Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Northwest Section Stage 1 Case 1 (Average Strength of Ash Slimes)
Method: Morgenstern-Price
Analysis Sluiced Ash Drained Condition
Block Specified Failure Surface

Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Ash - Sluiced
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 700 psf
Phi: 0 °

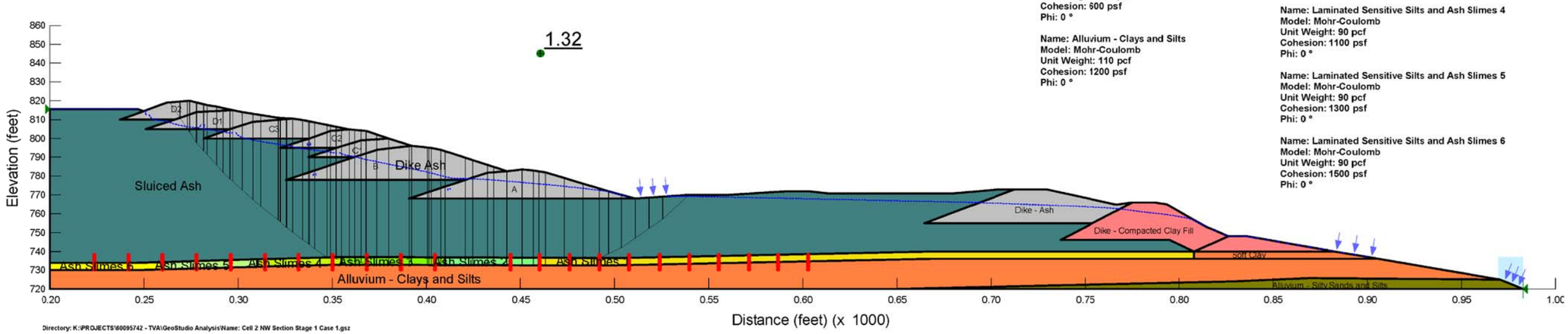
Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 800 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 900 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1100 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 5
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1300 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 6
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1500 psf
Phi: 0 °



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 NW Section Stage 1 Case 1.gsz

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CELL 2 NW SECTION STAGE 1 CASE 1-WEDGE
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_1

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_1.dwg: 6/14/2009 9:24:36 PM: DEARMAN, DANIEL: STS.stb

Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Northwest Section Stage 1 Case 2 (Low Bound Strength of Ash Slimes)
Method: Morgenstern-Price
Analysis Sluiced Ash Drained Condition
Block Specified Failure Surface

Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Ash - Sluiced
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 500 psf
Phi: 0 °

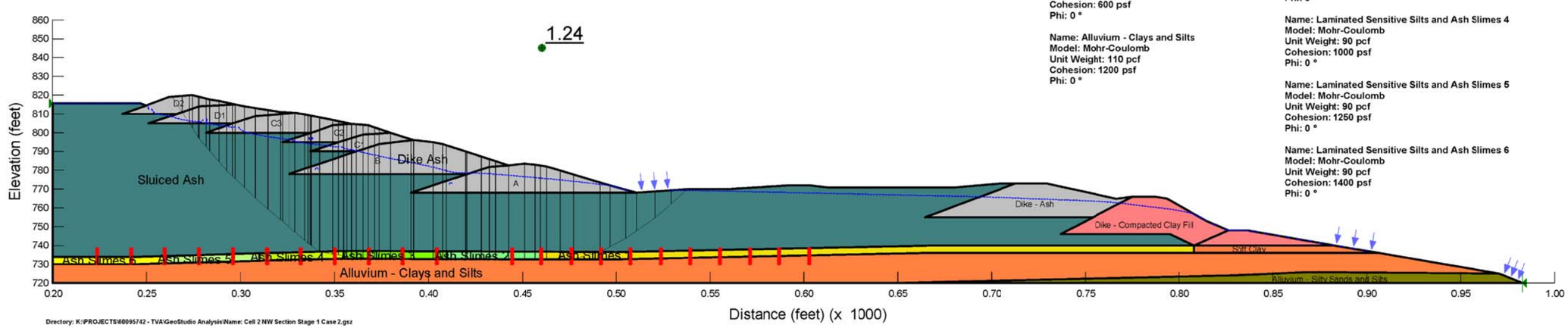
Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 700 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 800 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1000 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 5
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1250 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 6
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1400 psf
Phi: 0 °



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CELL 2 NW SECTION STAGE 1 CASE 2 - WEDGE
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009
PROJECT NUMBER	60095742	
FIGURE NUMBER	1.6.3_2	

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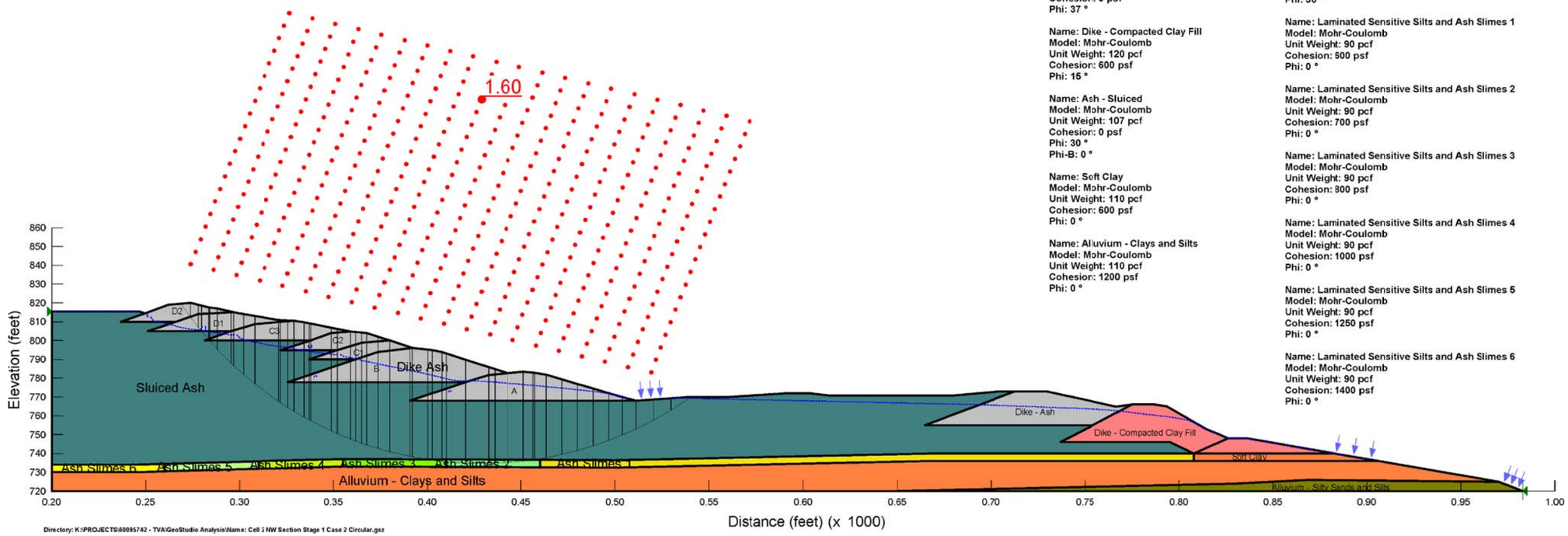
Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Northwest Section Stage 1 Case 2 (Low Bound Strength of Ash Slimes)
Method: Morgenstern-Price
Analysis Sluiced Ash Drained Condition
Grid and Radius Failure Surface



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 NW Section Stage 1 Case 2 Circular.gsz

Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Ash - Sluiced
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 500 psf
Phi: 30 °

Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 500 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 700 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 800 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1000 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 5
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1250 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 6
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1400 psf
Phi: 0 °

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CELL 2 NW SECTION STAGE 1 CASE 2 - CIRCULAR
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_3

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Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Northwest Section Stage 2 Case 1 (Average Strength of Ash Slimes)
Method: Morgenstern-Price
Analysis Sluiced Ash Undrained Condition
Block Specified Failure Surface

Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Ash - Sluiced
Model: S=f(overburden)
Unit Weight: 107 pcf
Tau/Sigma Ratio: 0.3
Minimum Strength: 0

