

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

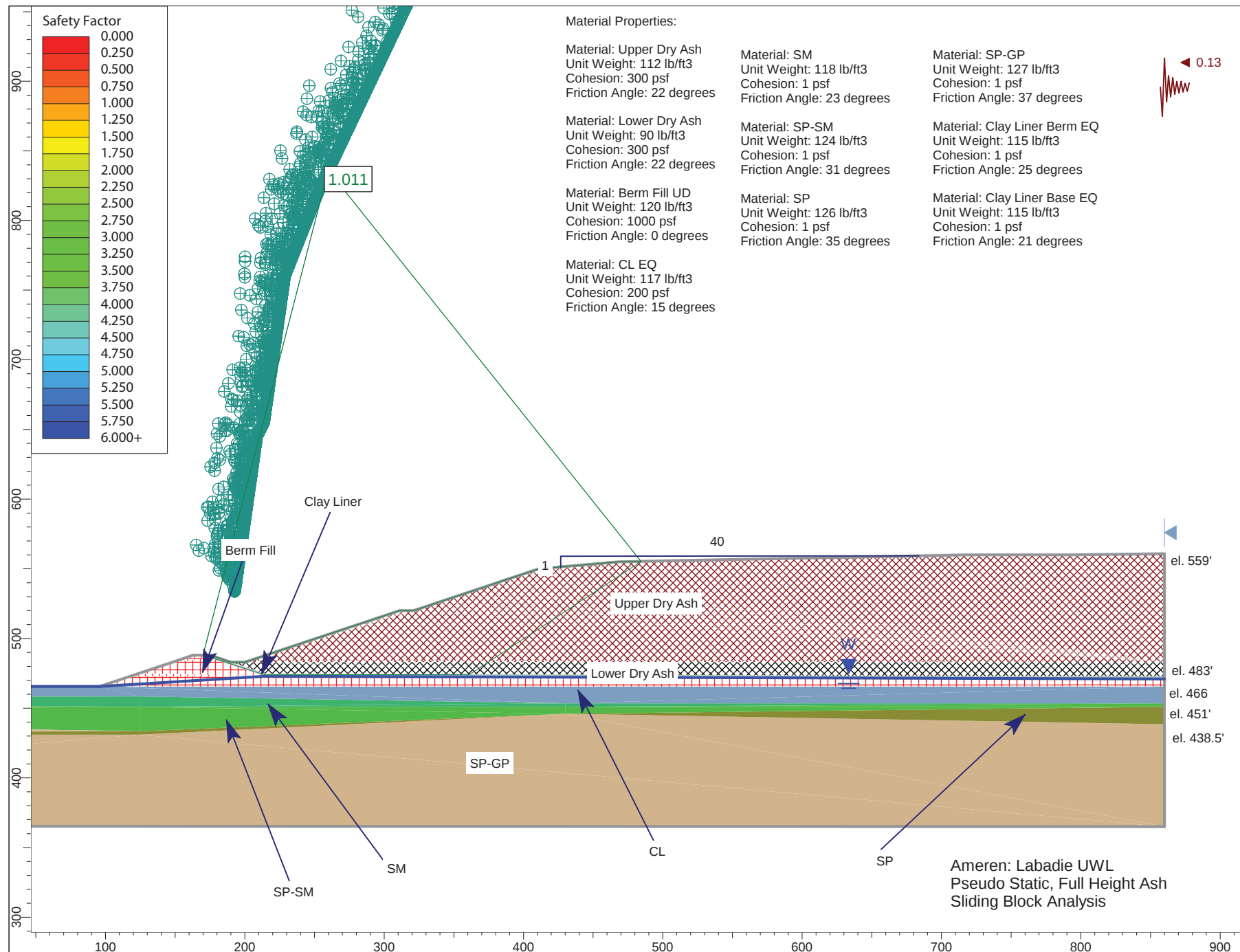
External Boundary

-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



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$ < 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

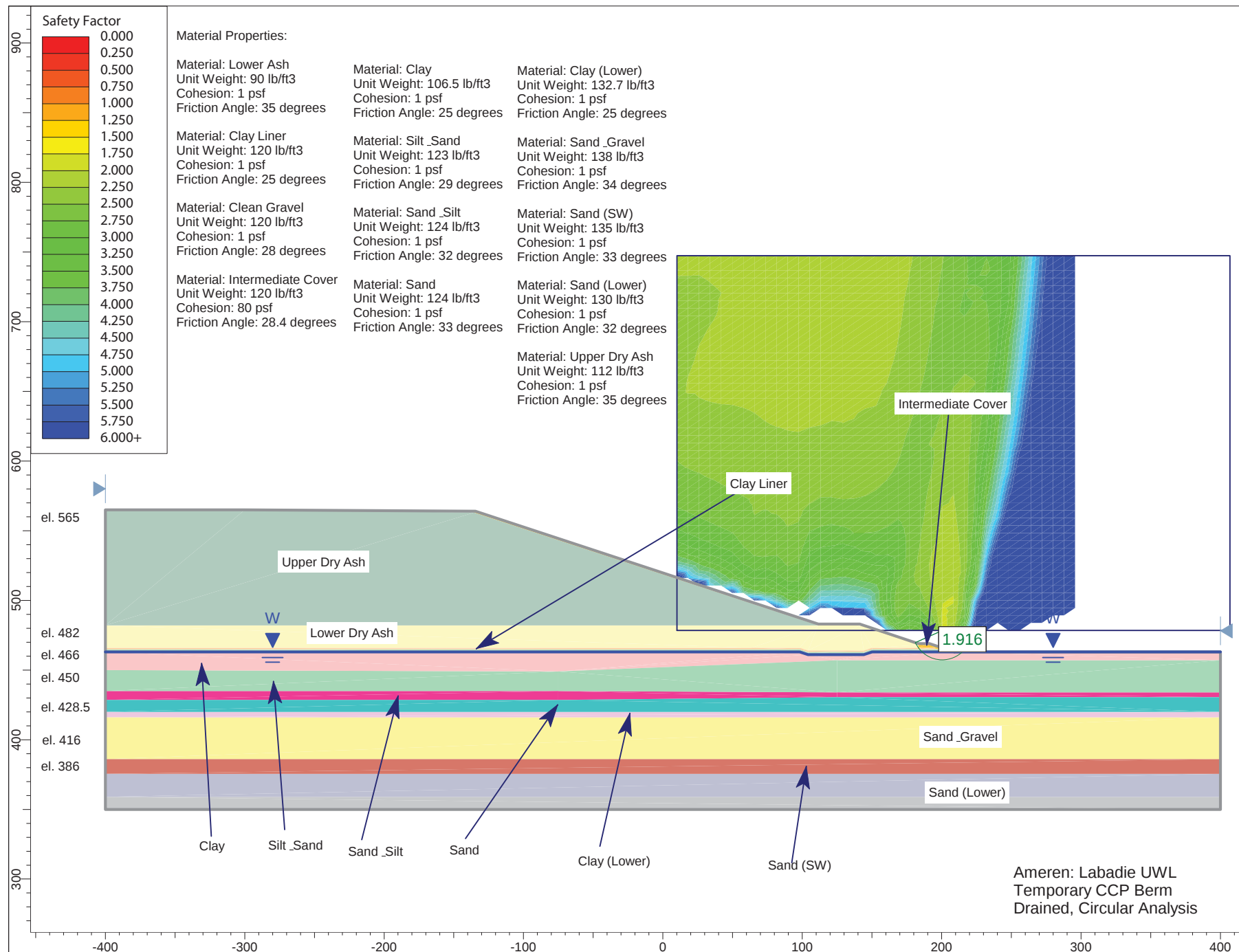
External Boundary

-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



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$ < 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
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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
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400.000	359.000
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Material Boundary

