to silty clay	11	Very stiff fine grained *
6	Sandy silt to clayey silt	12	Sand to clayey sand *

* Overconsolidated or cemented

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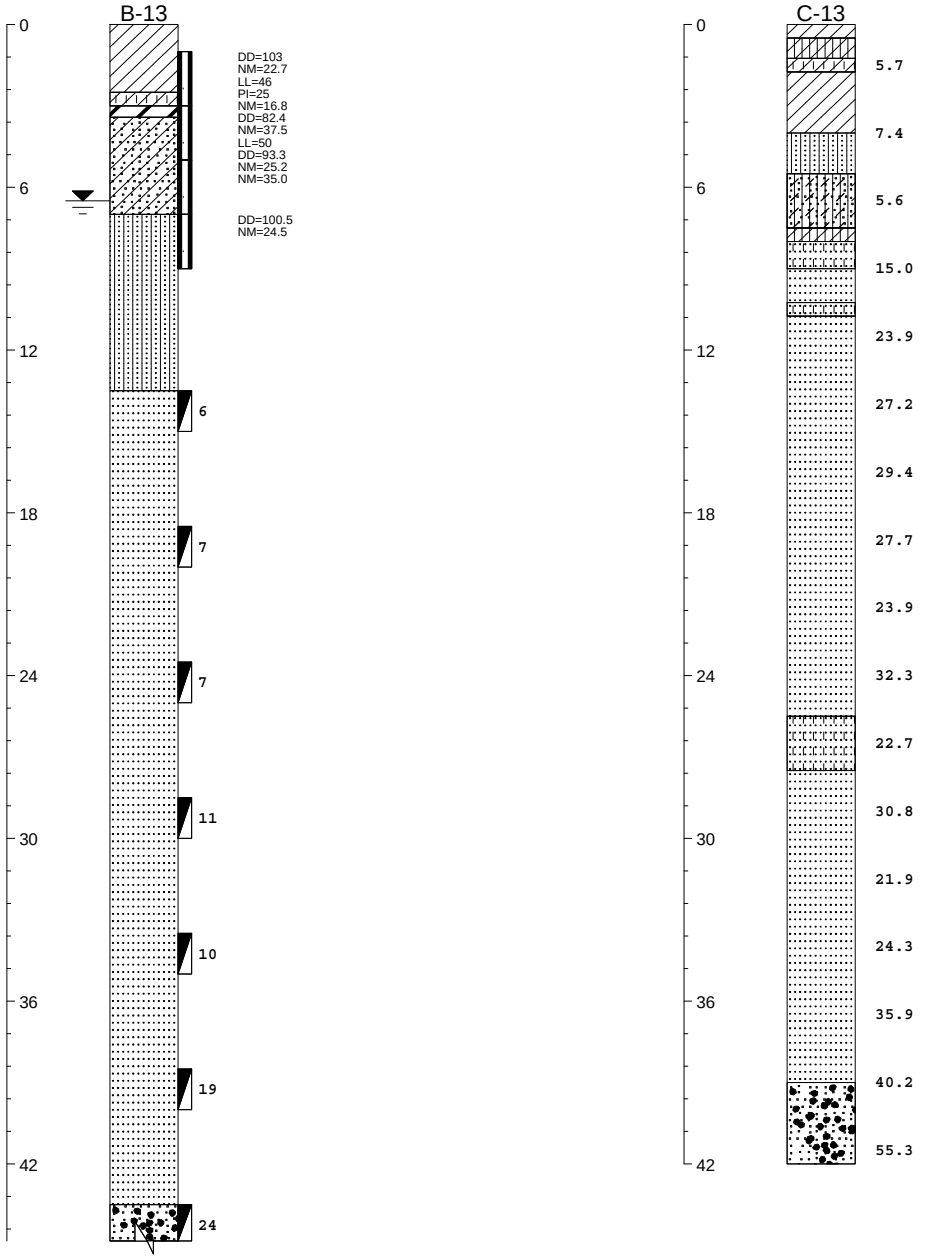

REITZ & JENS, INC.