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 700 psf
Phi: 0 °

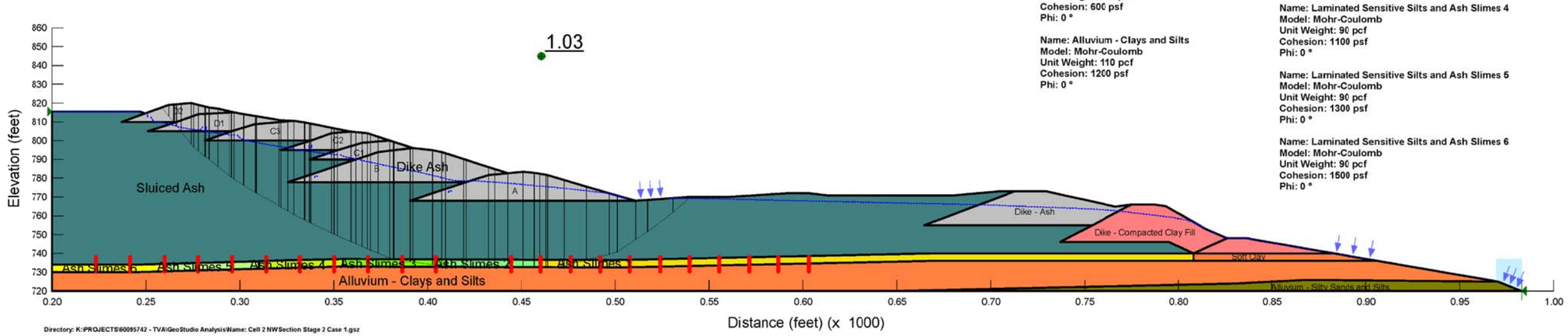
Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 800 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 900 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1100 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 5
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1300 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 6
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1500 psf
Phi: 0 °



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 NWSection Stage 2 Case 1.gsz

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CELL 2 NW SECTION STAGE 2 CASE 1 - WEDGE
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_4

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Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Northwest Section Stage 2 Case 2 (Low Bound Strength of Ash Slimes)
Method: Morgenstern-Price
Analysis Sluiced Ash Undrained Condition
Block Specified Failure Surface

Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Ash - Sluiced
Model: S=f(overburden)
Unit Weight: 107 pcf
Tau/Sigma Ratio: 0.3
Minimum Strength: 0

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 600 psf
Phi: 0 °

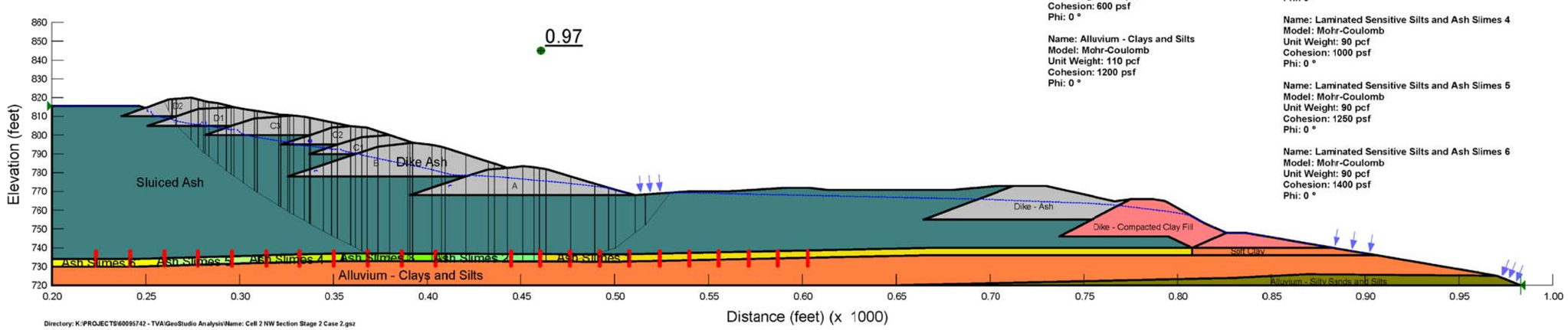
Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 700 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 800 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1000 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 5
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1250 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 6
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1400 psf
Phi: 0 °



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CELL 2 NW SECTION STAGE 2 CASE 2 - WEDGE
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_5

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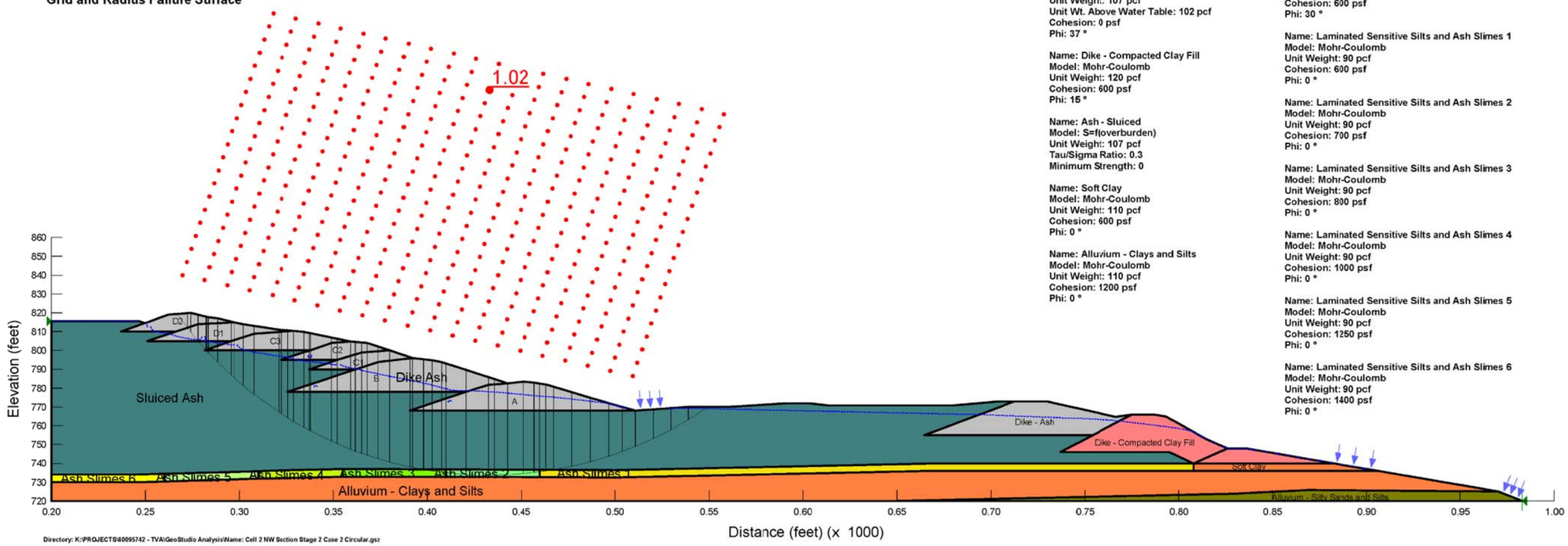
Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Northwest Section Stage 2 Case 2 (Low Bound Strength of Ash Slimes)
Method: Morgenstern-Price
Analysis Sluiced Ash Undrained Condition
Grid and Radius Failure Surface



Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight:: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight:: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Ash - Sluiced
Model: S=f(overburden)
Unit Weight:: 107 pcf
Tau/Sigma Ratio: 0.3
Minimum Strength: 0

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight:: 110 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight:: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 700 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 800 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1000 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 5
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1250 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 6
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1400 psf
Phi: 0 °