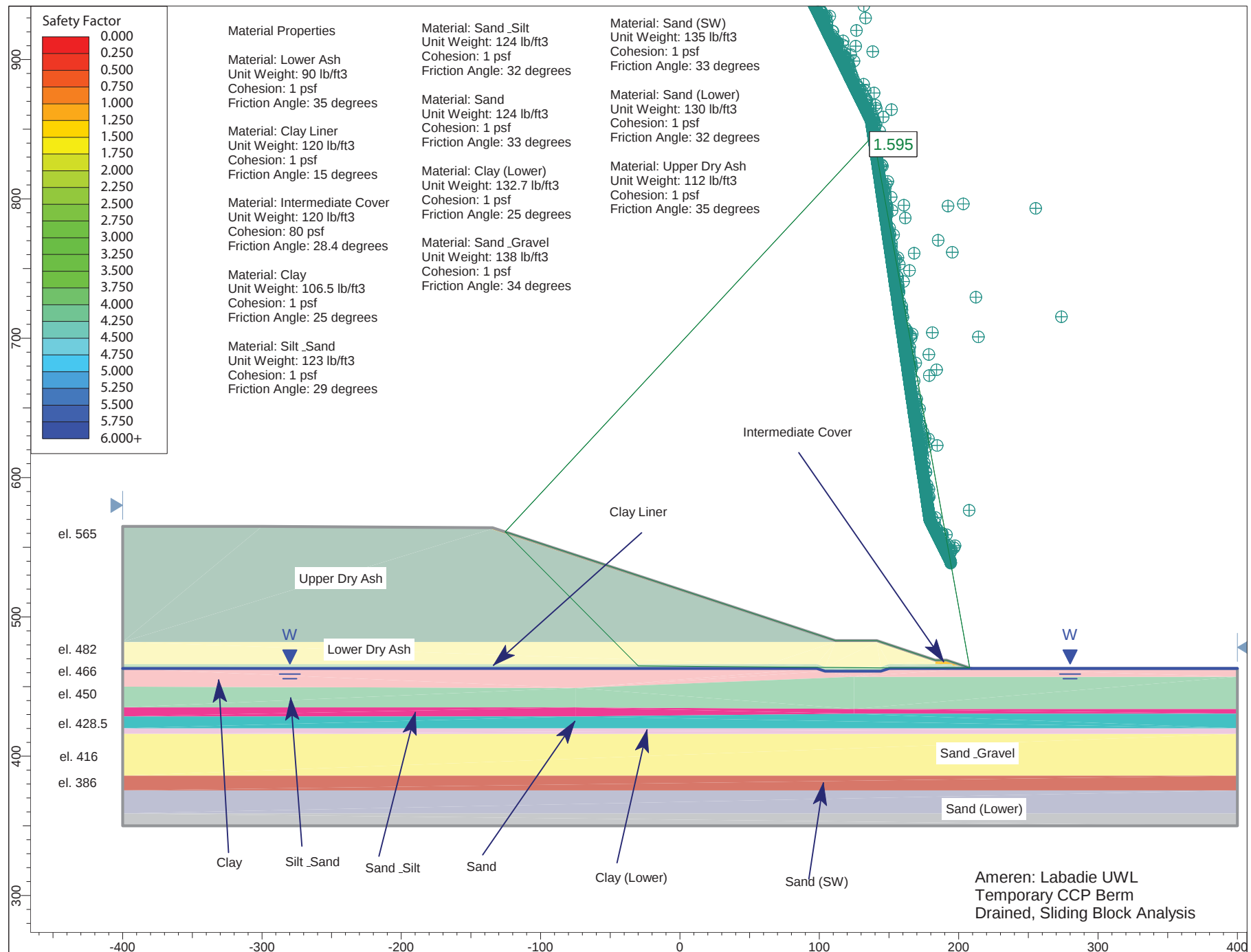
-400.000	482.000
111.500	482.000

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



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$ < 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

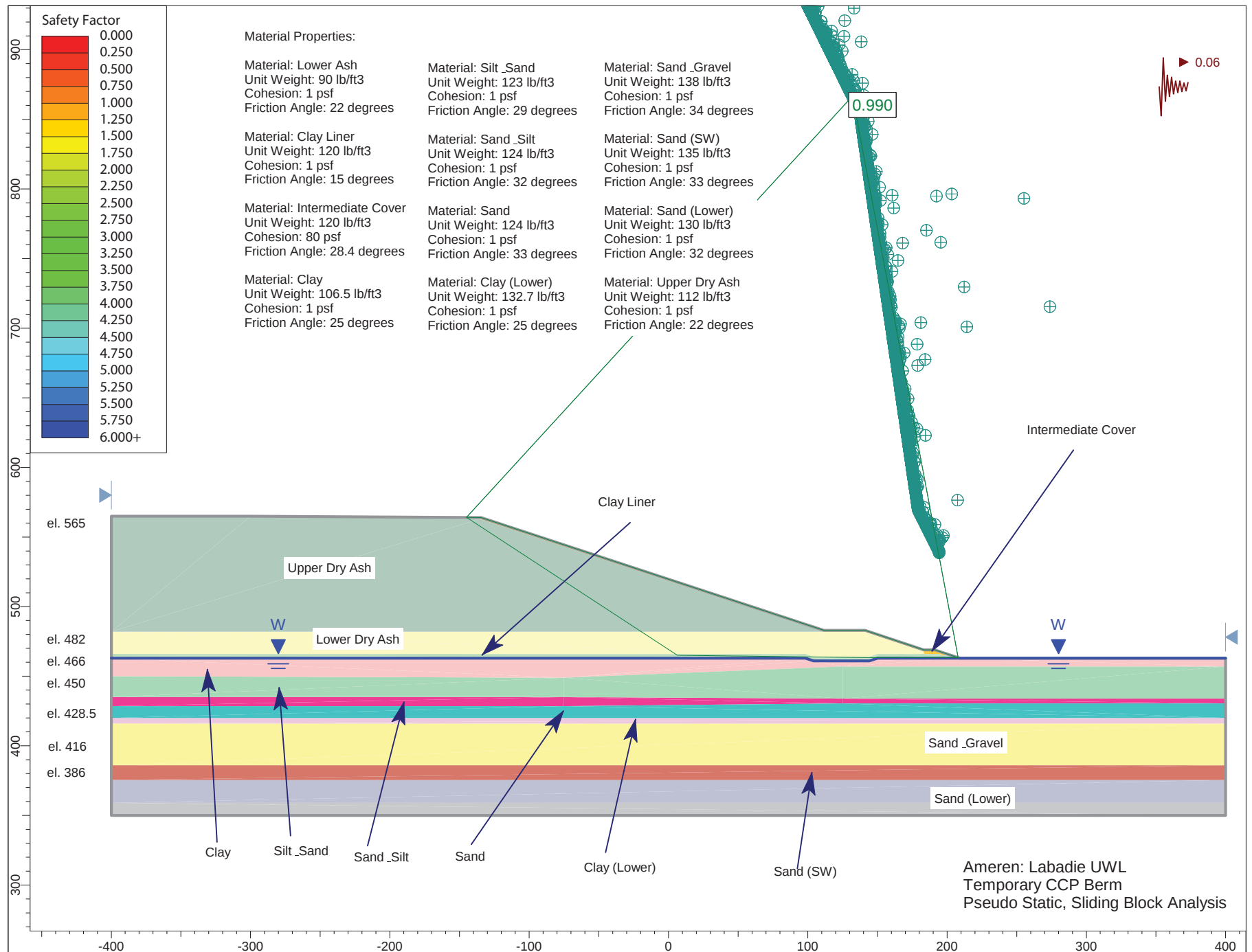
-400.000	482.000
111.500	482.000

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



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$ < 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	$\beta =$	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	$\gamma_m =$	116	PCF
	Sat. Unit Weight	$\gamma_s =$	122	PCF
	Friction Angle	$\phi =$	25	degrees
	Cohesion	c =	0	PSF
Minimum Interface Shear Properties	Friction Angle	$\delta =$	15	degrees
	Adhesion	a =	246	PSF

Cover/textured HDPE

Weight of Active Block	W _a =	26371	LBS/FT
Weight of Passive Block	W _p =	773	LBS/FT
Normal Force of Active Block	N _a =	25017	LBS/FT
Adhesion Force to HDPE	C _a =	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

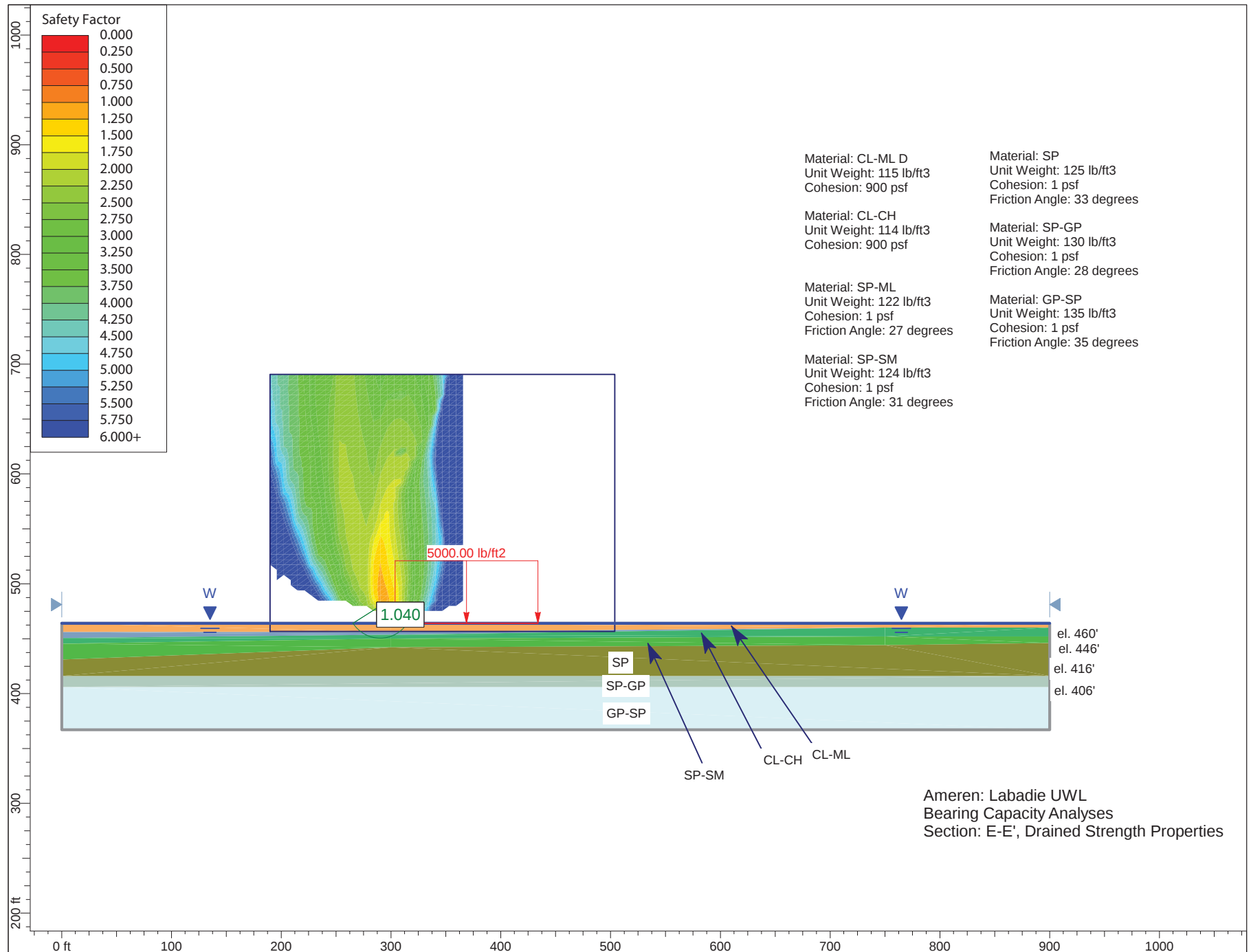
a = 12115 LBS/FT
b = -33477 LBS/FT
c = 4861 LBS/FT

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.)