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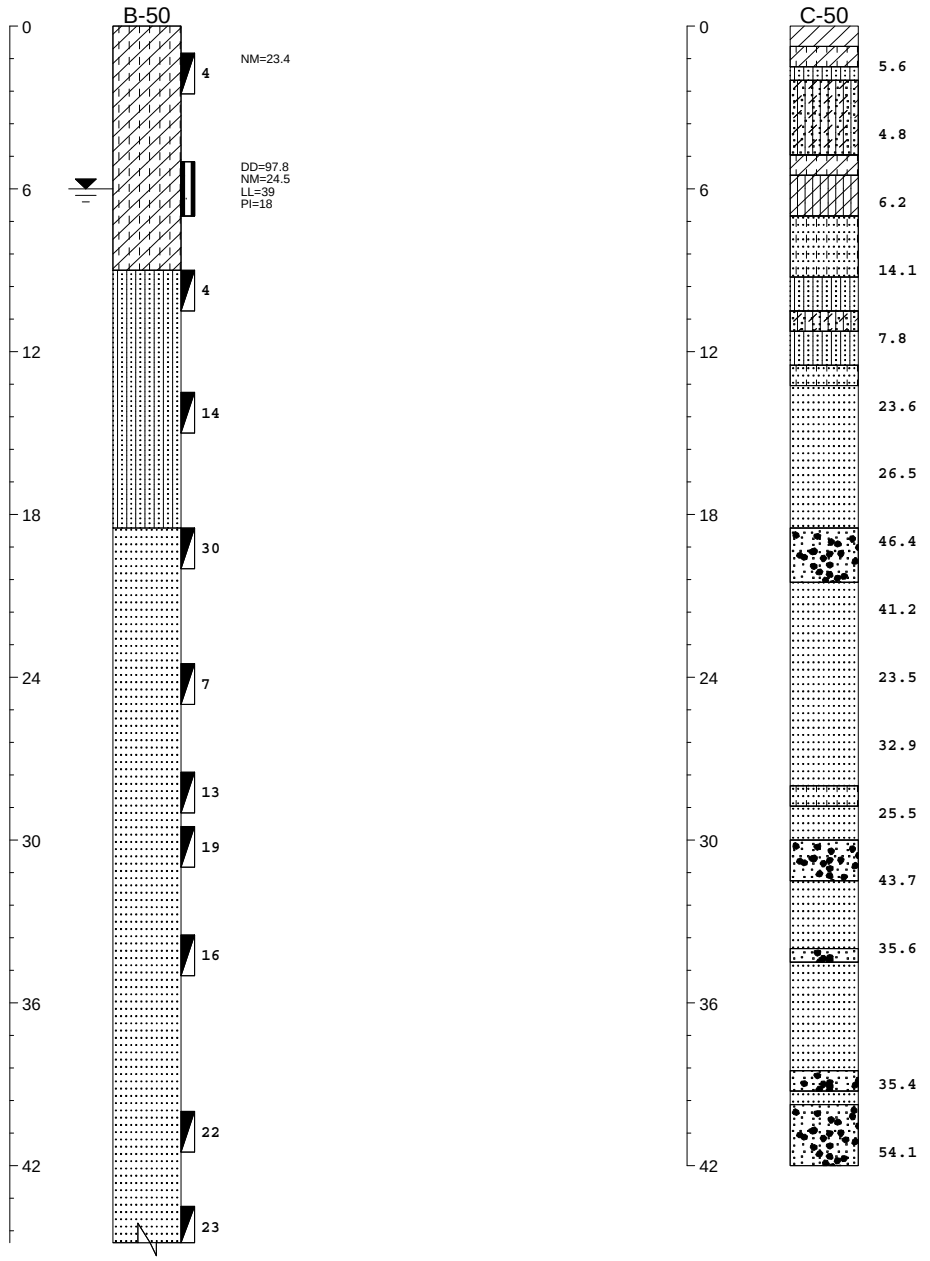

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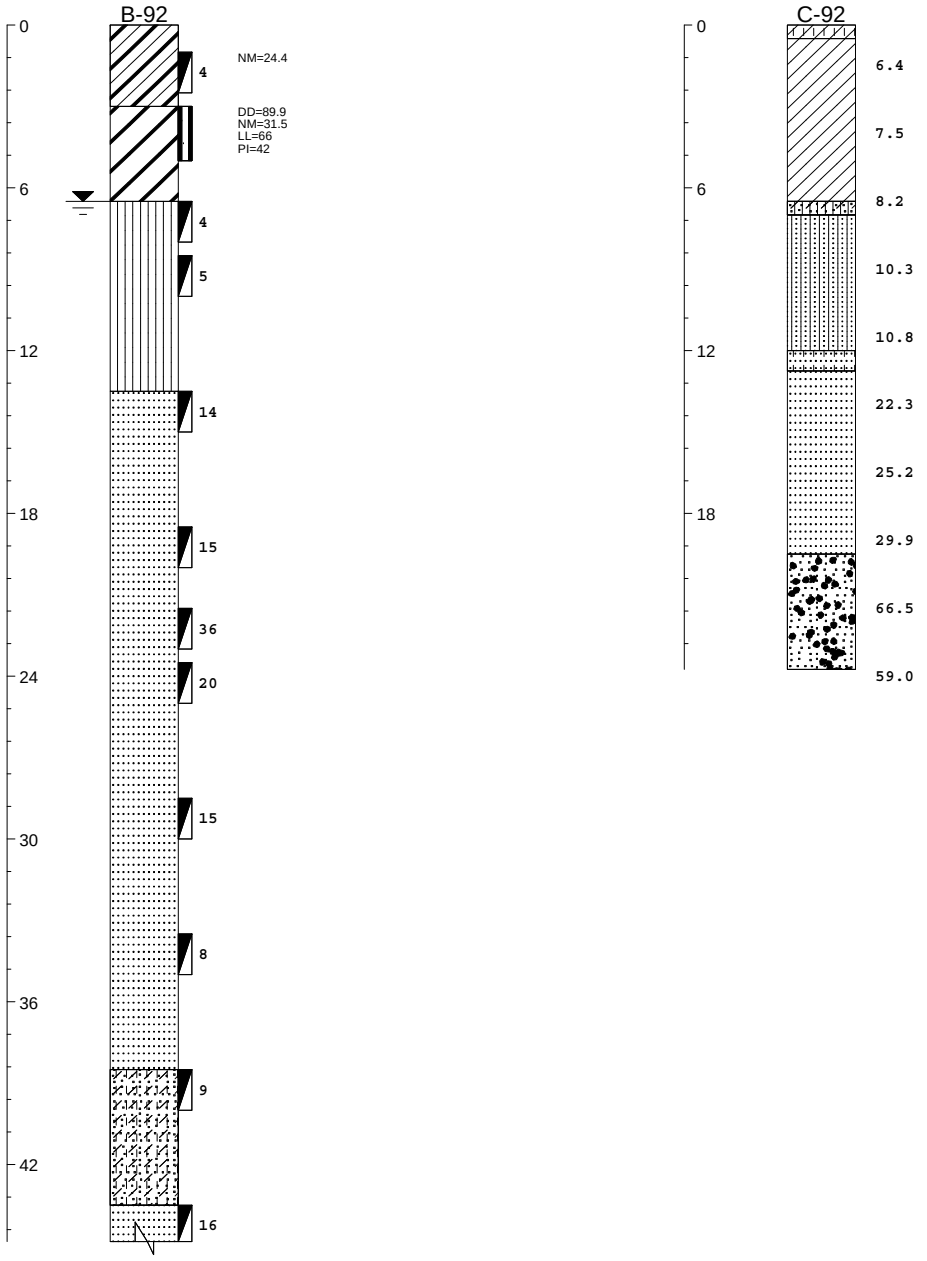

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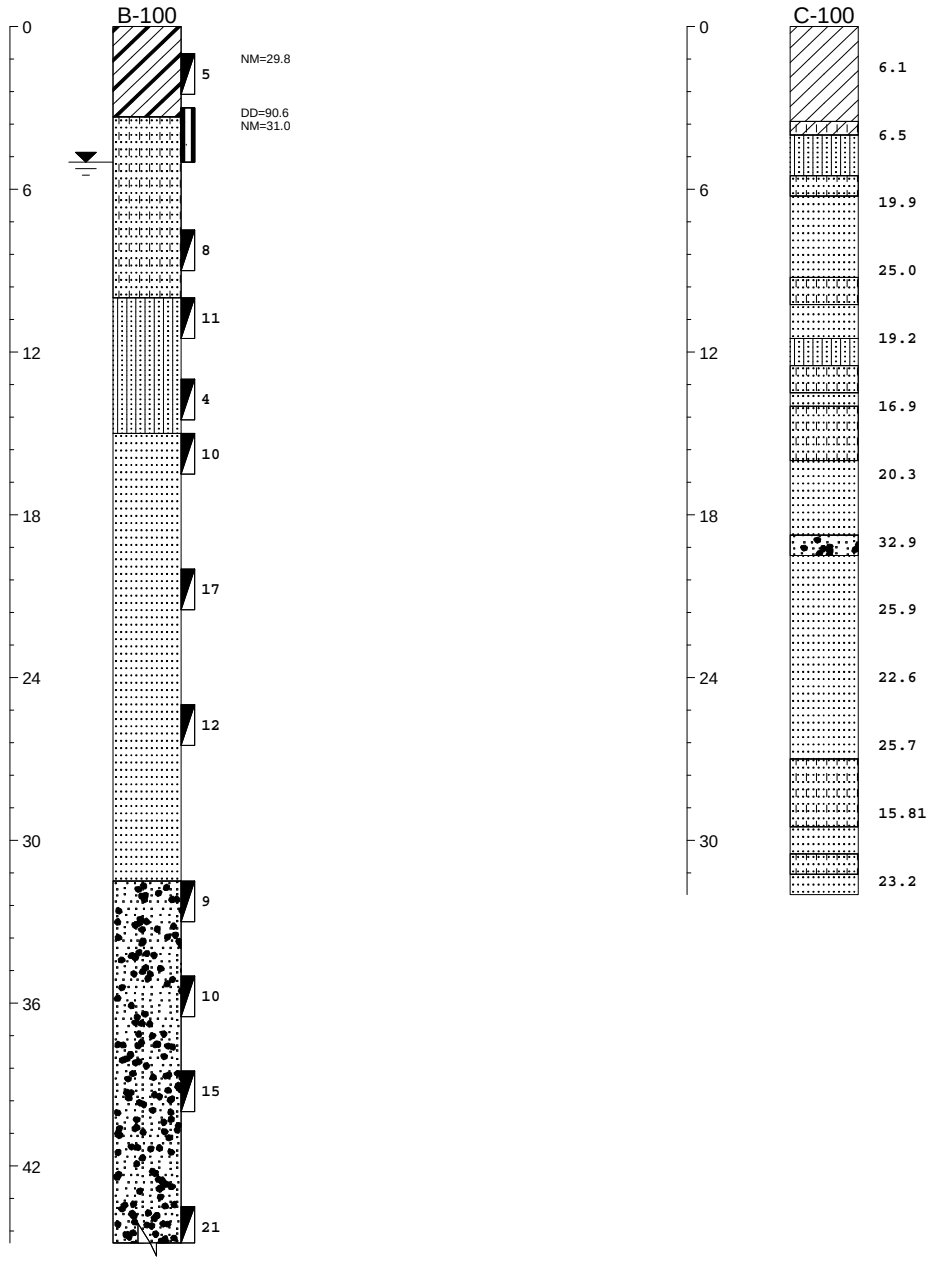