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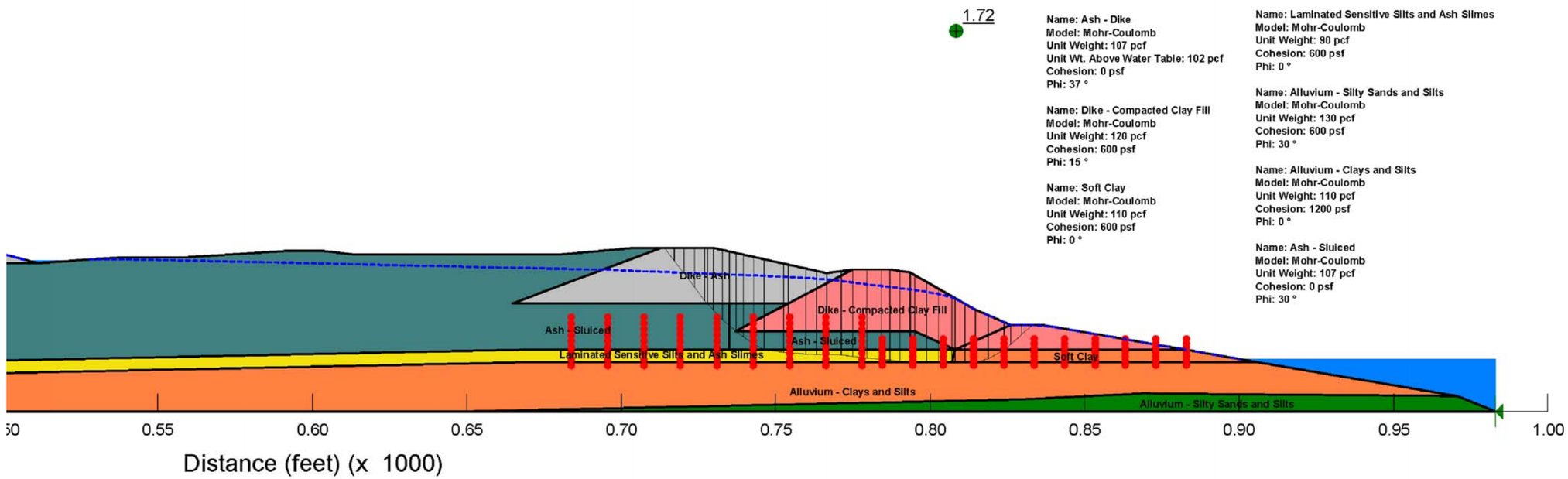
CELL 2 NW SECTION STAGE 2 CASE 2 - CIRCULAR
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009
PROJECT NUMBER	60095742	
FIGURE NUMBER	1.6.3_6	

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_6.dwg: 6/14/2009 9:31:52 PM: DEARMAN, DANIEL: STS.stb

Title: TVA - Kingston RCA
Comments: Stability Analysis for Cell 2 Northwest Section Stage 3 Pre-Failure
Method: Morgenstern-Price
Block Specified Failure Surface



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 NW Section - Stage 3 Pre-Failure.gsz

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CELL 2 NW SECTION STAGE 3 PRE-FAILURE - WEDGE
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

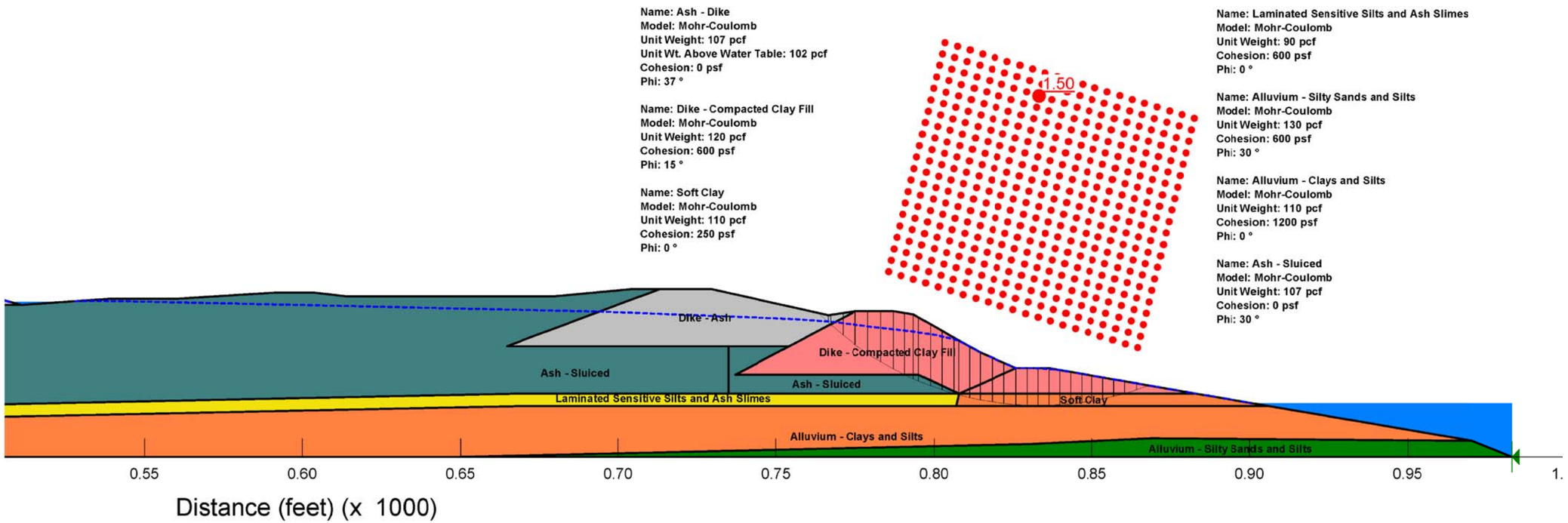
Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_7

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_7.dwg; 6/14/2009 9:34:25 PM; DEARMAN, DANIEL; STS.stb

Title: TVA - Kingston RCA
Comments: Stability Analysis for Cell 2 Northwest Section Stage 3 Pre-Failure Case 1 Circular
Method: Morgenstern-Price
Block Specified Failure Surface



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 NW Section - Stage 3 Pre-Failure Case 1 Circular.gsz

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CELL 2 NW SECTION STAGE 3 PRE FAILURE CIRCULAR
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009
PROJECT NUMBER	60095742	
FIGURE NUMBER	1.6.3_8	

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_8.dwg; 6/14/2009 9:37:14 PM; DEARMAN, DANIEL; STS.stb

Title: TVA - Kingston RCA
Comments: Stability Analysis for Cell 2 Northwest Section Stage 3 Post-Failure Case 1
Method: Morgenstern-Price
Block Specified Failure Surface

0.68

Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Dike - Compacted Clay Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 600 psf
Phi: 15 °

Name: Soft Clay
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 250 psf
Phi: 0 °

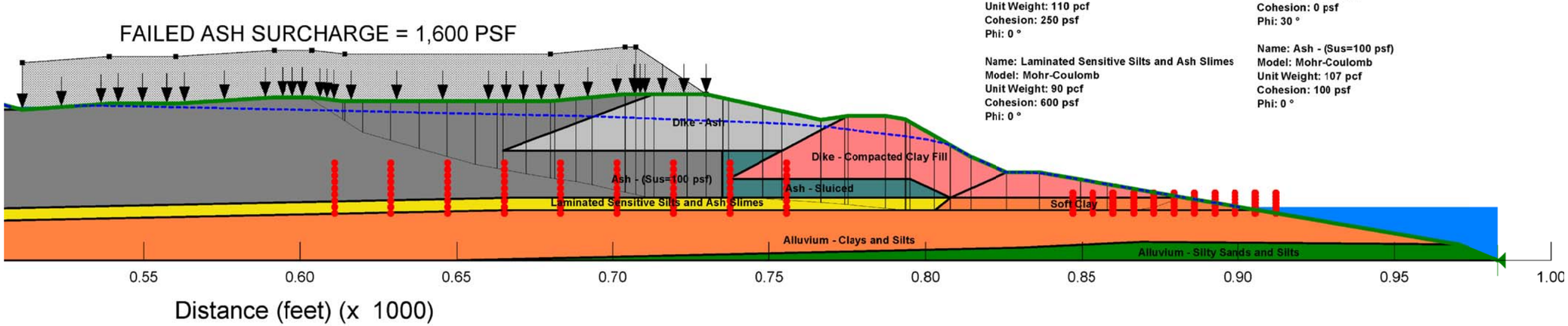
Name: Laminated Sensitive Silts and Ash Slimes
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 600 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Ash - Sluiced
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 0 psf
Phi: 30 °

Name: Ash - (Sus=100 psf)
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 100 psf
Phi: 0 °



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 NW Section - Stage 3 Post-Failure.gsz

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CELL 2 NW SECTION STAGE 3 POST FAILURE CASE 1
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_9