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$
< 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

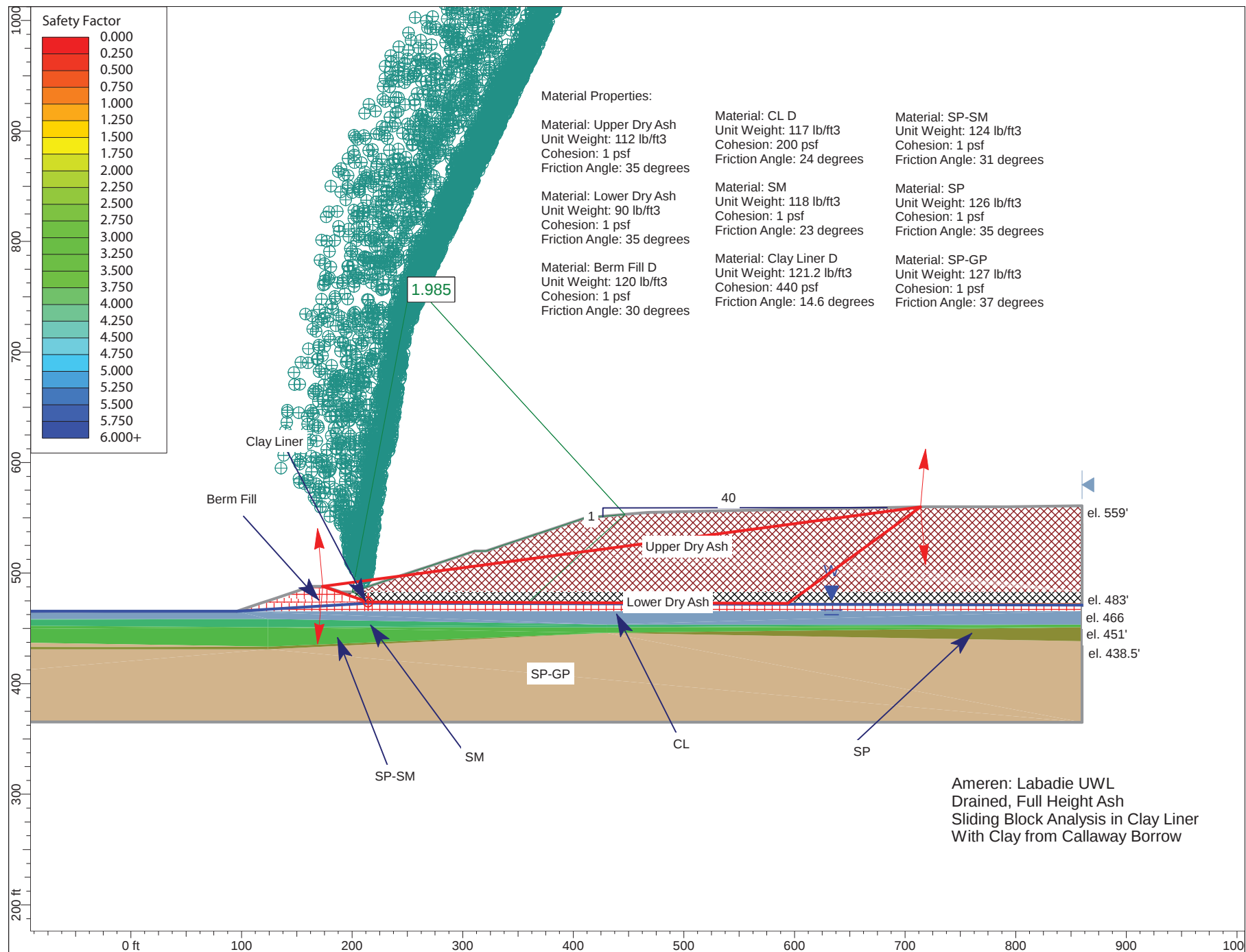
0.000	445.500
0.000	431.000
0.000	416.000
0.000	406.000
0.000	367.000
900.000	367.000
900.000	406.000
900.000	416.000
900.000	446.000
900.000	452.000
900.000	460.000
900.000	464.000
300.000	464.000

Water Table

0.000	464.000
433.806	464.000
900.000	464.000

Distributed Load

433.832	464.000
303.589	464.000



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F$
< 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

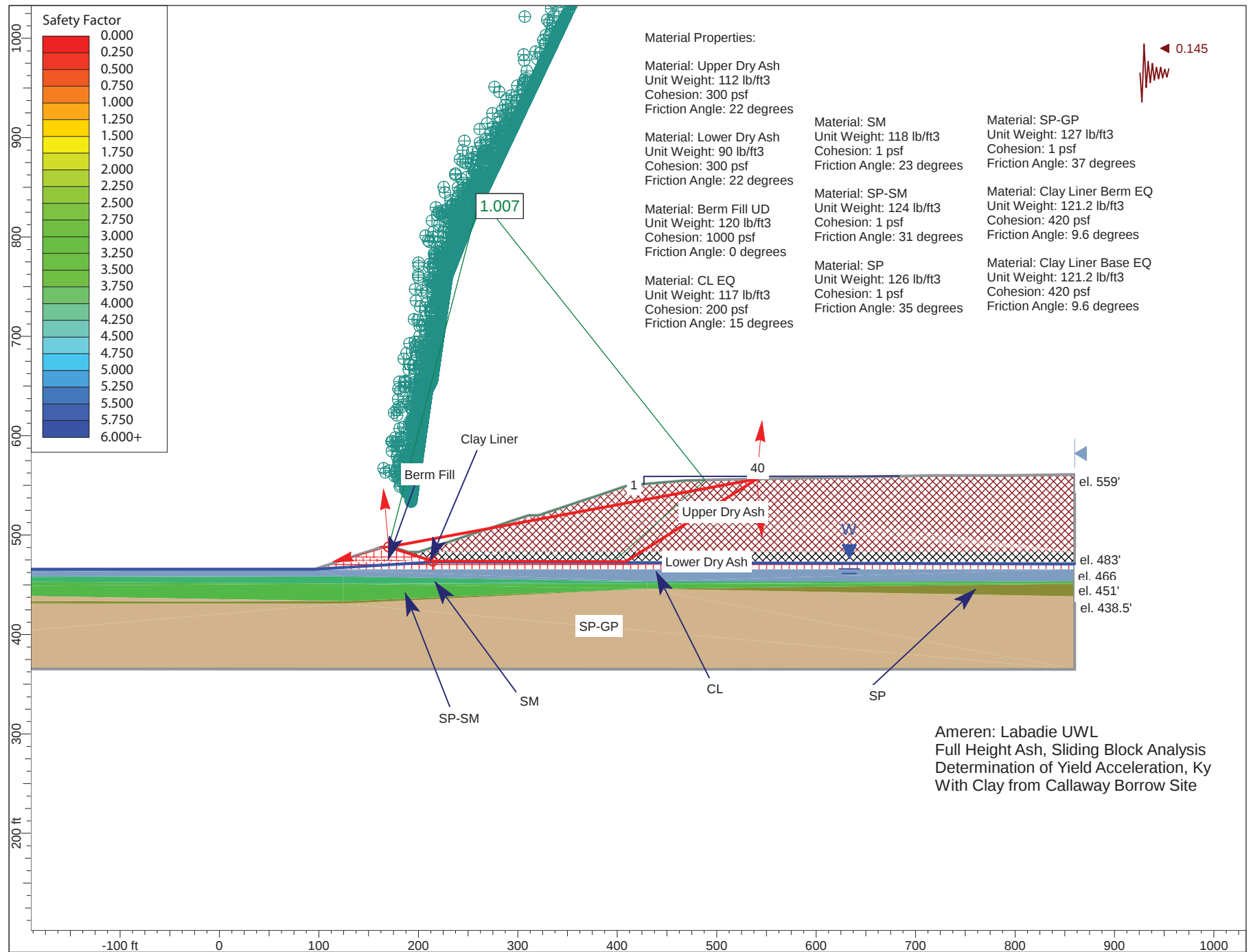
-650.000	465.500
95.732	465.577
214.462	472.846
860.011	471.000

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
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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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$ < 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