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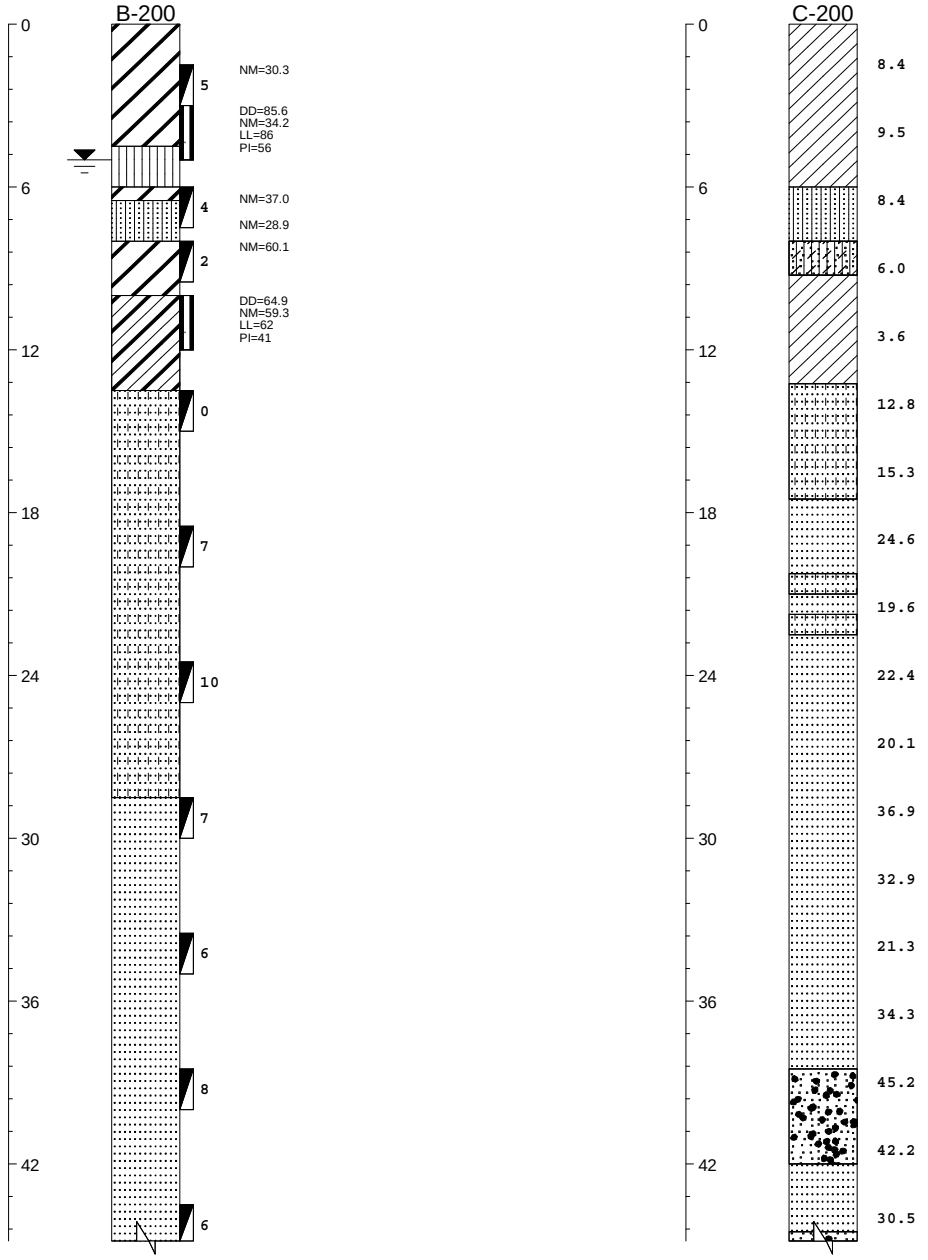

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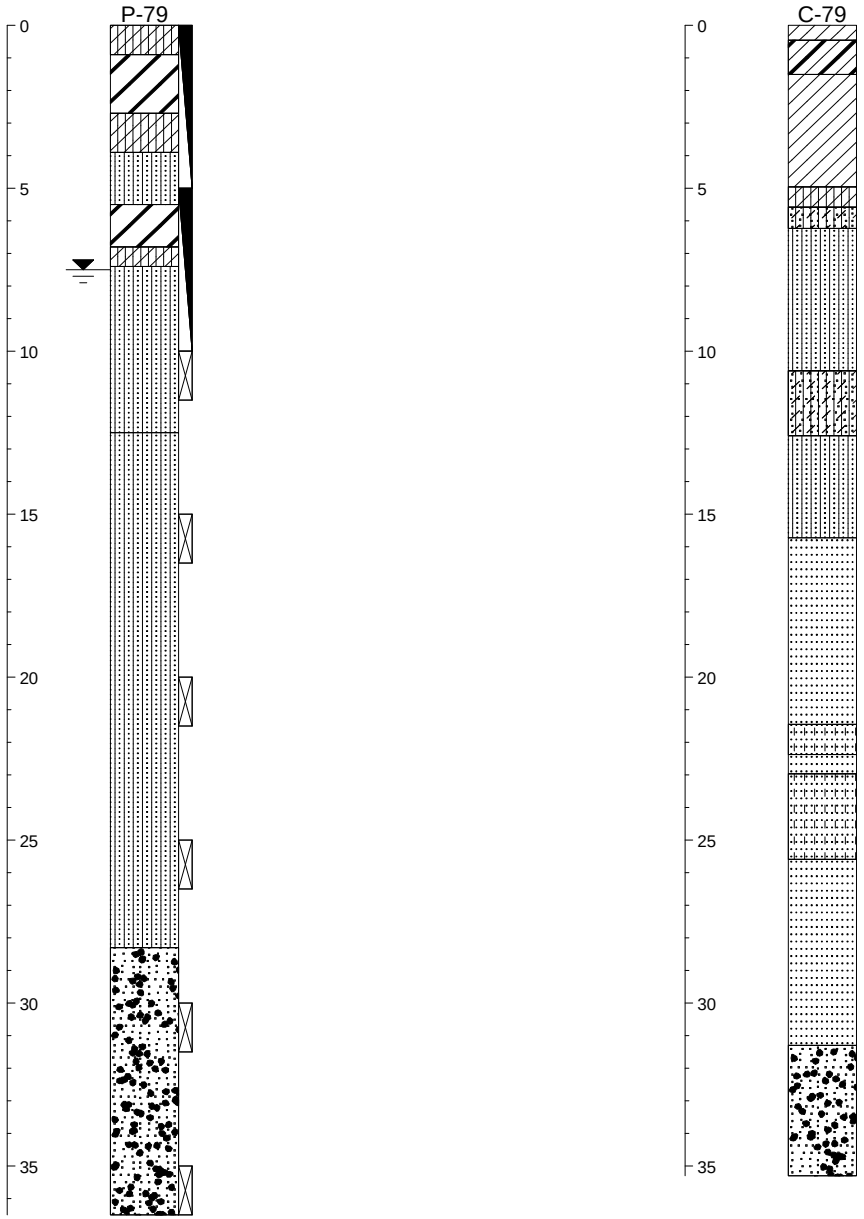

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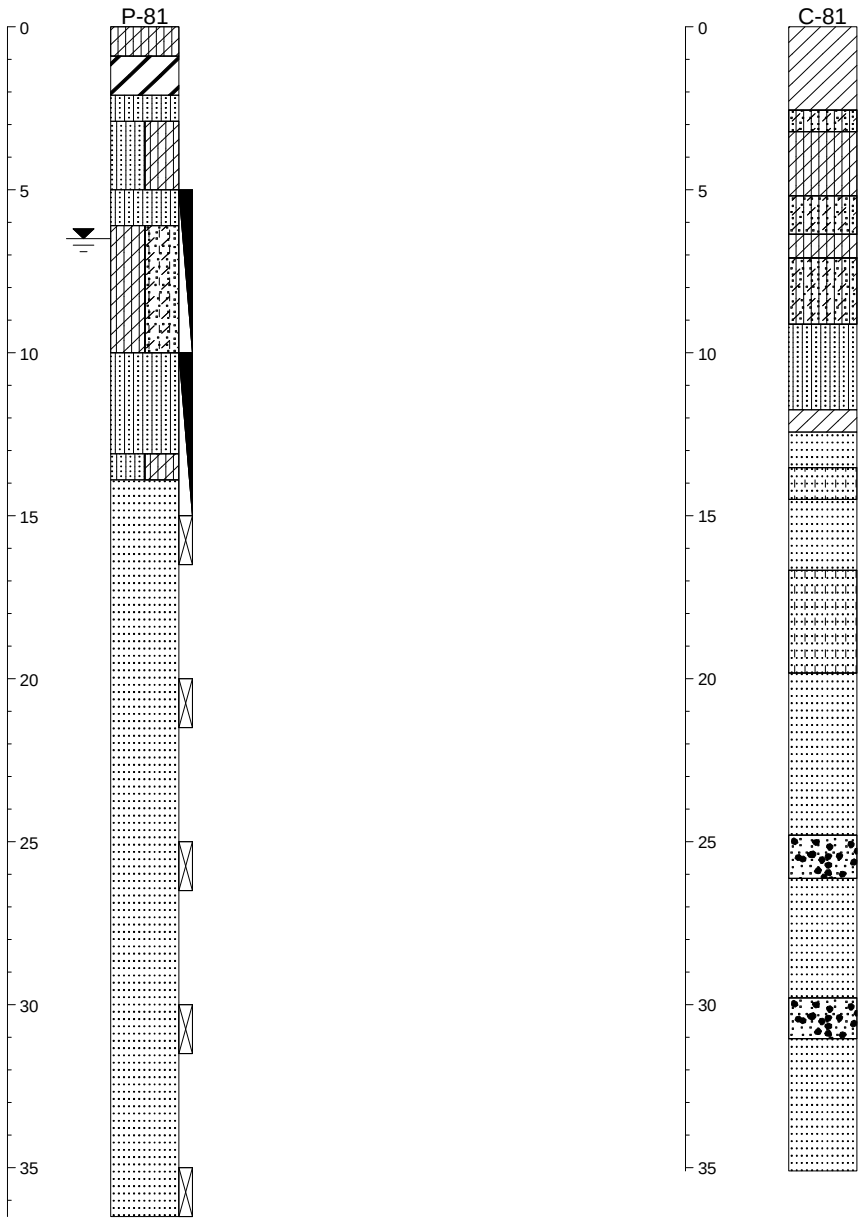