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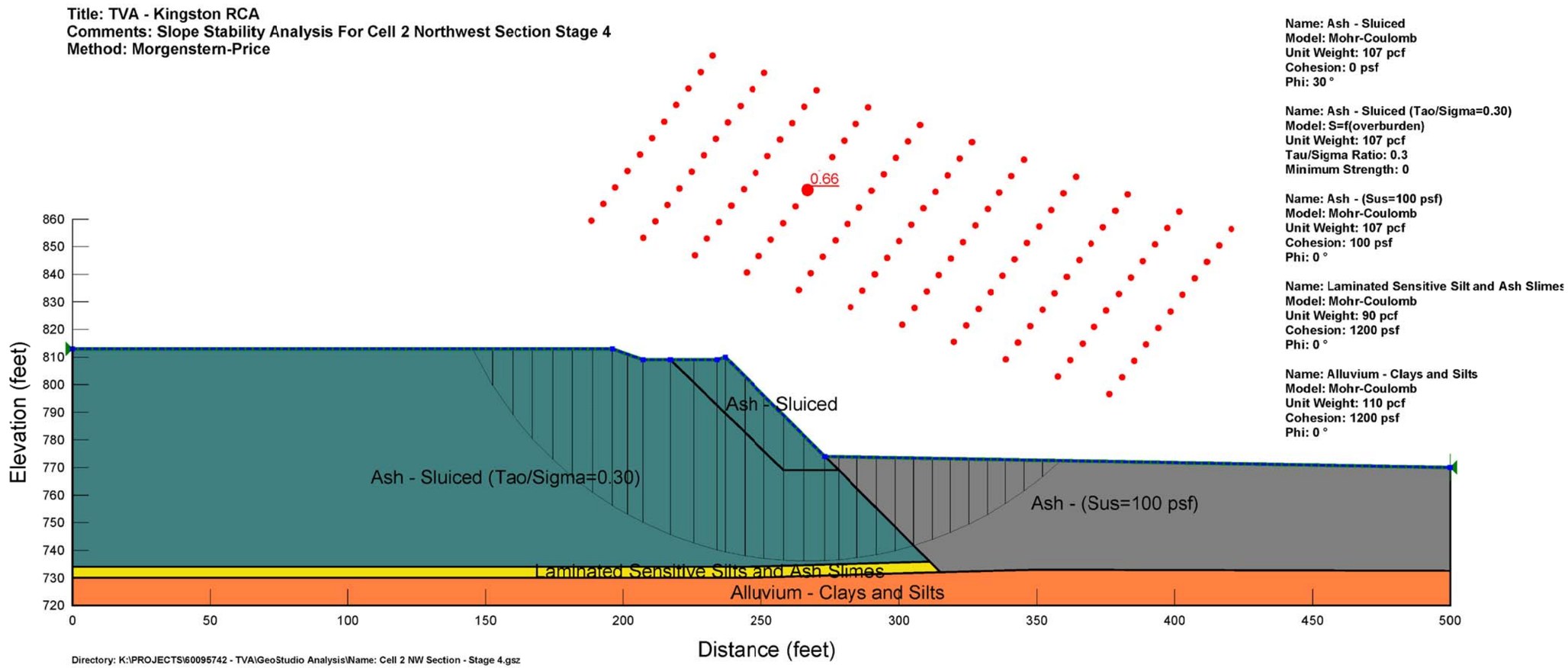

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CELL 2 NW SECTION STAGE 4 - CIRCULAR
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_10

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_10.dwg; 6/14/2009 9:41:05 PM; DEARMAN, DANIEL; STS.stb

Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Southwest Section Case 1
Method: Morgenstern-Price
Analysis Sluiced Ash Drained Condition
Block Specified Failure Surface

Name: Ash - Dike & Dike B2
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Ash - Sluiced
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 0 psf
Phi: 30 °

Name: Dike B1 & Swan Pond Road
Model: Mohr-Coulomb
Unit Weight: 114 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Railroad Shale Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

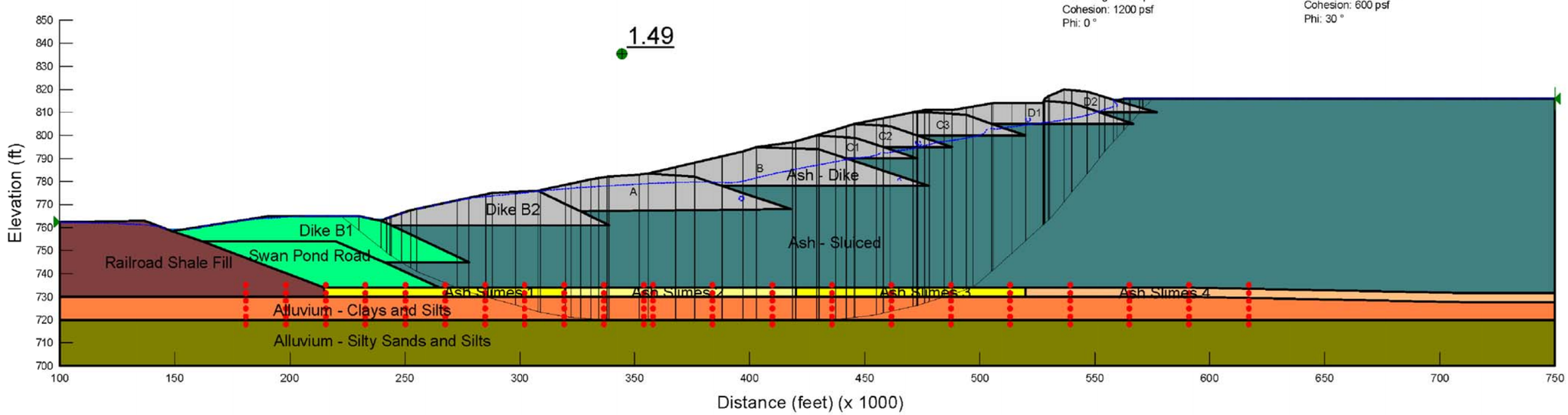
Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1100 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1175 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1250 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1400 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °



Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Cell 2 SW Section Case 1.gsz

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CELL 2 SW SECTION CASE 1
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009
PROJECT NUMBER	60095742	
FIGURE NUMBER	1.6.3_11	

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_11.dwg; 6/14/2009 9:42:46 PM; DEARMAN, DANIEL; STS.stb

Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Cell 2 Southwest Section Case 2
Method: Morgenstern-Price
Analysis Sluiced Ash Undrained Condition
Block Specified Failure Surface

Name: Ash - Dike & Dike B2
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Ash - Sluiced
Model: S=f(overburden)
Unit Weight: 107 pcf
Tau/Sigma Ratio: 0.3
Minimum Strength: 0

Name: Dike B1 & Swan Pond Road
Model: Mohr-Coulomb
Unit Weight: 114 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Railroad Shale Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

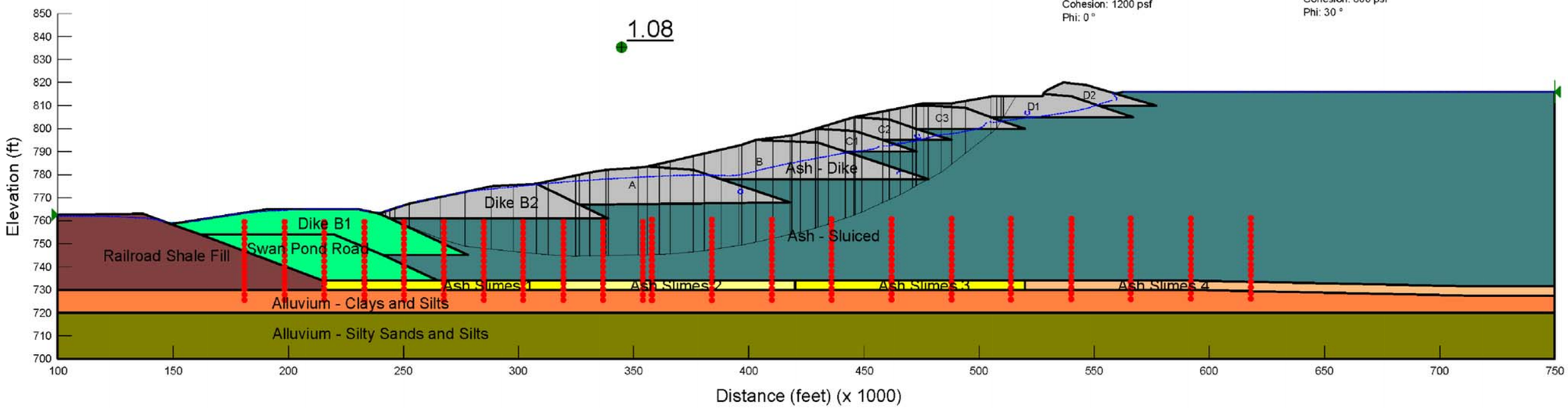
Name: Laminated Sensitive Silts and Ash Slimes 1
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1100 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 2
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1175 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 3
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1250 psf
Phi: 0 °