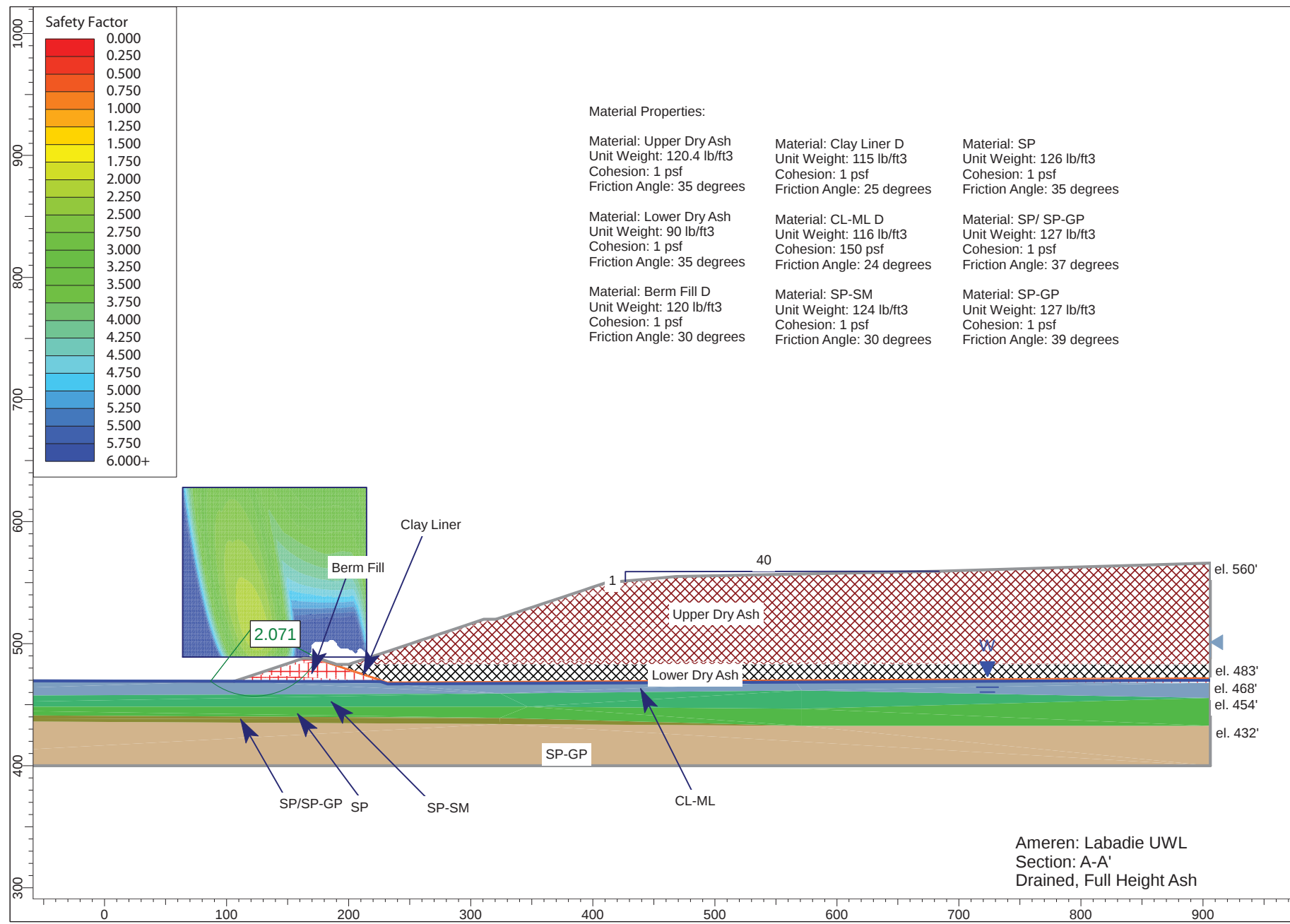
170.055	487.977
214.462	473.808
408.263	473.263
540.567	556.443

Focus/Block Search Point

214.462	473.808
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Focus/Block Search Point

170.055	487.977
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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

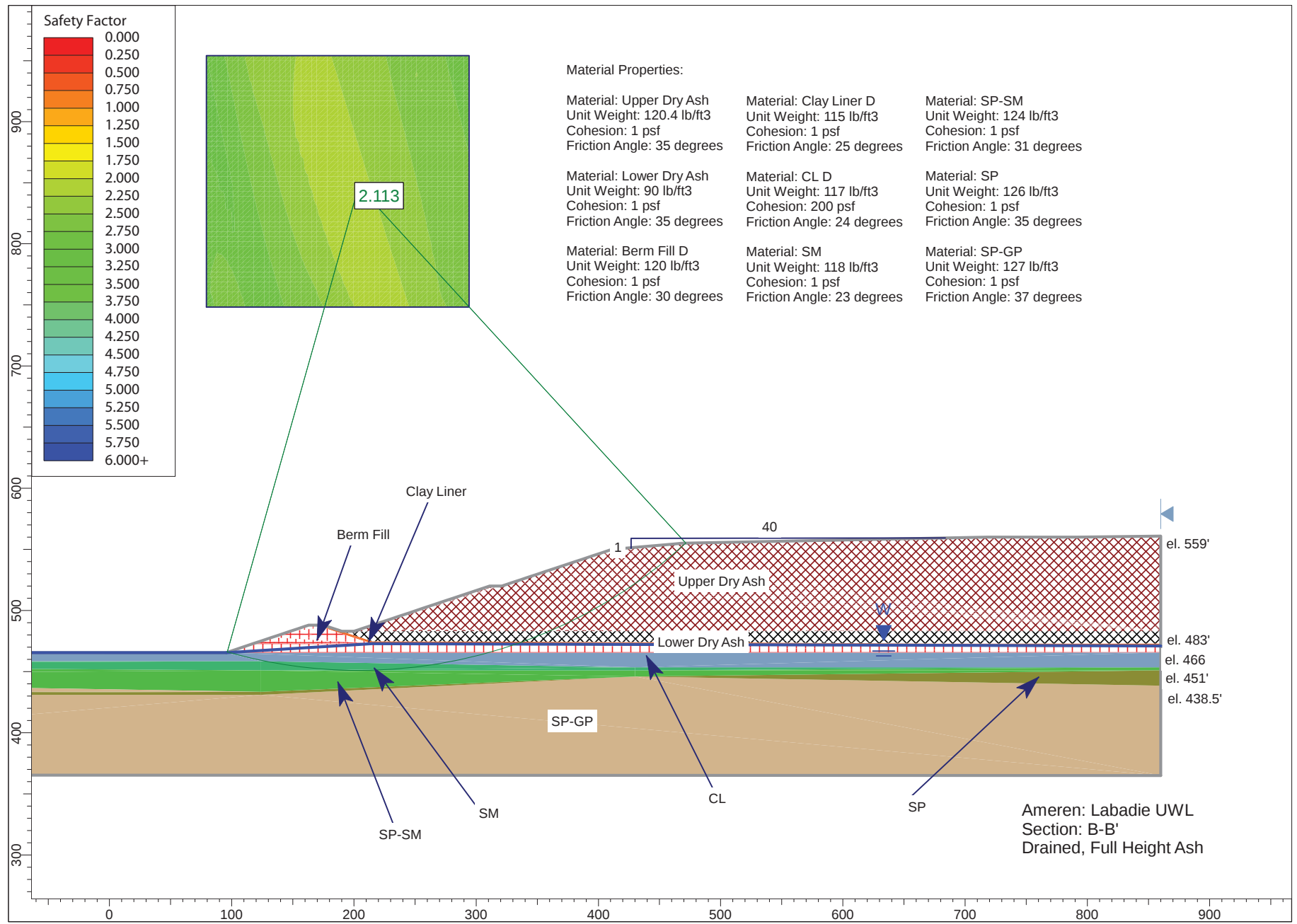
139.000	480.000
129.527	476.842
124.000	475.000
118.473	473.158
106.184	469.061
-310.816	469.954
-310.816	456.500
-310.816	448.252
-310.816	442.454
-310.816	437.454
-310.816	400.000
906.000	400.000
906.000	432.561
906.000	455.500
906.000	467.967
906.000	470.000
906.000	472.524
906.000	483.000

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



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

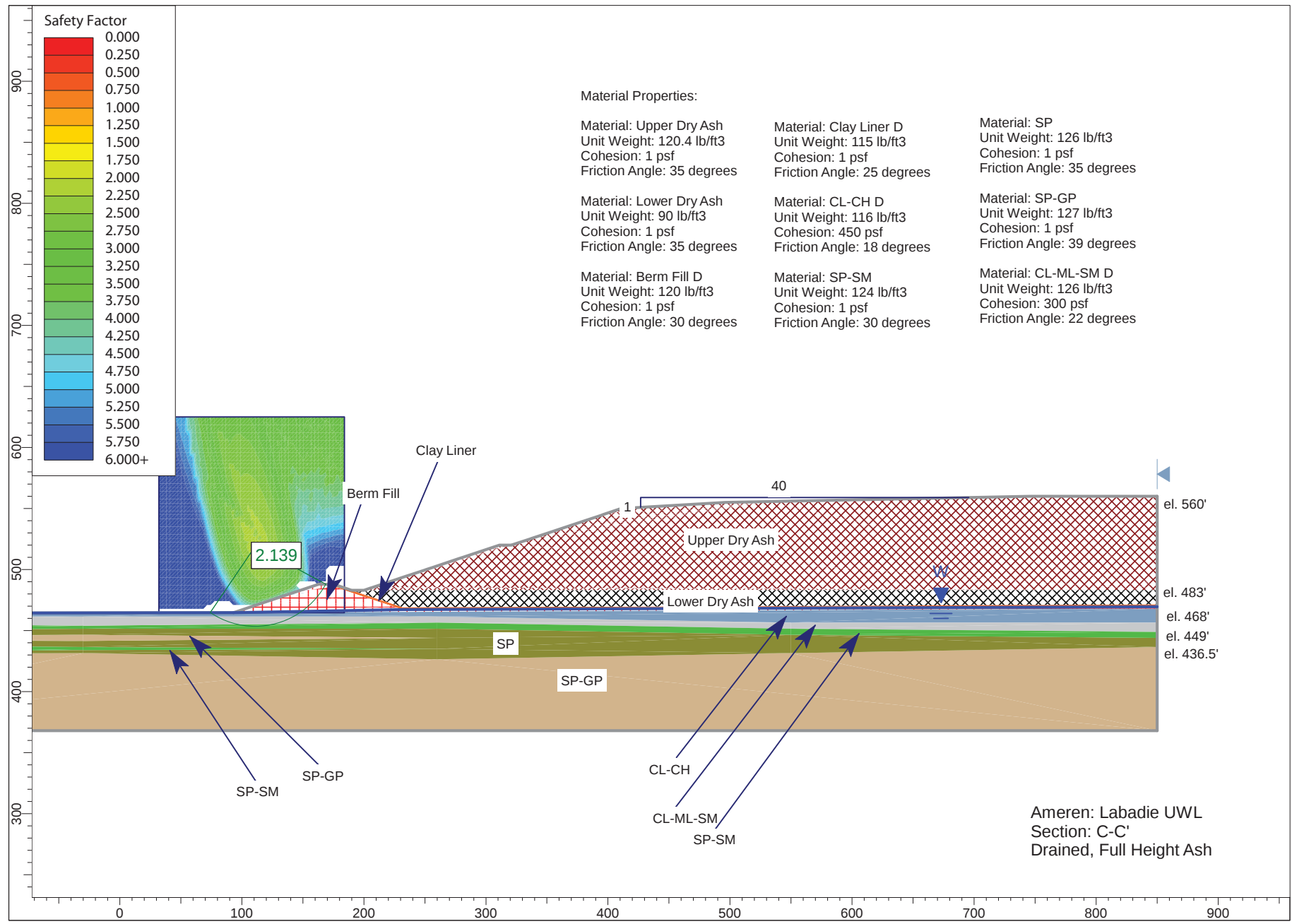
External Boundary

-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



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 $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$
< 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