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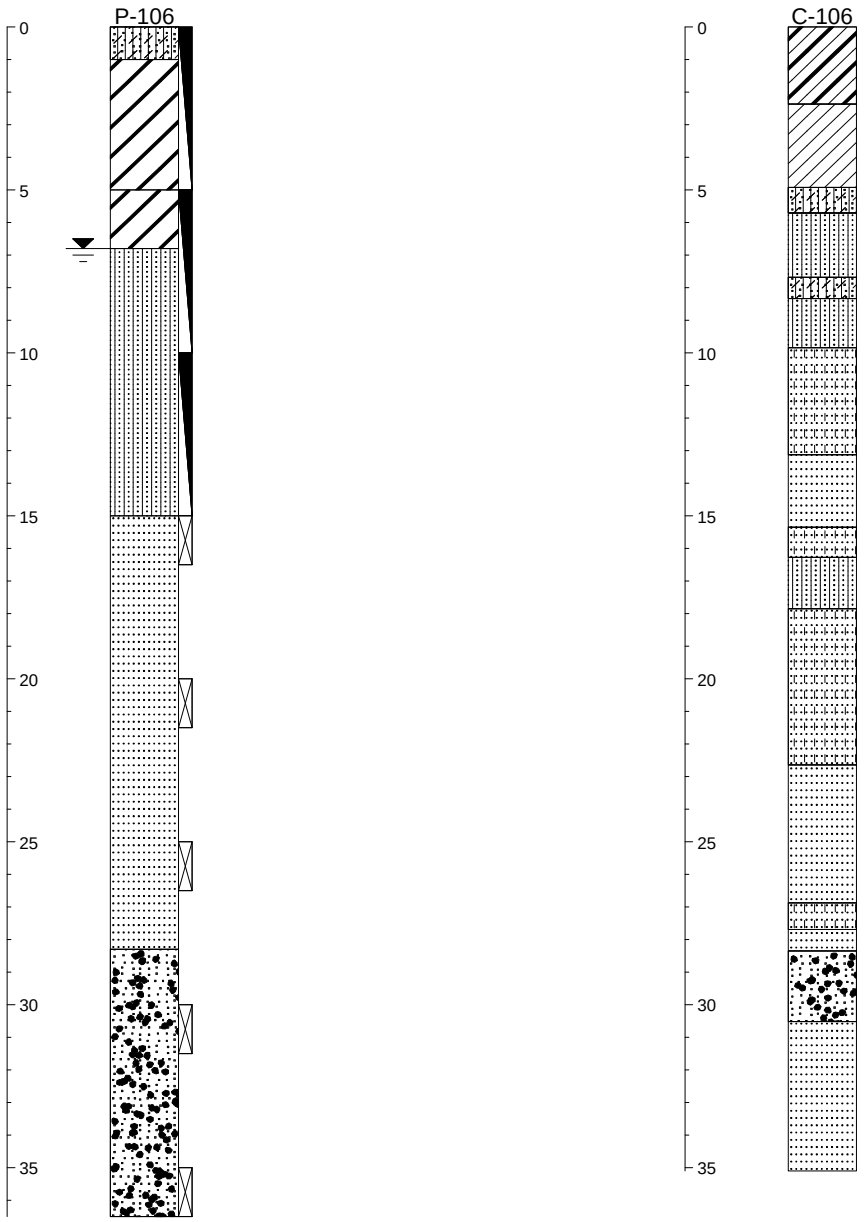

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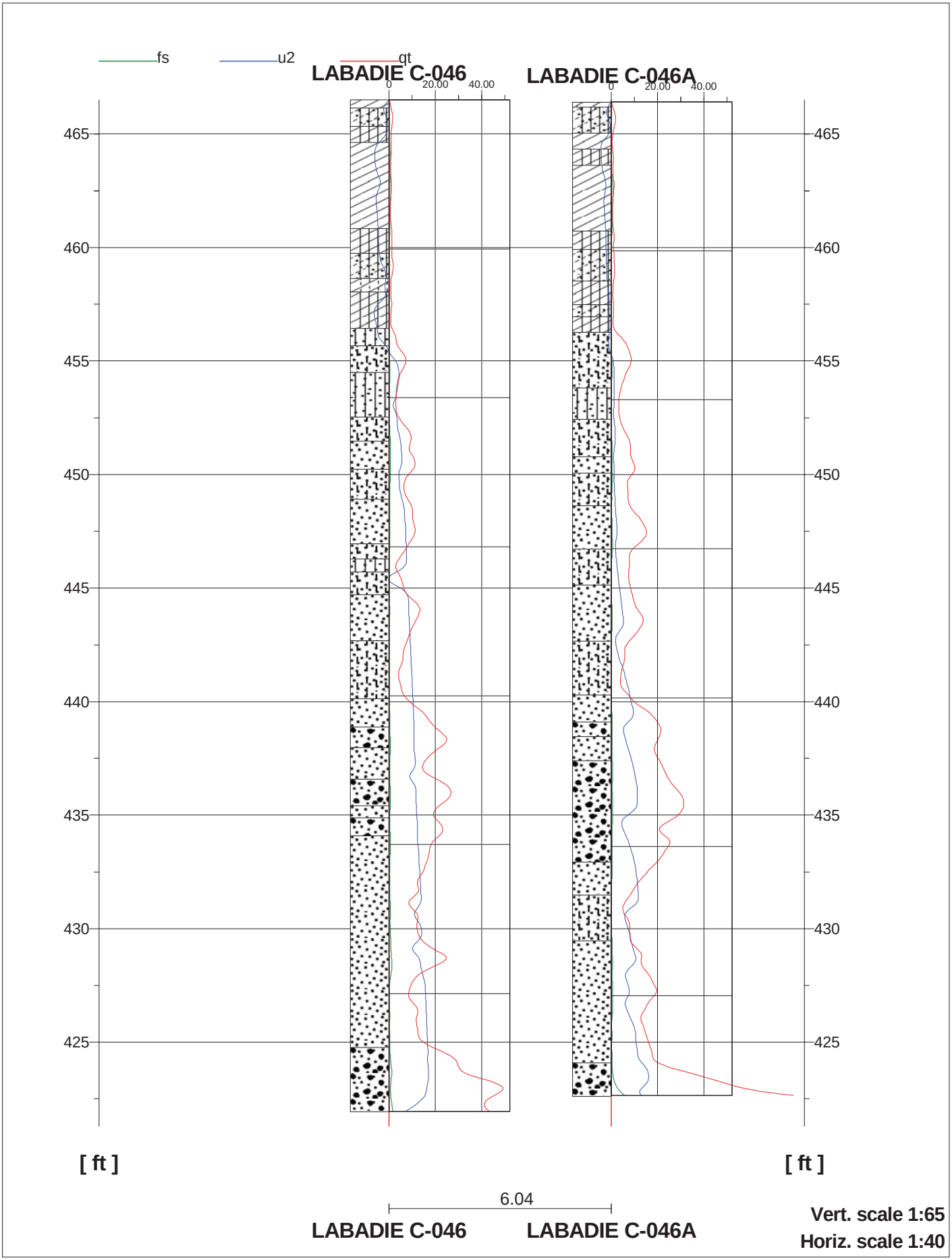
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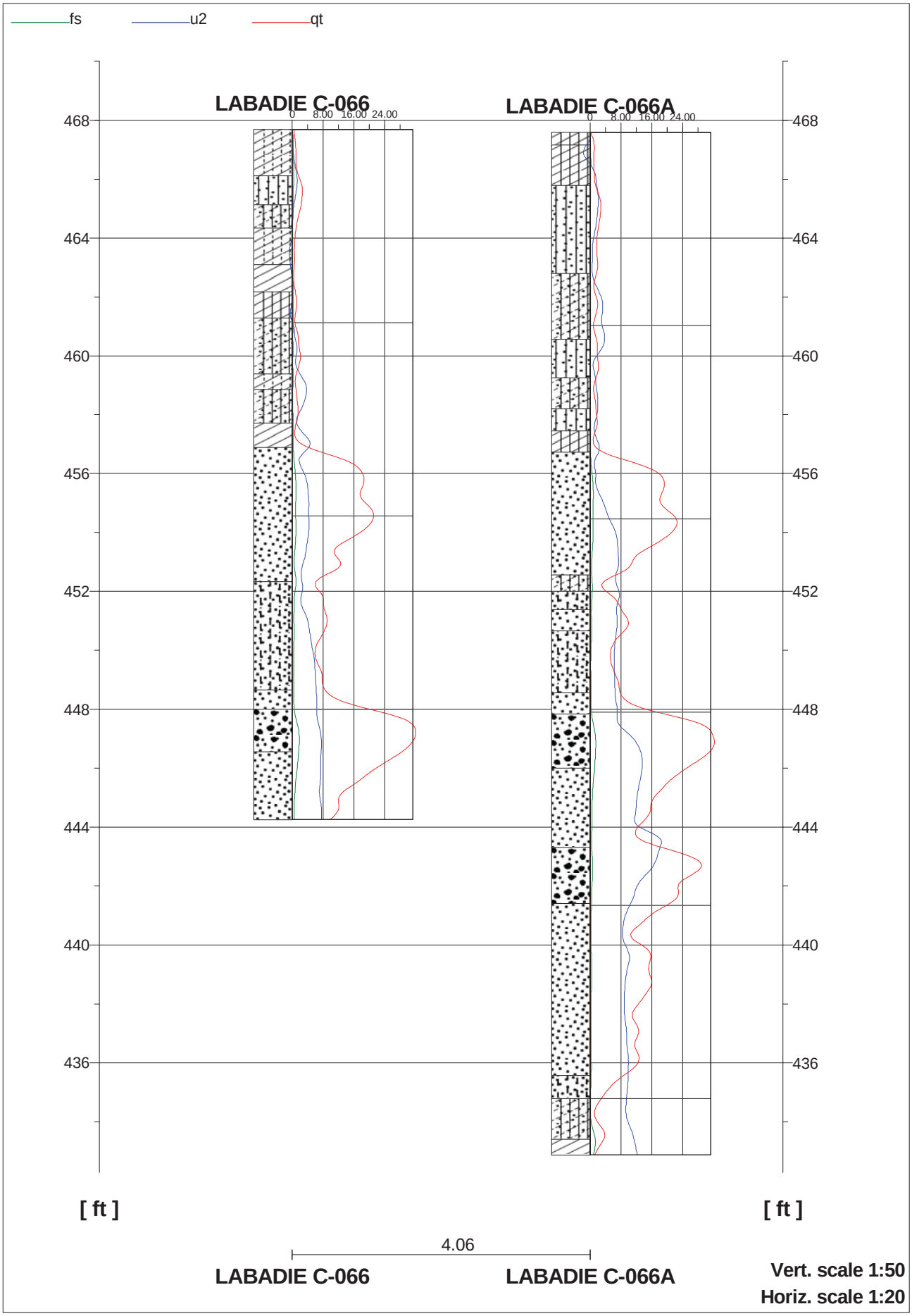