Name: Laminated Sensitive Silts and Ash Slimes 4
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion: 1400 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °



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CELL 2 SW SECTION CASE 2
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

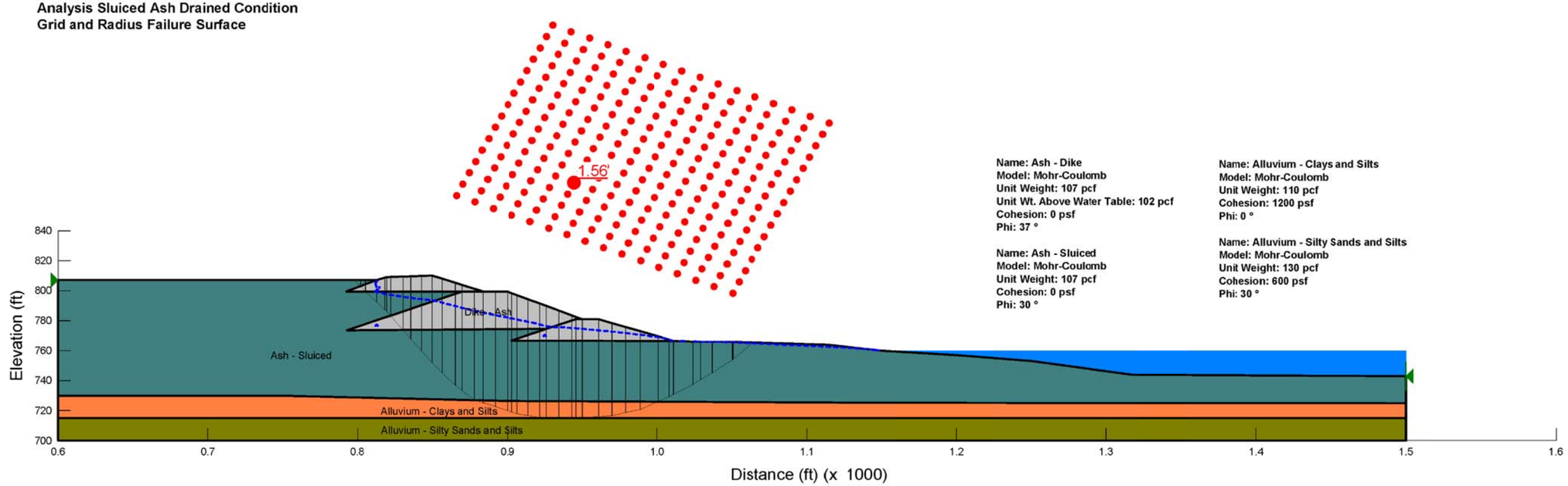
Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_12

X:\PROJECTS\60095742\DWG\slope_stability-figs\G60095742_1-6-3_12.dwg; 6/14/2009 9:46:12 PM; DEARMAN, DANIEL; STS.stb

Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Phase 1 Emergency Dredge Cell East Section Case 1
Method: Morgenstern-Price
Analysis Sluiced Ash Drained Condition
Grid and Radius Failure Surface



Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Ash - Sluiced
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion: 0 psf
Phi: 30 °

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

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PHASE 1 EAST SECTION CASE 1
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_13

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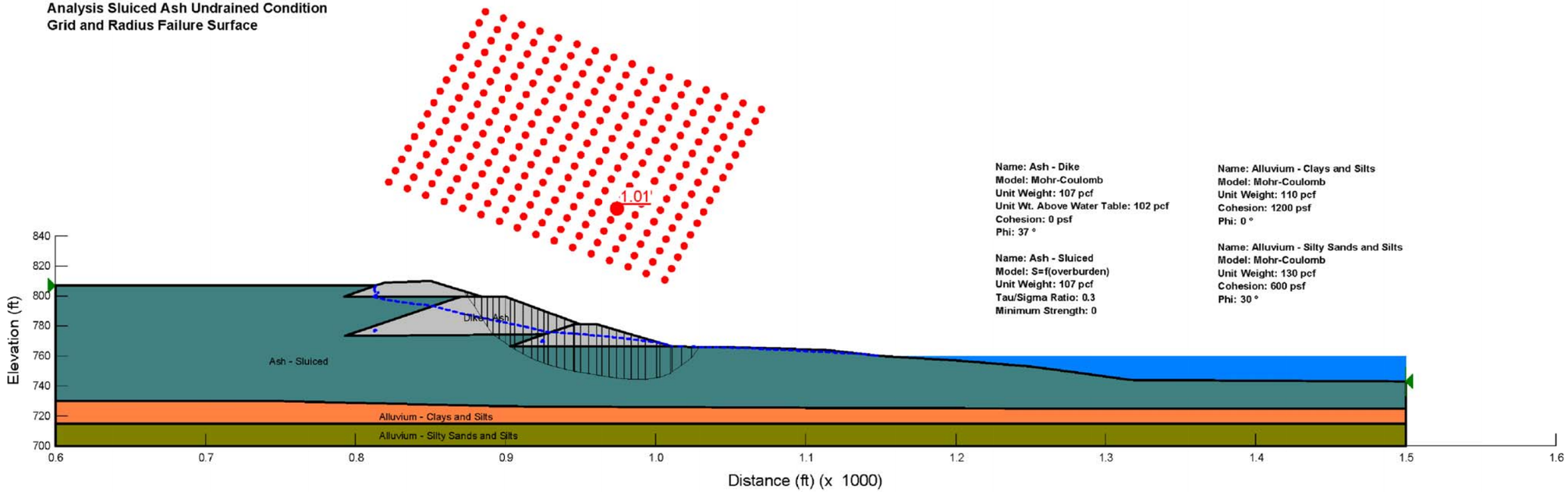
Title: TVA - Kingston RCA
Comments: Slope Stability Analysis for Phase 1 Emergency Dredge Cell East Section Case 2
Method: Morgenstern-Price
Analysis Sluiced Ash Undrained Condition
Grid and Radius Failure Surface



Name: Ash - Dike
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Unit Wt. Above Water Table: 102 pcf
Cohesion: 0 psf
Phi: 37 °

Name: Ash - Sluiced
Model: S=f(overburden)
Unit Weight: 107 pcf
Tau/Sigma Ratio: 0.3
Minimum Strength: 0

Name: Alluvium - Clays and Silts
Model: Mohr-Coulomb
Unit Weight: 110 pcf
Cohesion: 1200 psf
Phi: 0 °

Name: Alluvium - Silty Sands and Silts
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 600 psf
Phi: 30 °

Directory: K:\PROJECTS\60095742 - TVA\GeoStudio Analysis\Name: Phase 1 East Section Case 2_r.gsz

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PHASE 1 EAST SECTION CASE 2
SLOPE STABILITY ANALYSES
TVA-KINGSTON
DREDGE CELL FAILURE RCA
HARRIMAN, TENNESSEE