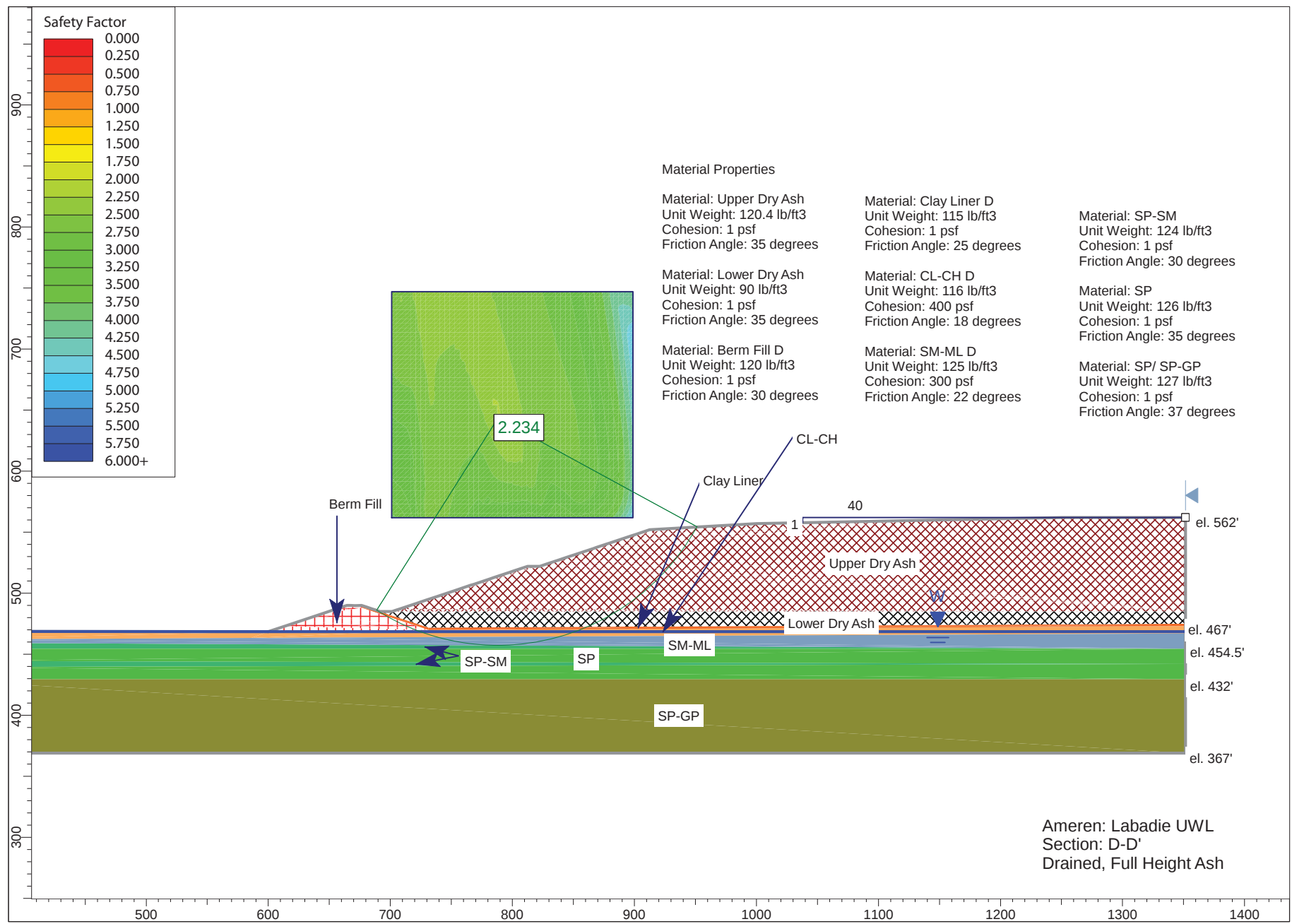
850.000	560.000
746.465	560.000
531.296	555.697
496.414	555.000
428.162	551.003
411.000	550.000
410.785	549.928
396.000	545.000
394.686	544.562
381.000	540.000
378.604	539.201
366.000	535.000
357.068	532.023

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



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

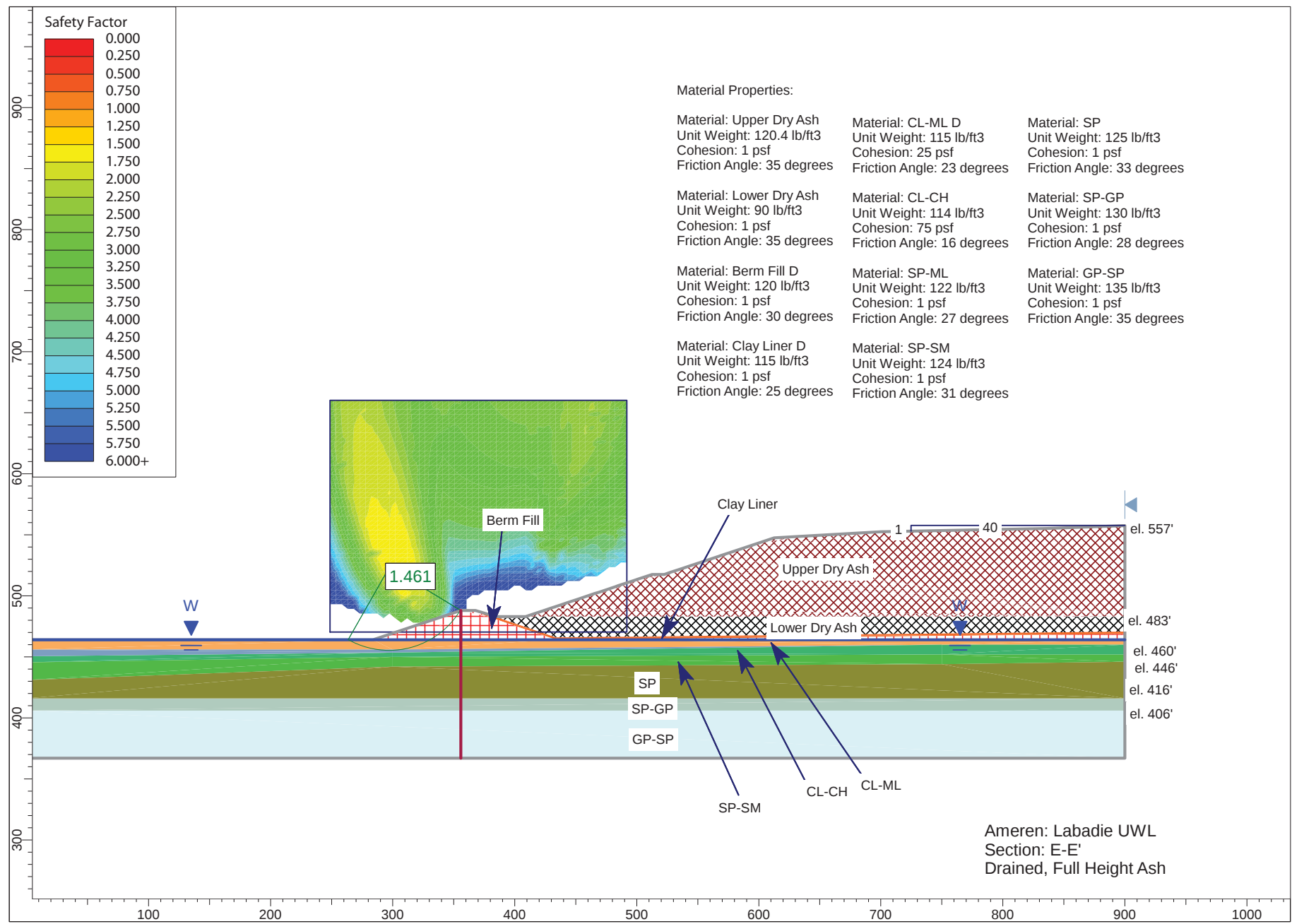
External Boundary

-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



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 $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F)$
< 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