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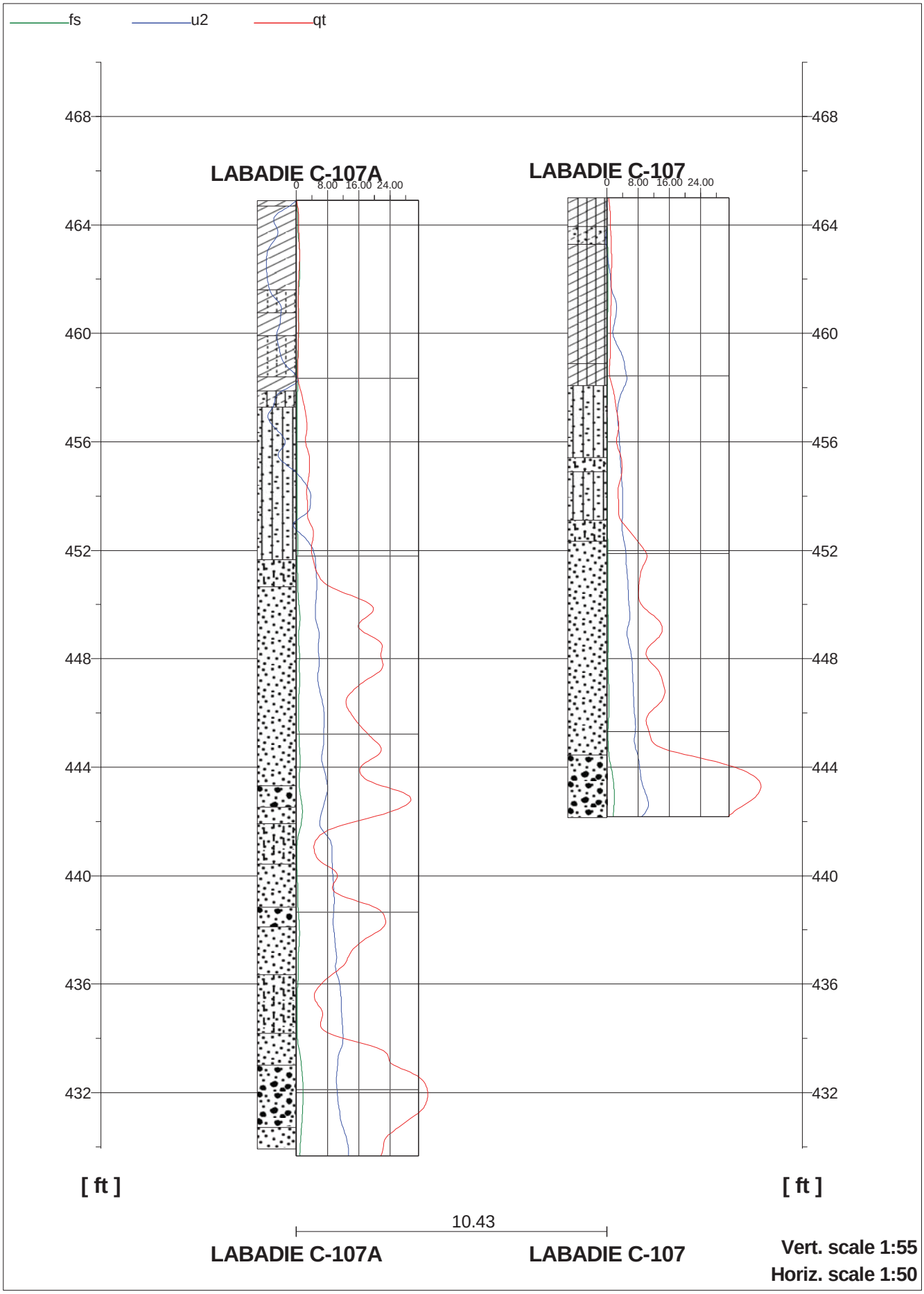
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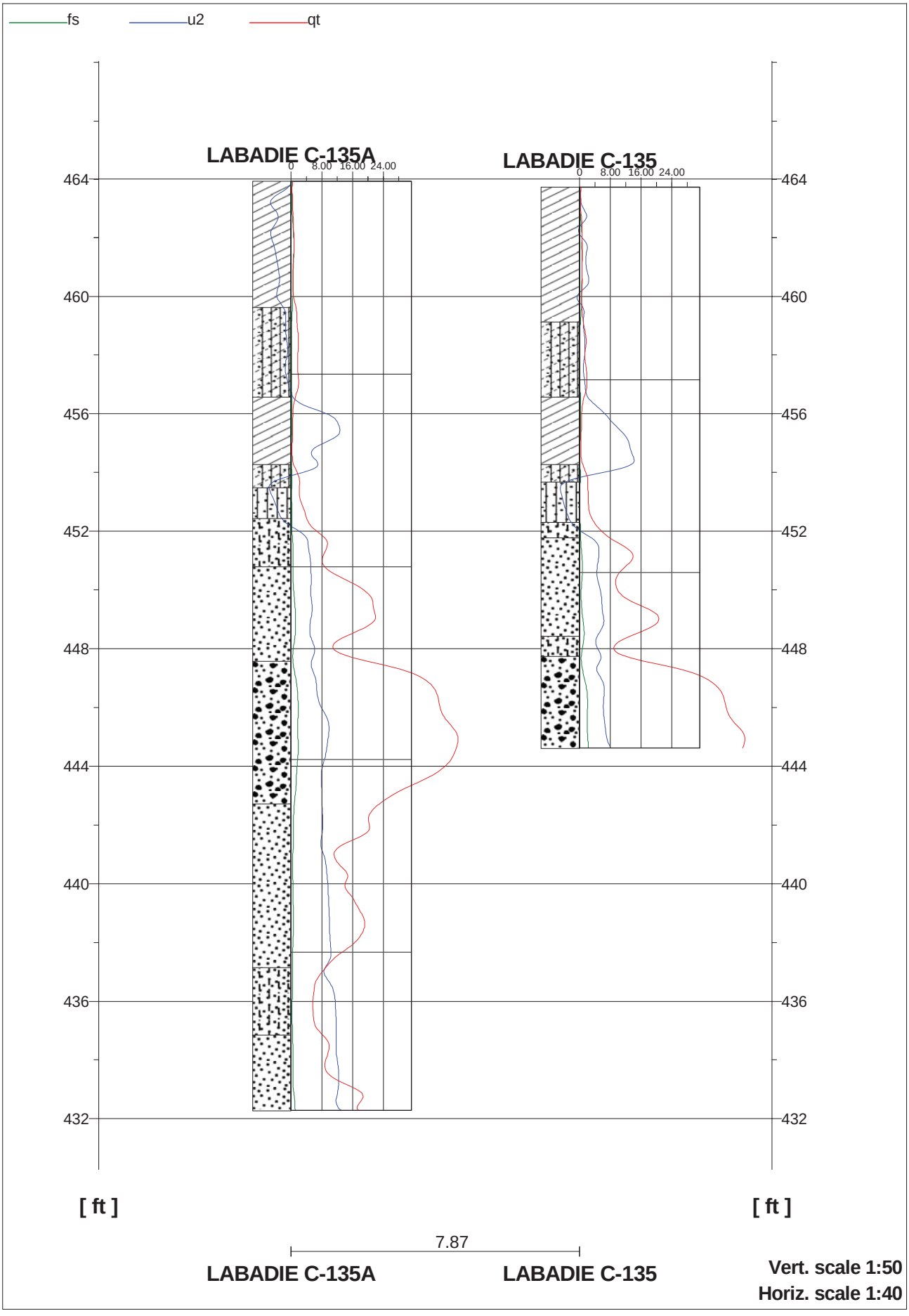
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