Analytics :	PCC	06/05/2009
Checked:	LWB	06/05/2009
Approved:	WHW	06/05/2009

PROJECT NUMBER 60095742

FIGURE NUMBER 1.6.3_14

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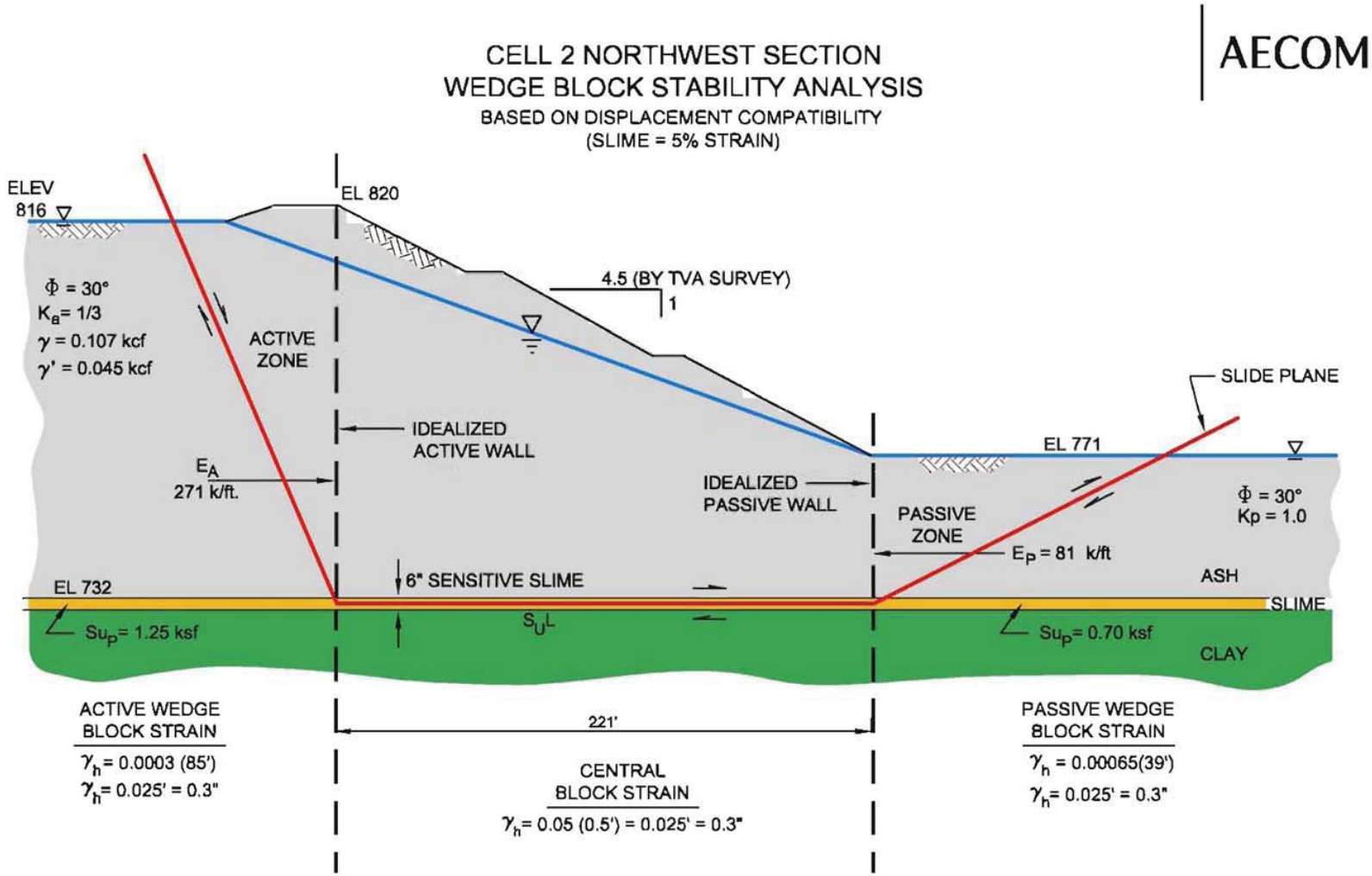
Traditional Wedge Block Analysis for Weak Foundation



$$FS = \frac{S_U L}{E_A - E_P} = \frac{(1.25 + 0.7)/2\ (221')}{271 - 81} = \frac{215\ \text{k/ft.}}{190\ \text{k/ft.}} = 1.1,\ \textbf{FAILURE IMMINENT}$$

Traditional Wedge Block Analysis for Weak Foundation

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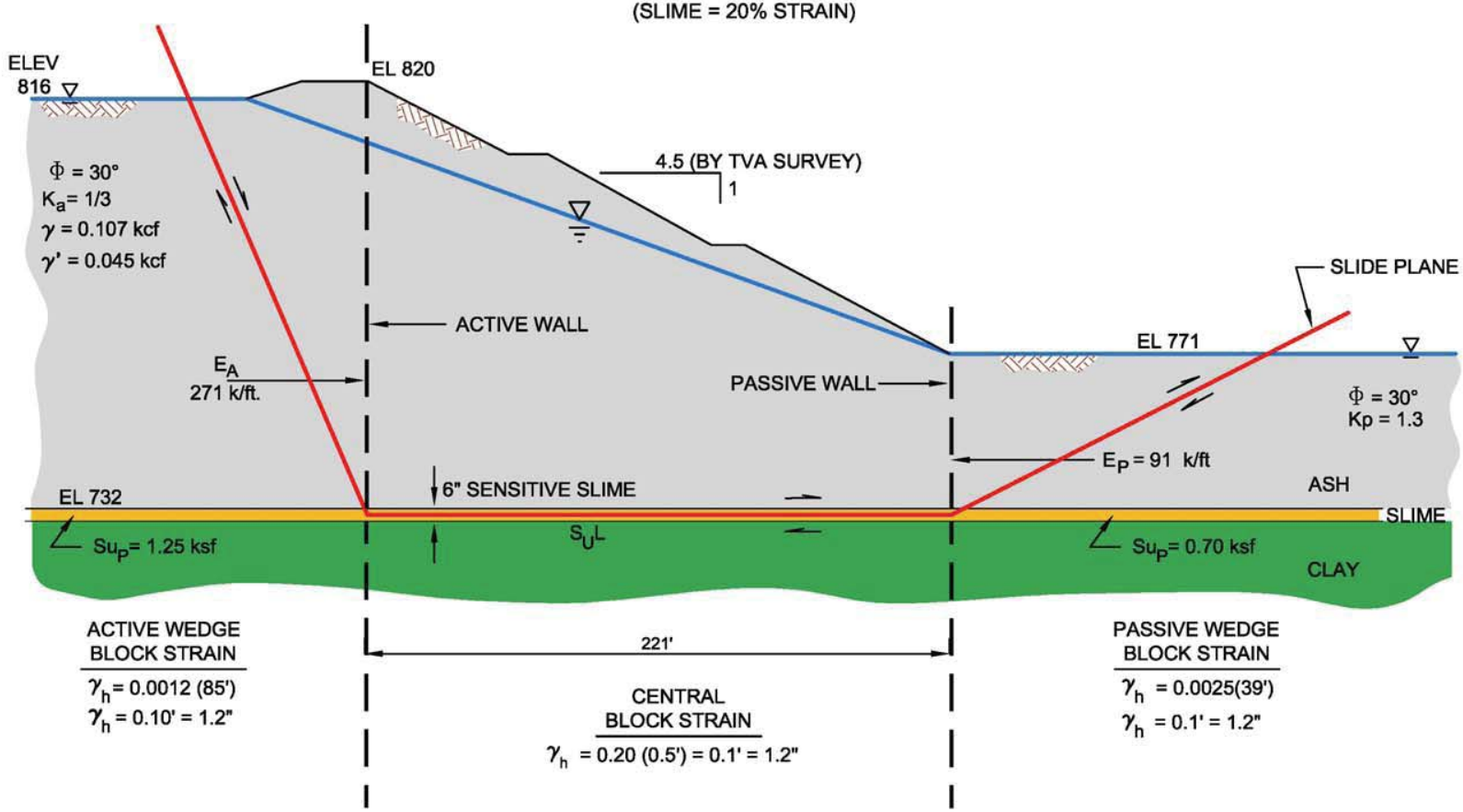

$$FS = \frac{S_u L}{E_A - E_P} = \frac{0.75\,(1.25 + 0.7)/2\,(221')}{271 - 91} = \frac{162\text{ k/ft.}}{180\text{ k/ft.}} = 0.9, \textbf{ FAILURE}$$

FS=0.9 < 1.0

CELL 2 SOUTHWEST SECTION
WEDGE BLOCK STABILITY ANALYSIS

BASED ON DISPLACEMENT COMPATIBILITY
(SLIMES = 5% STRAIN)