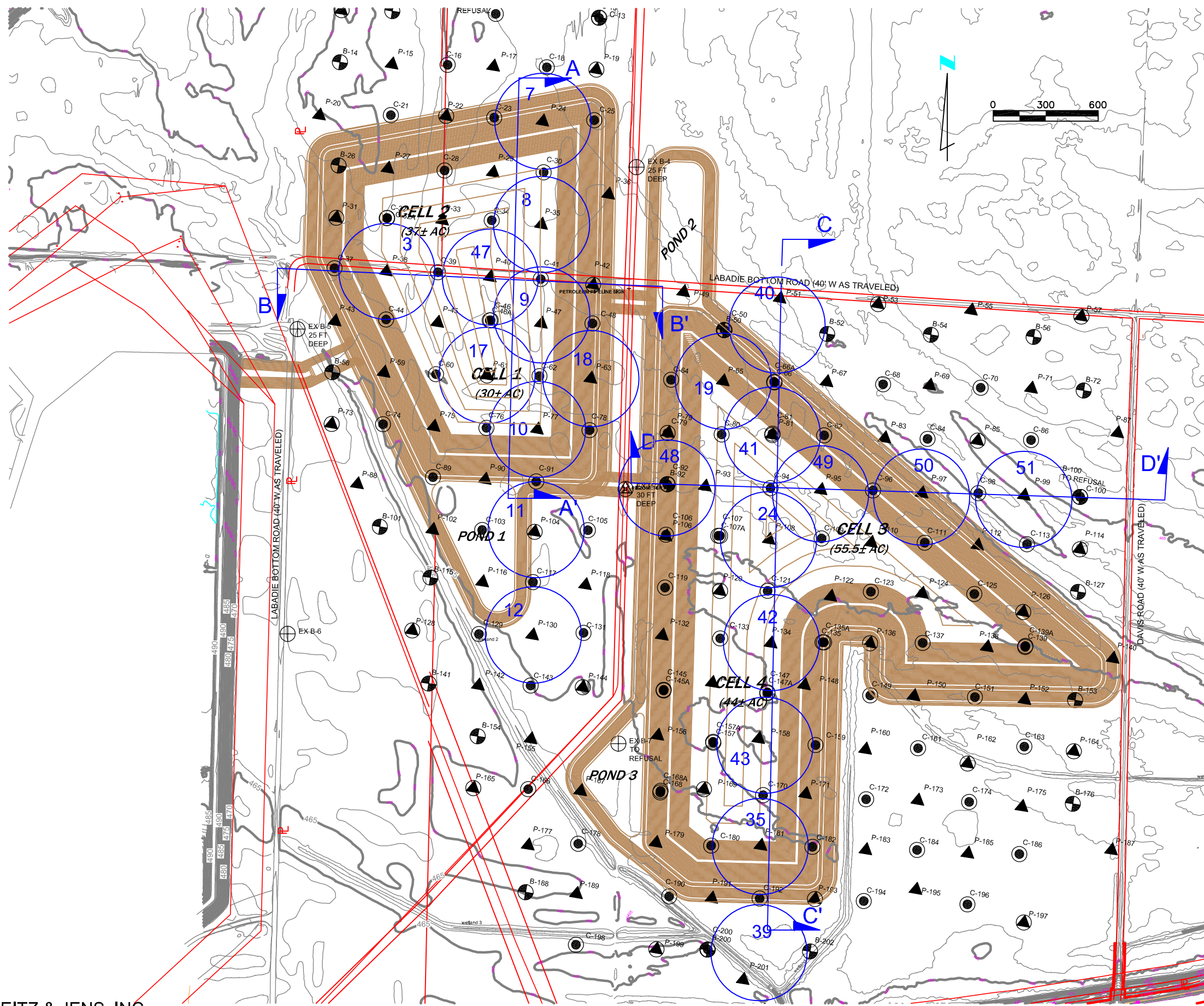
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433.805	464.000
900.000	464.000