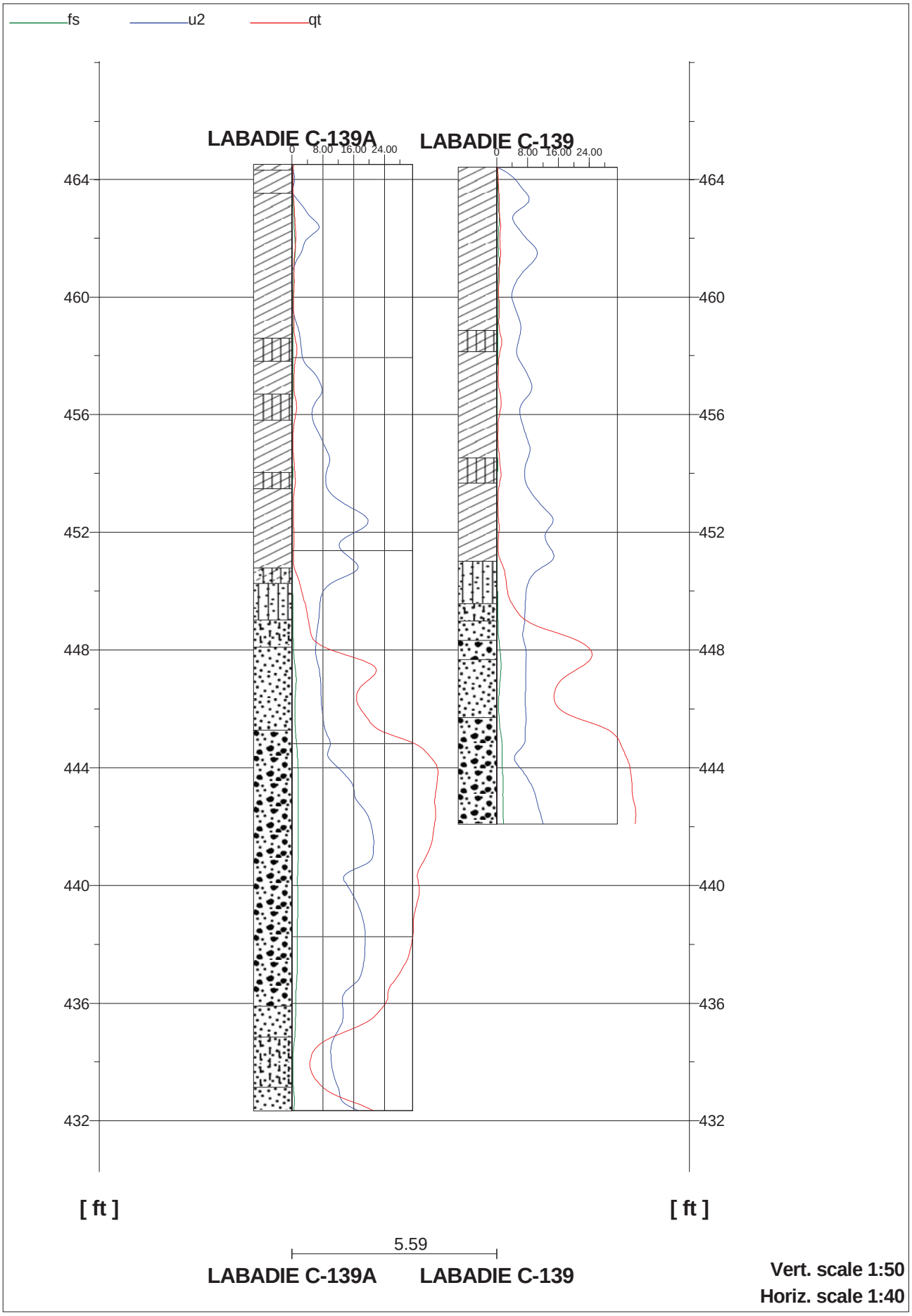
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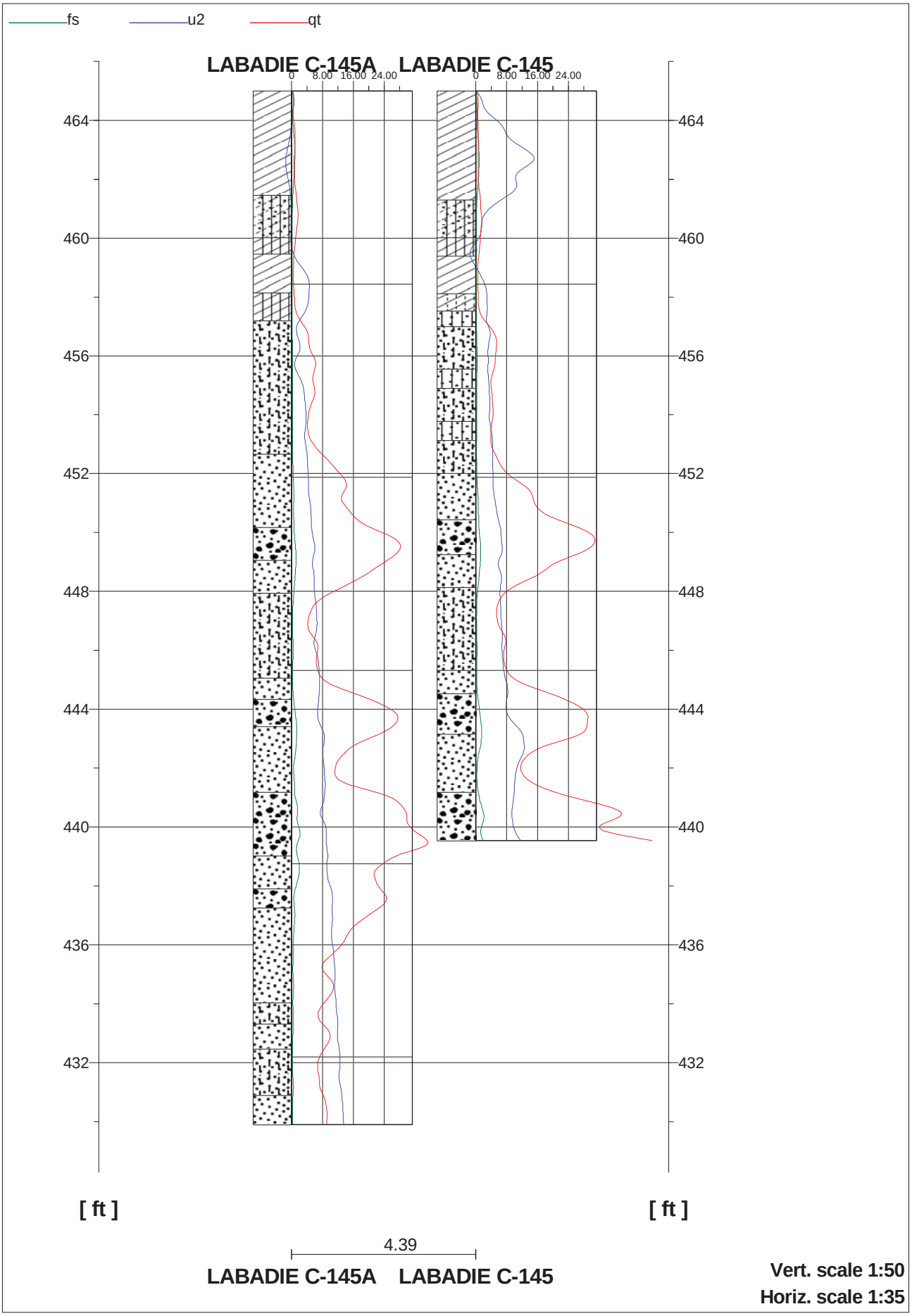
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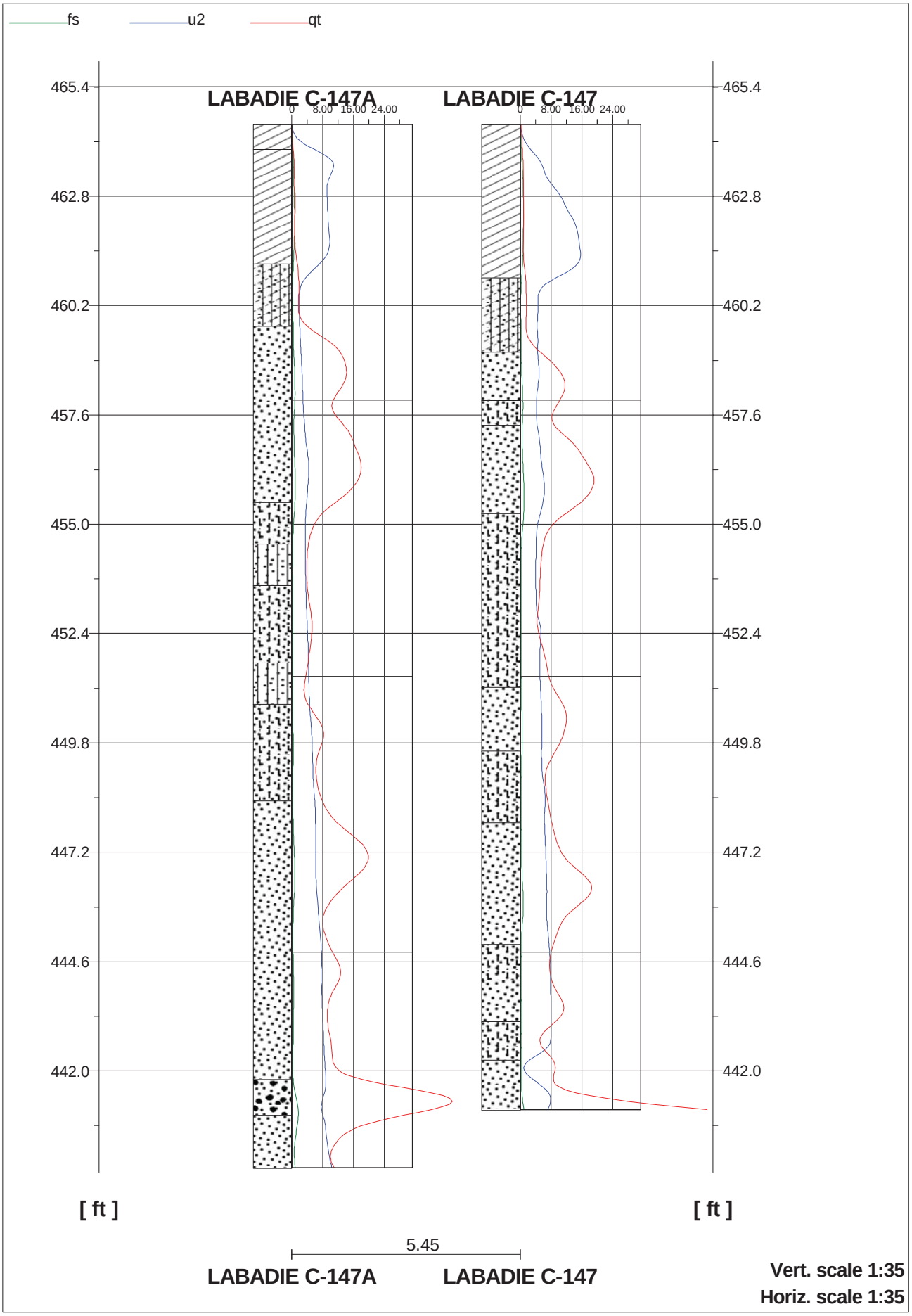