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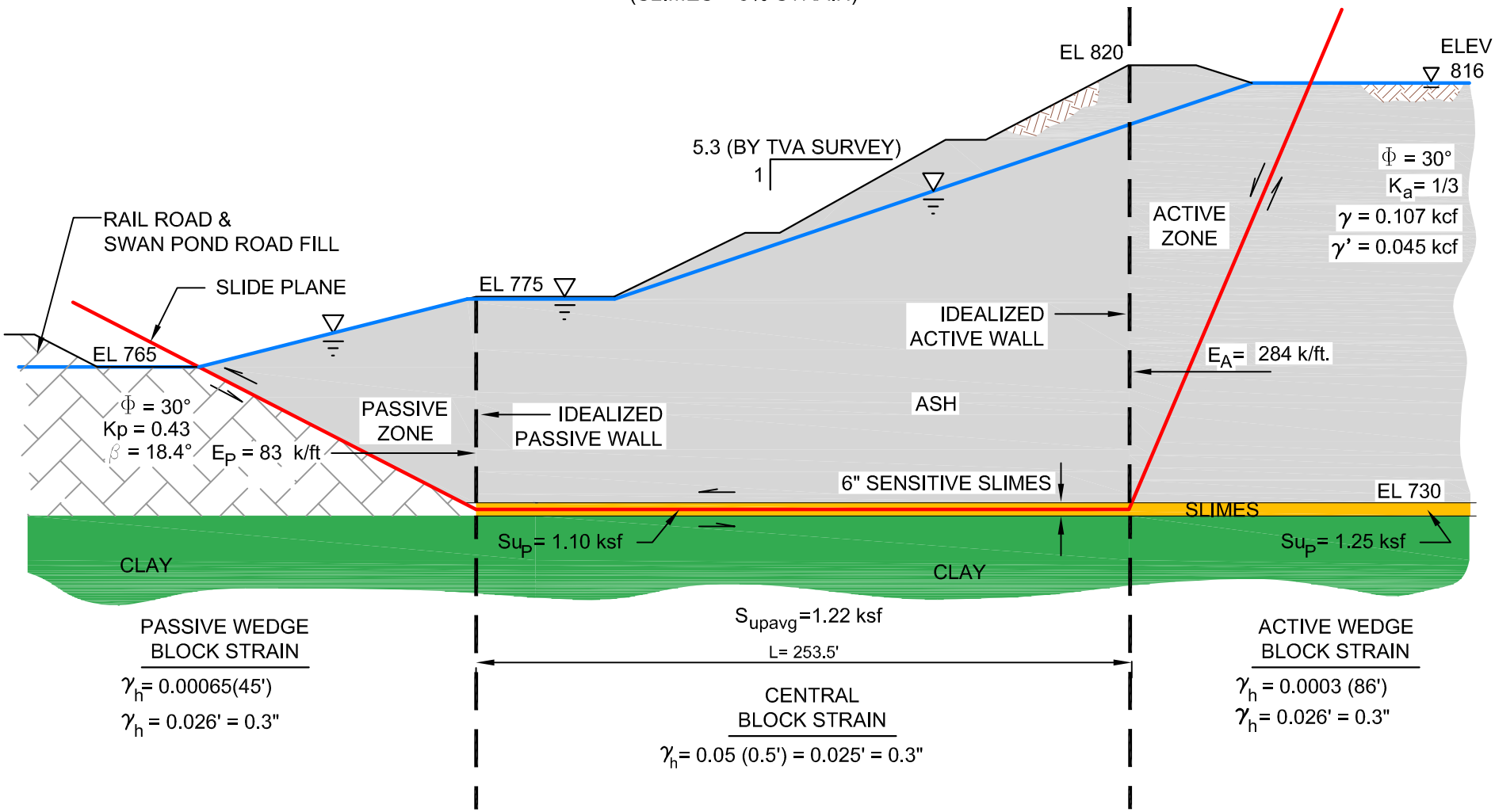

$$FS = \frac{S_{upavg}}{E_A - E_P} = \frac{1.22\ (253.5')}{284 - 83} = \frac{309\ \text{k/ft.}}{201\ \text{k/ft.}} = 1.5,\ \textbf{STABLE}$$

FIG. 1.6.3_17

CELL 2 SOUTHWEST SECTION
WEDGE BLOCK STABILITY ANALYSIS

BASED ON DISPLACEMENT COMPATIBILITY
(SLIMES = 20% STRAIN)

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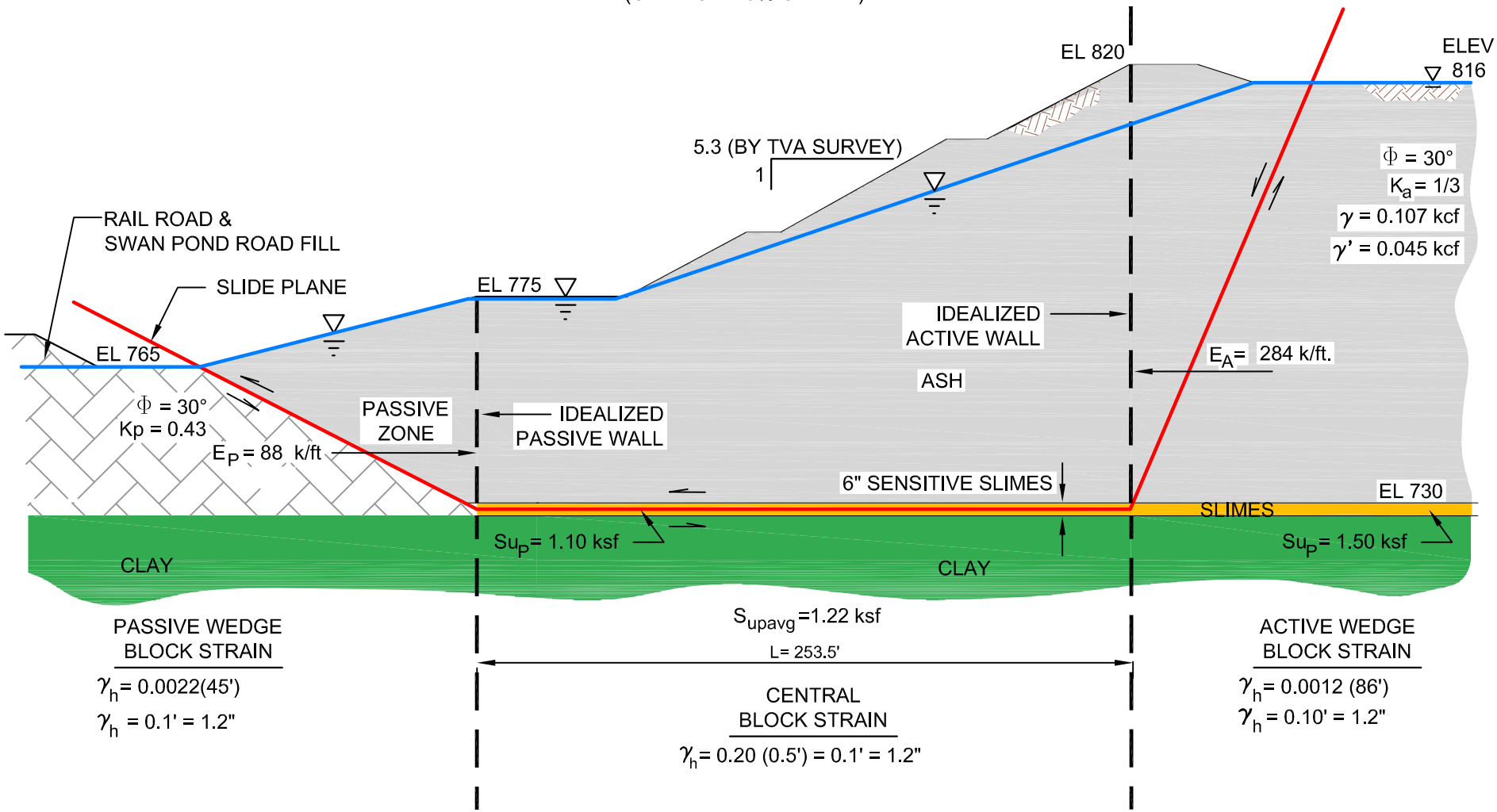

$$FS = \frac{S_{upavg}}{E_A - E_P} = \frac{0.75\ (1.22)\ (253.5')}{284 - 88} = \frac{232\ \text{k/ft.}}{196\ \text{k/ft.}} = 1.2,\ \textbf{NO FAILURE}$$

(INCLUDES CREEP)

FIG. 1.6.3_18

PHASE 1 EAST EMERGENCY DREDGE CELL
WEDGE BLOCK STABILITY ANALYSIS

BASED ON DISPLACEMENT COMPATIBILITY
(CLAY = 10% STRAIN)