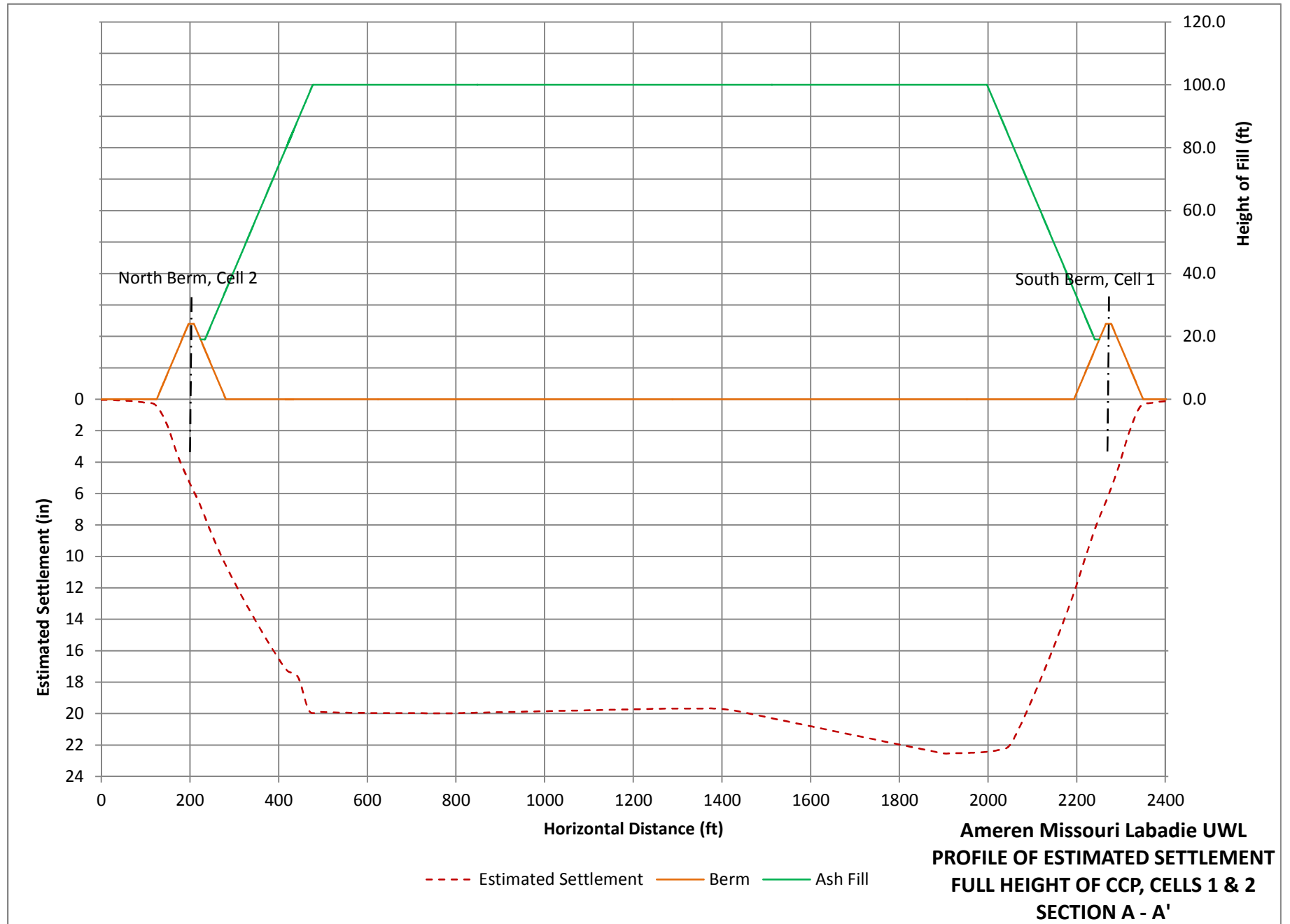
Focus/Block Search Line

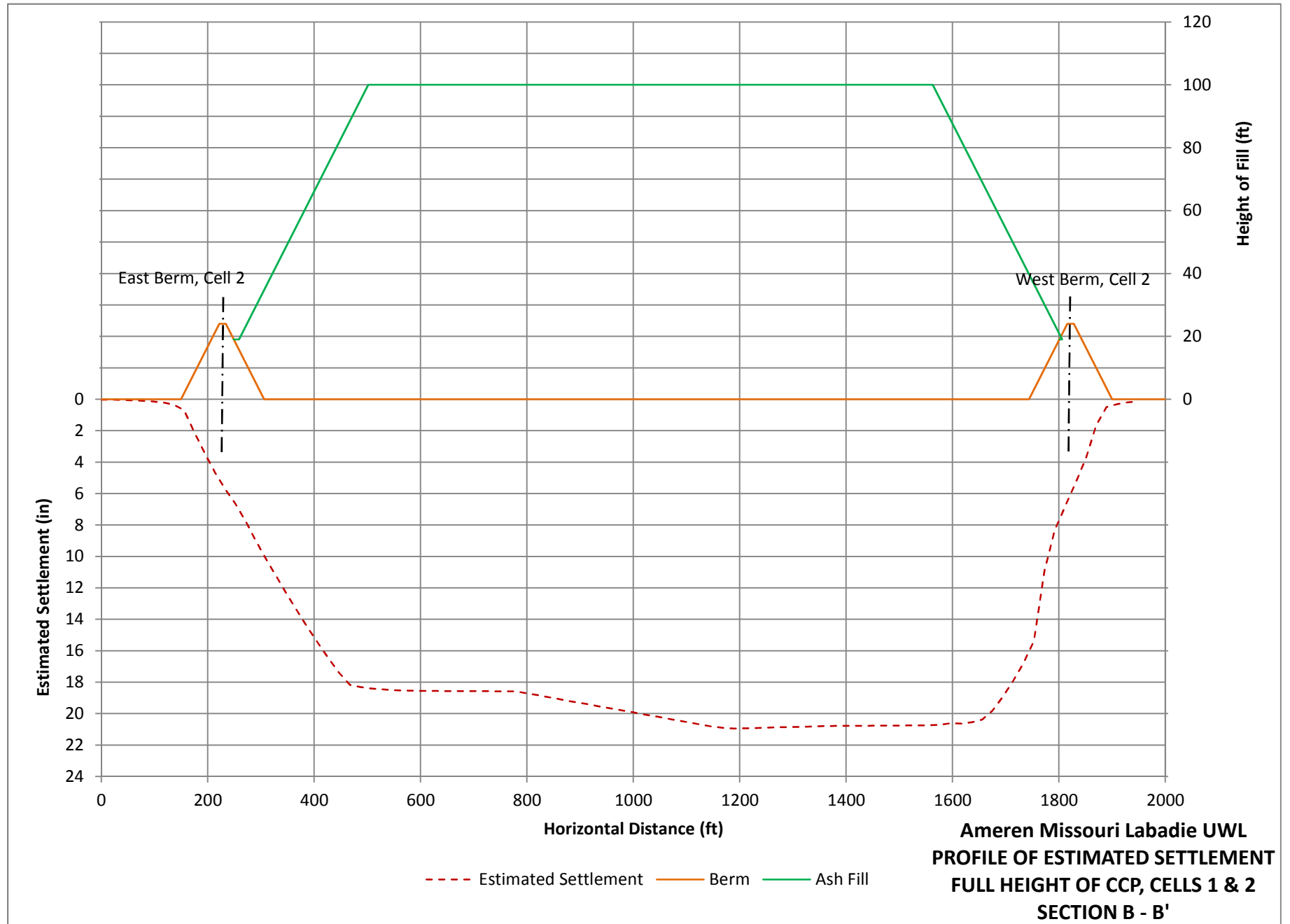
355.800	367.000
355.800	488.000

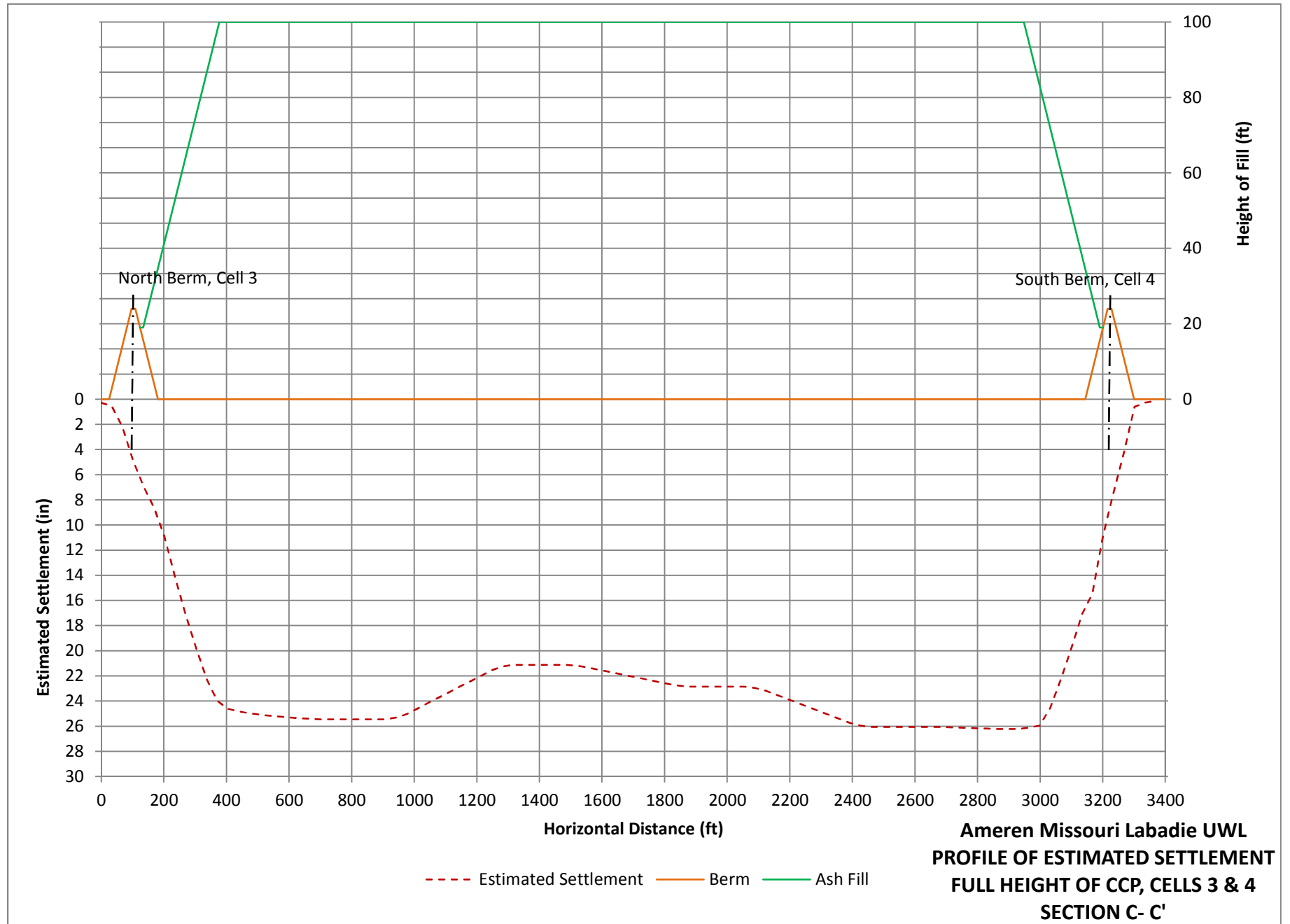
Appendix F

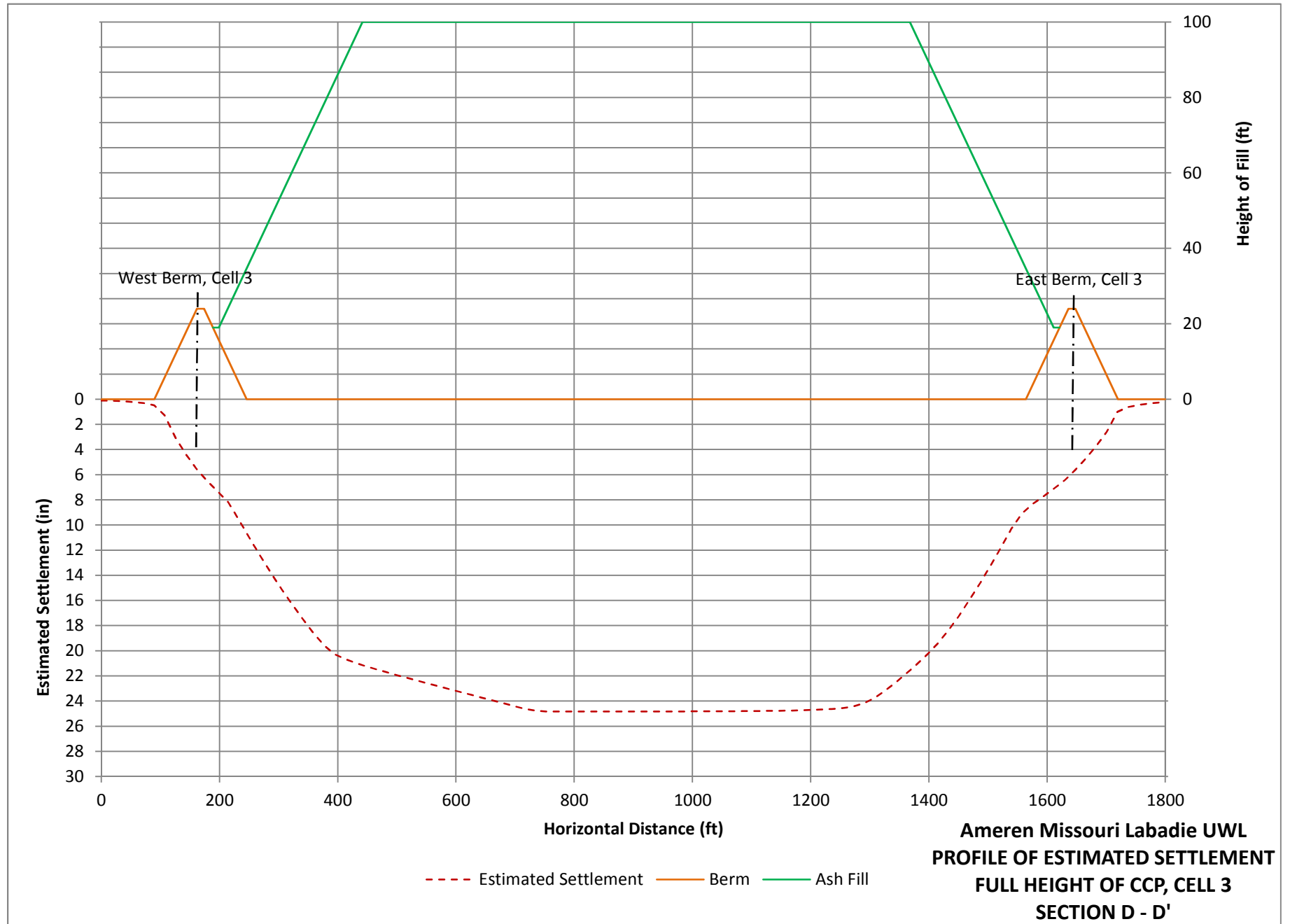
RESULTS OF SETTLEMENT ANALYSES
Revised August 2013