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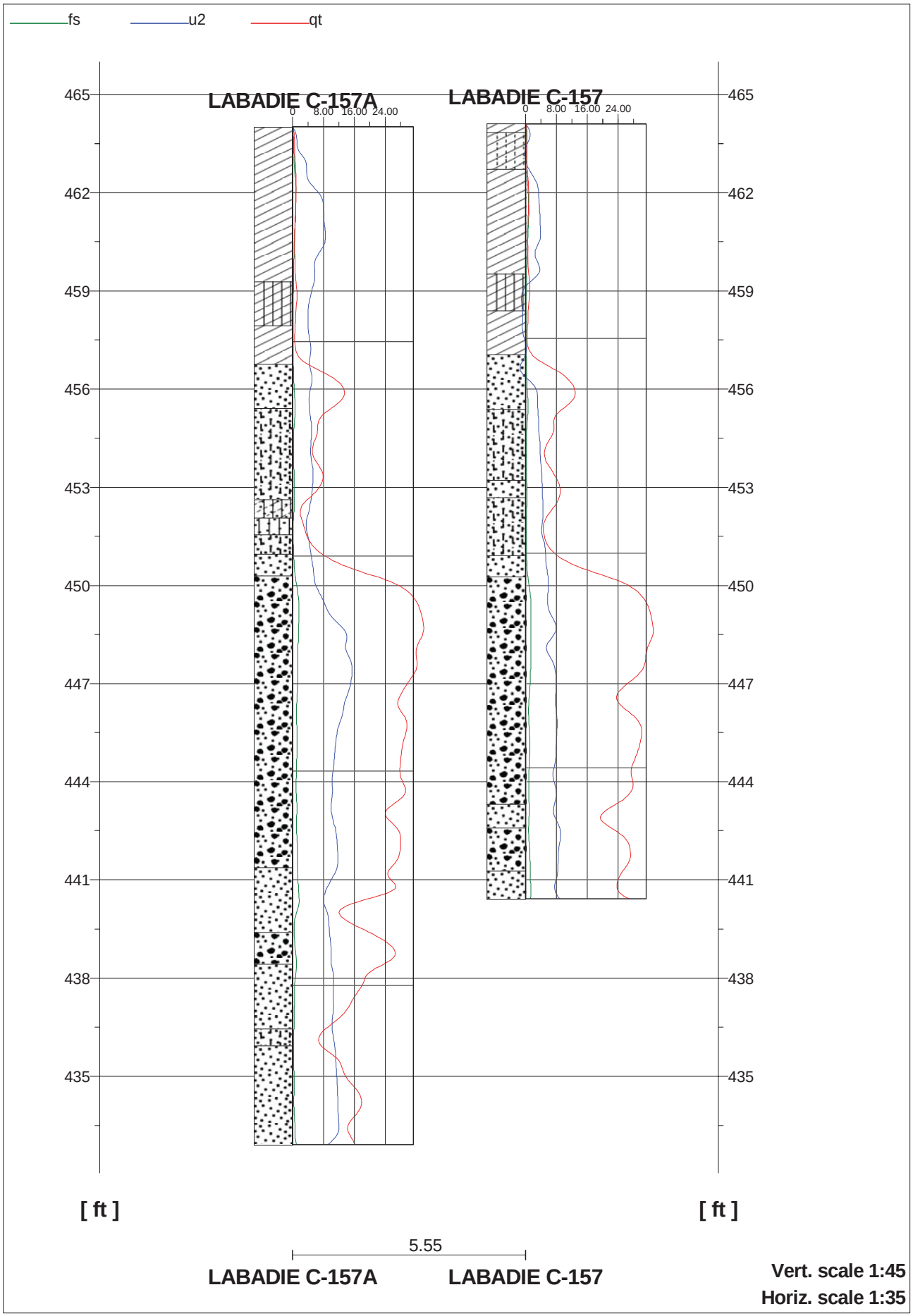
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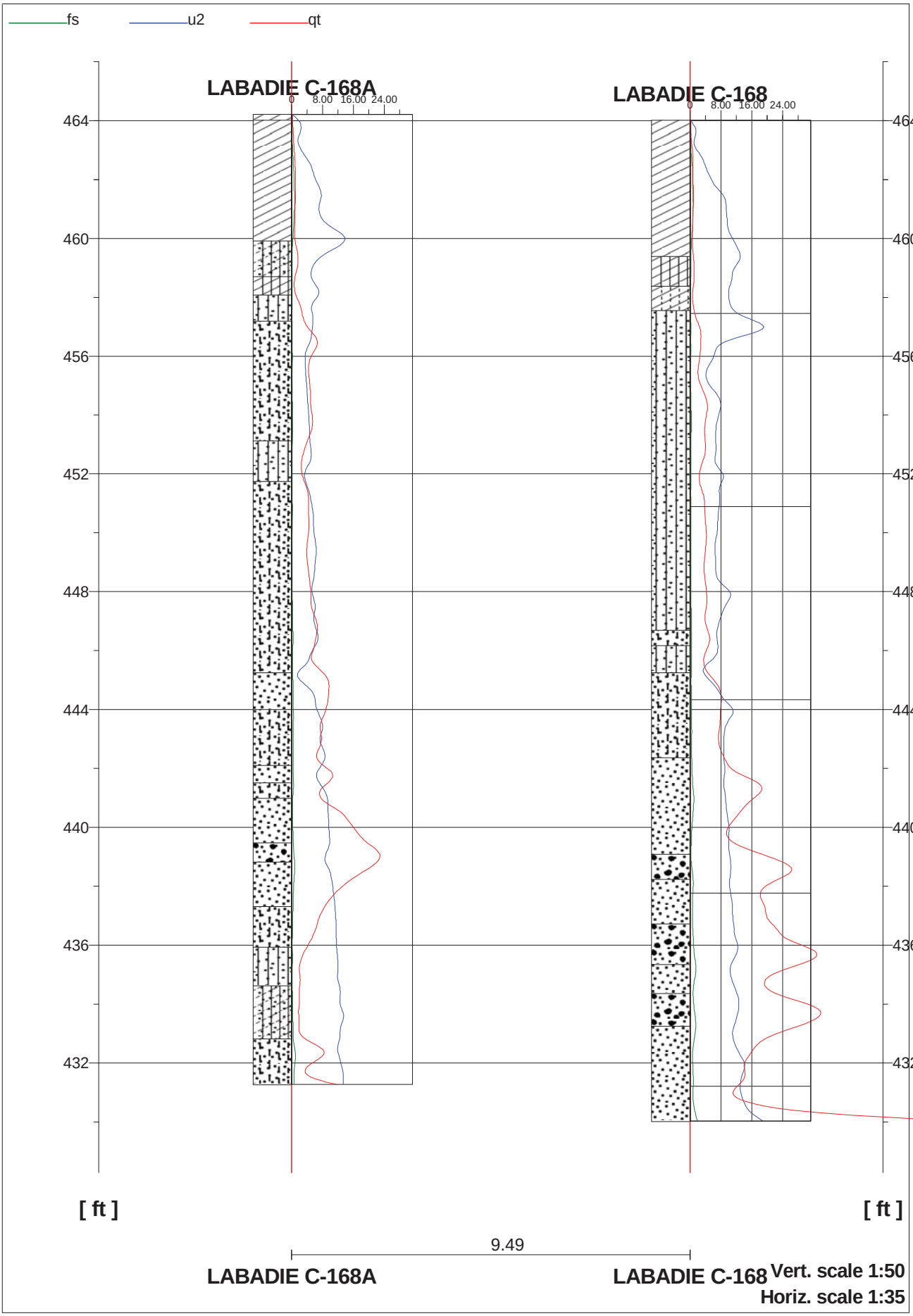
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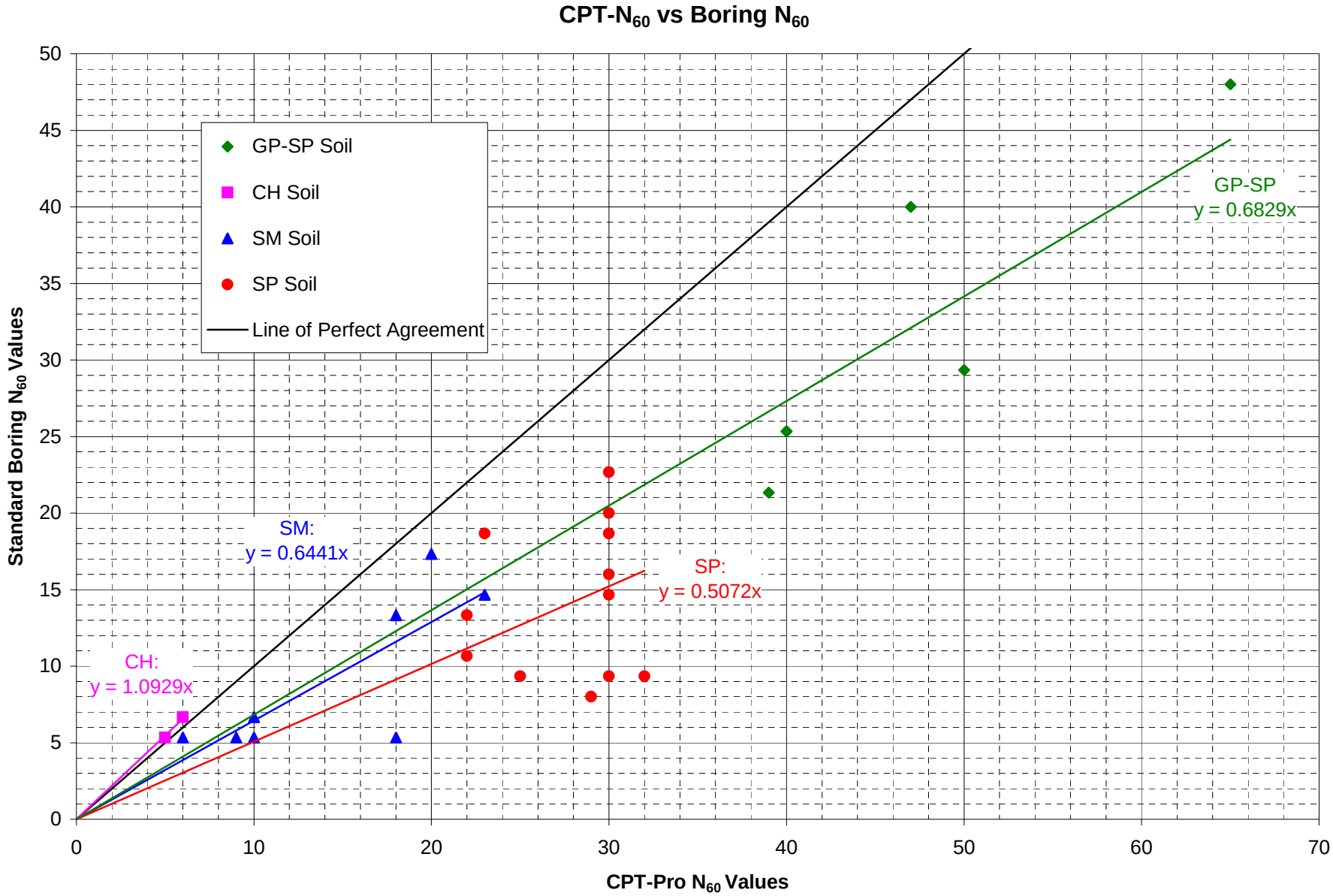
CPT-N60 vs Boring N60
Standard Boring N60 Values
CPT-Pro N60 Values
GP-SP Soil
CH Soil
SM Soil
SP Soil
Line of Perfect Agreement
GP-SP
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SM:
y = 0.6441x
SP:
y = 0.5072x
CH:
y = 1.0929x
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