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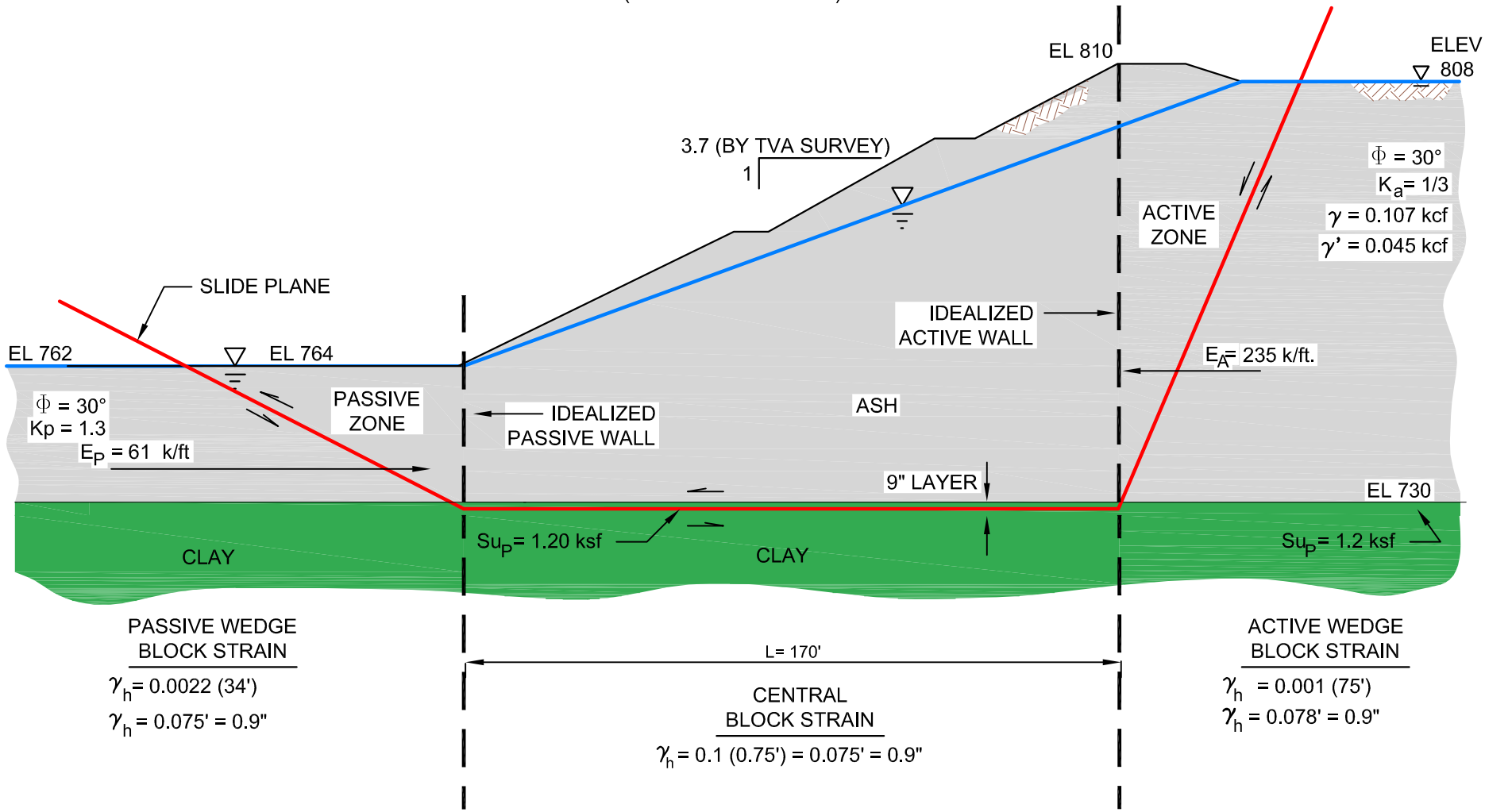
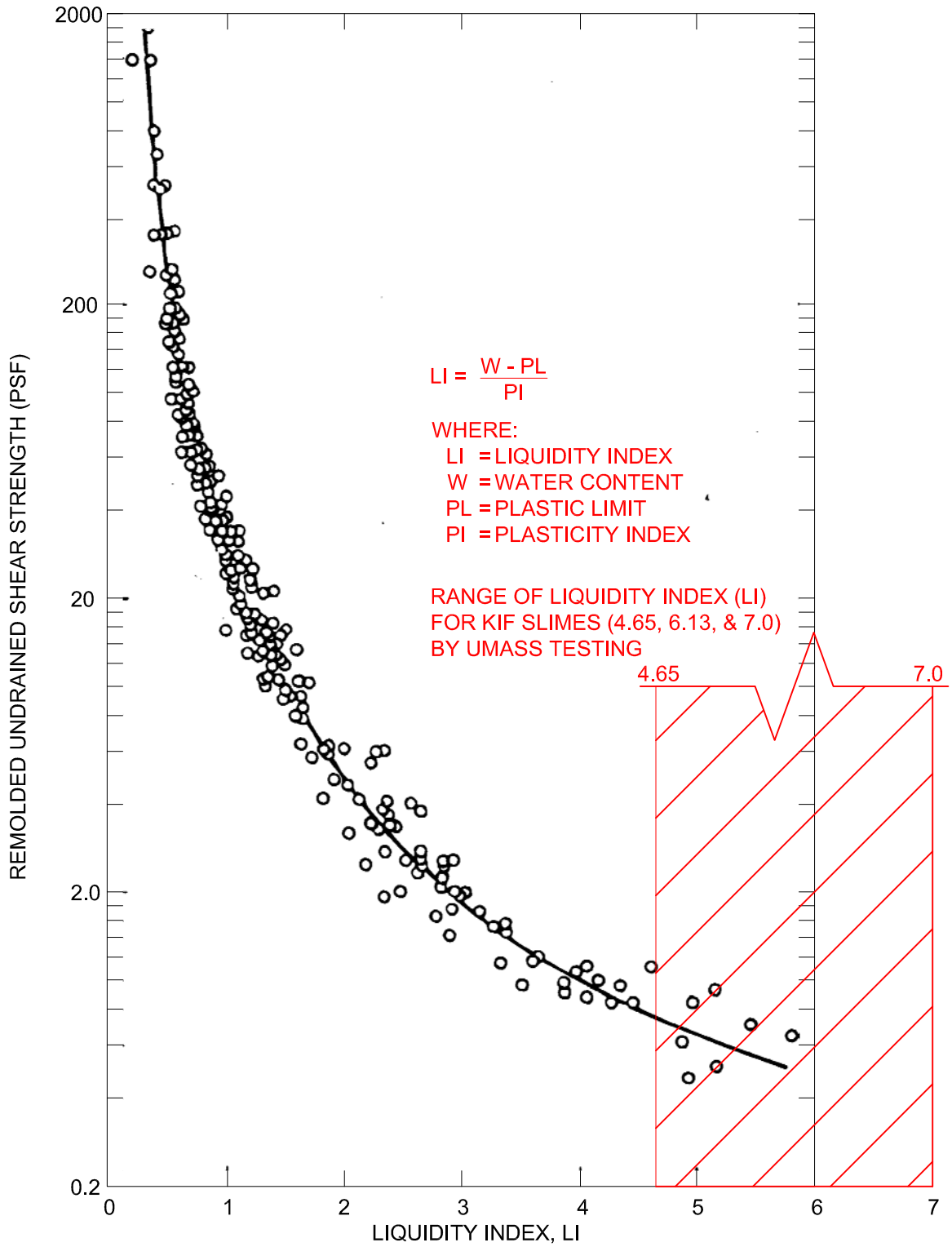


$$FS = \frac{S_{upavg}}{E_A - E_P} = \frac{(1.2)\,(170')}{235 - 61} = \frac{204\ \text{k/ft.}}{174\ \text{k/ft.}} = 1.2,\ \textbf{STABLE}$$

FIG. 1.6.3_19



RELATION BETWEEN UNDRAINED SHEAR STRENGTH AND LIQUIDITY INDEX OF CLAYS FROM AROUND THE WORLD. ADAPTED FROM SOIL MECHANICS IN ENGINEERING PRACTICE, TERZAGHI, PECK, MESRI (1996), FIG 20.33

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LIQUIDITY INDEX VS. REMOLEDED SHEAR STRENGTH
ROOT CAUSE ANALYSIS
TVA KINGSTON DREDGE CELL FAILURE
ON DECEMBER 22, 2008
KINGSTON FOSSIL PLANT
HARRIMAN, TENNESSEE

Drawn :	DJD	6/12/2009
Checked:	LWB	6/12/2009
Approved:	WHW	6/12/2009
PROJECT NUMBER	60095742	
FIGURE NUMBER	1.6.3_20	

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