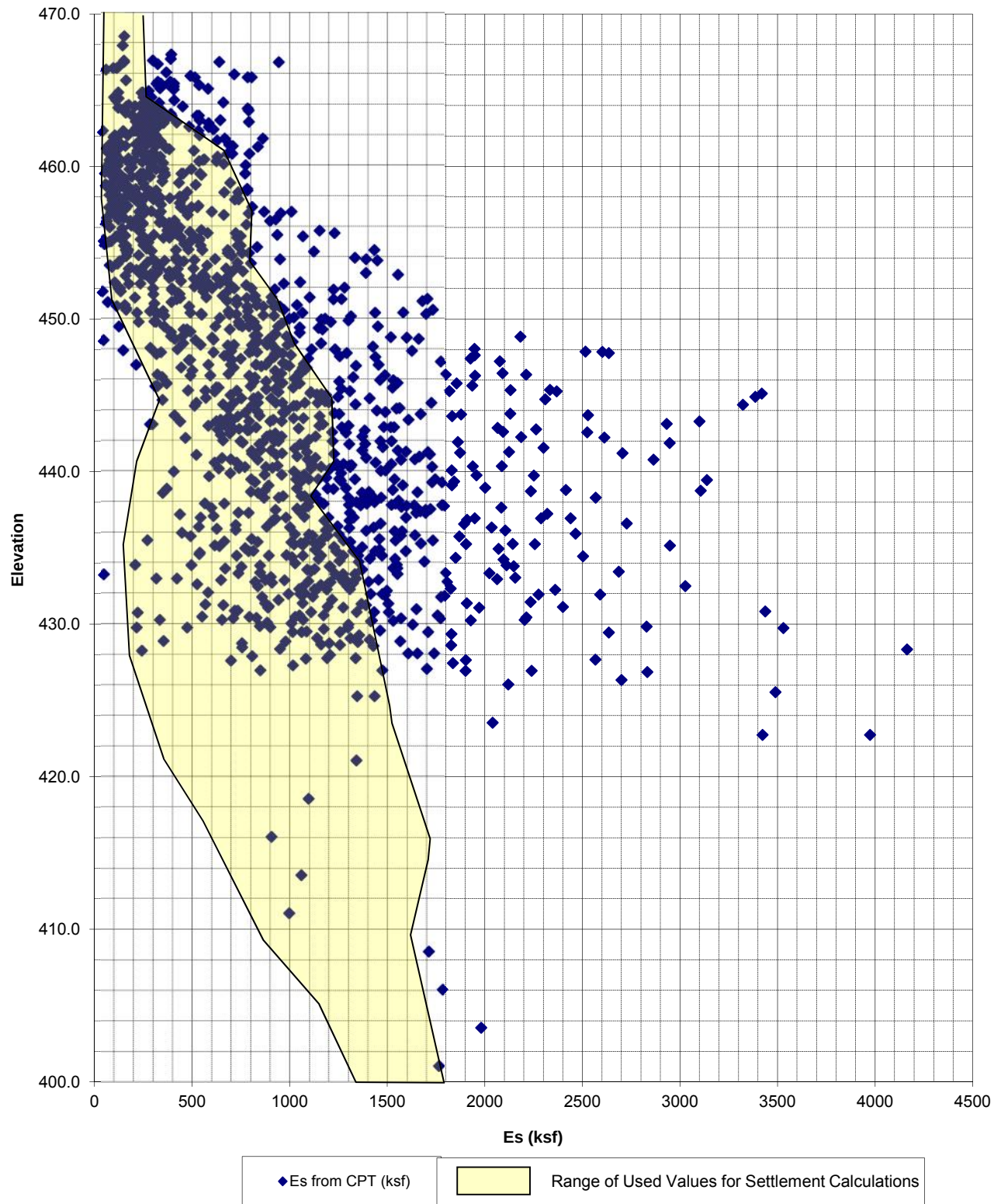


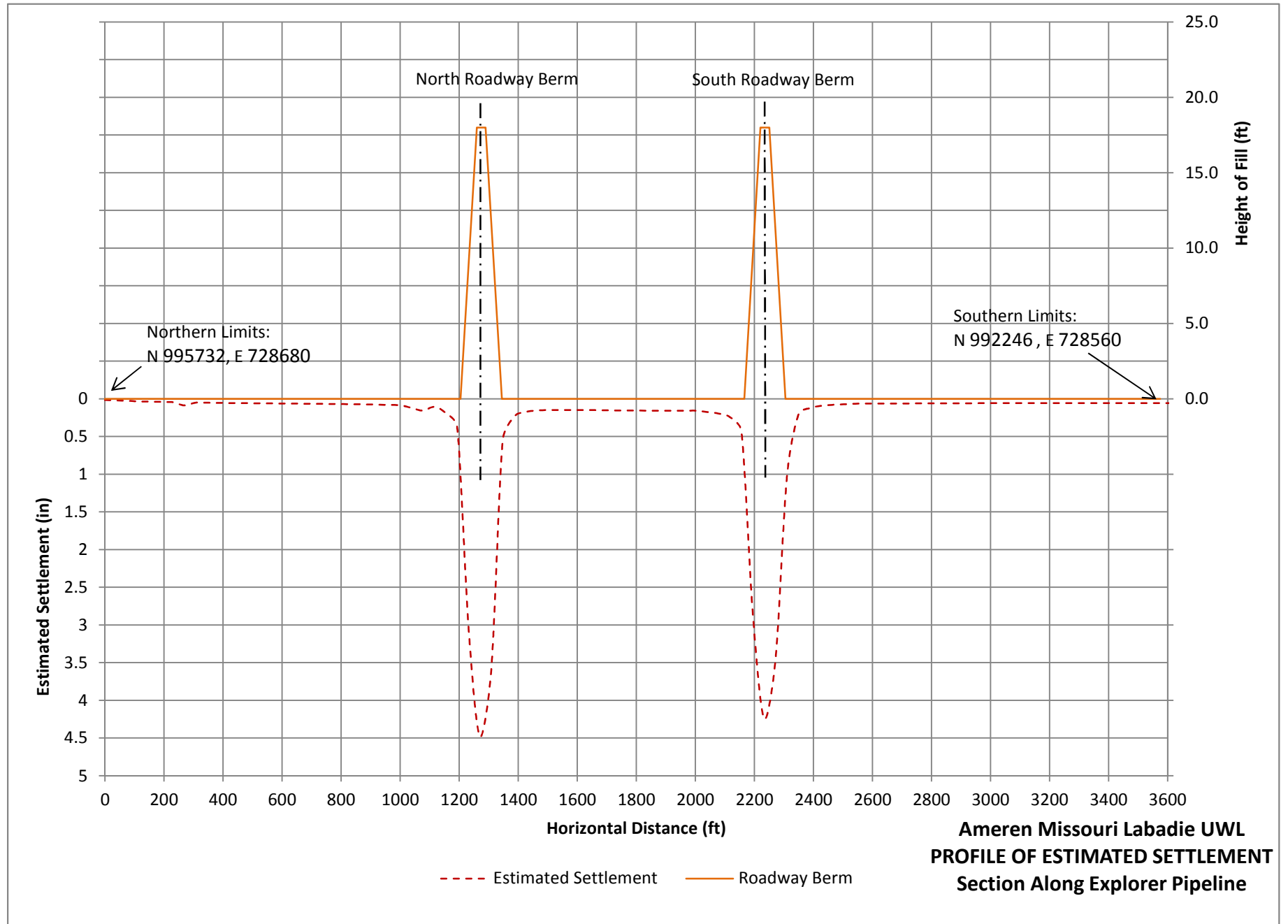






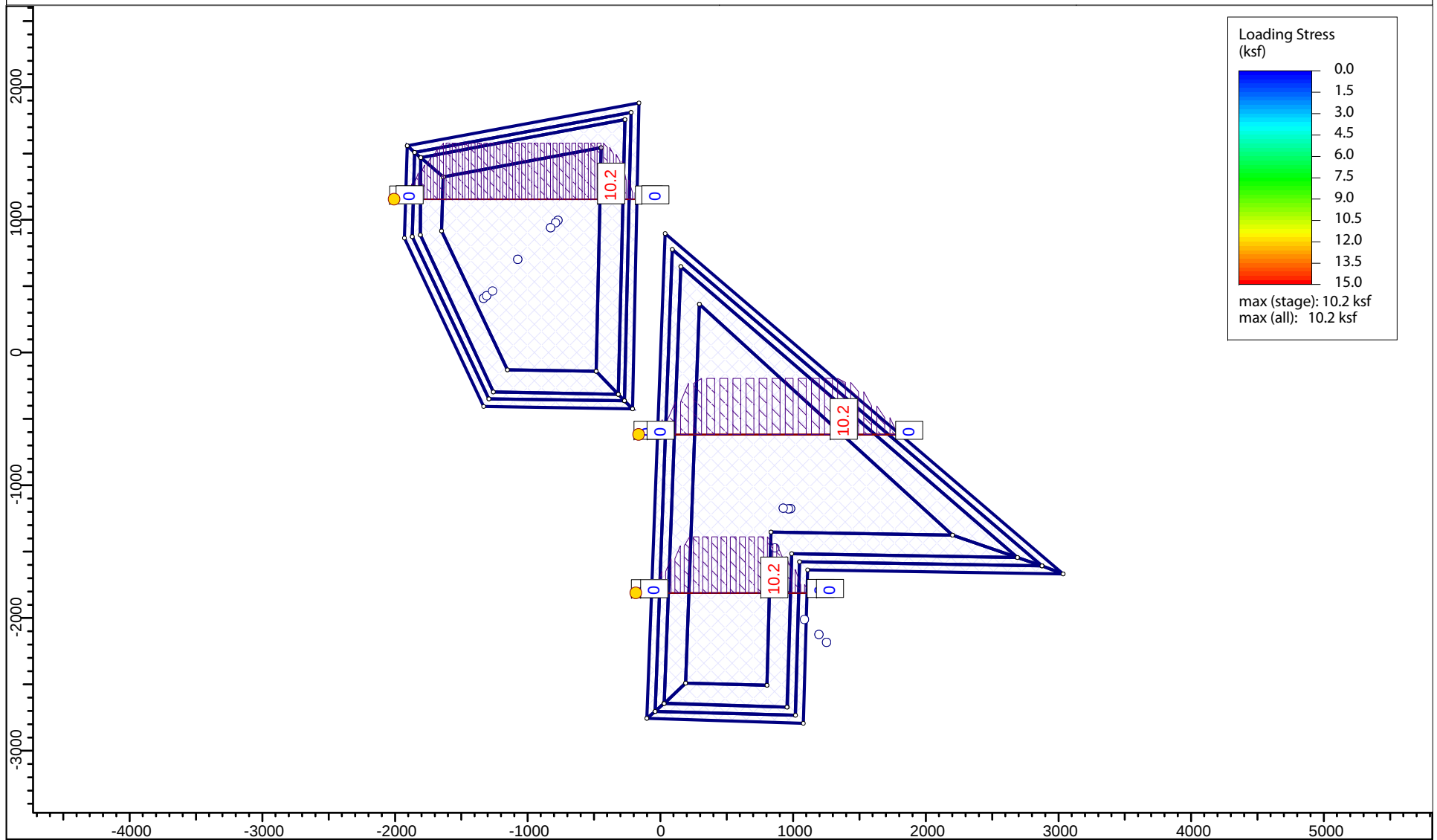
Ameren Missouri: Labadie UWL
Es (ksf) vs Elevation





Stage 1

Data Type: Loading Stress



SETTLE3D 2.016

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

Figure F-8