



**US Army Corps
of Engineers**



Lower Missouri River Jefferson City L-142 Flood Risk Management Feasibility Study

Final Feasibility Report and Integrated Environmental Assessment

Appendix A6 Slope Stability Analysis

July 2026



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

CA13 (FEDERAL INTEREST PLAN)

Stability Analysis

Strength Values Assume in Feasibility

(Taken from the 2001 GRR for Jeff City/L142 Levee project - was not built)

Table B-4.2. Soil Strength Parameters

Material Type	Unit Weight (pcf)		Strength Parameters	
	Moist	Saturated	Phi Φ (deg.) see note	Cohesion (psf)
Embankment Clays	115	125	12 (R) 25 (S)	400 (R) 0 (S)
Embankment Sands	125	130	30 (R) 32 (S)	100 (R) 0 (S)
Foundation Clays and Silts	120	120	12 (R) 25 (S)	400 (R) 0 (S)
Berm Material	110	120	12 (R) 25 (S)	400 (R) 0 (S)
Foundation Sands	125	125	30	0

note: (R) indicates the consolidated undrained strength, (S) indicates the consolidated drained strength.

VERIFICATION with 2025 Drilling and Testing - BLANKET STRENGTH Jan. 2026

Original Design Assumption of Foundation Blanket Strength

Used 2001 GRR Report design value assumptions

Effective strength: $\phi' = 25^\circ$, $C' = 0$ psf

Historic (prior to the 2025 testing) Strength Test Values

Reach	Boring #	Near Station	Depth	Soil Type	Testing Labs Name	ϕ' (deg)	c' (psf)
Trky Crk*	AUD-26	28+00	2.0-3.0	Fat Clay	Maxim	25.5	560
Trky Crk*	AUD-27	59+00	4.5-6.4	Fat Clay	Maxim	33.4	140
Trky Crk	AUDC-12	66+00	4.5-6.4	Silt	WES**	29	122
Trky Crk	AUD-13	80+00	5.5-7.4	Silt	WES**	35.9	0
Trky Crk	AUD-13	80+00	9.0-10.0	Silt	WES**	37	0
Mainstem	AUDC-19	151+00	7-8.9	Lean Clay	Corps	29	0
Mainstem	AUD-32	190+00	2-3.9	Fat Clay	Maxim	26	1080
Mainstem	DU-20	208+00	4.5-6.4			29	
Drainage Ditch*	AU-25	306+00	2.5-4.4	Fat Clay	Corps	27	0
Drainage Ditch	AUDC-22	314+00	10-11.9	Fat Clay	Maxim	29	0
Drainage Ditch	AUD-21	315+00	9.4	Fat Clay	Maxim	8.4	250

*Off the Alignment

**Waterways Experiment Station (Corps)

Average Historic: $\phi' = 28.1^\circ$, $C' = 185$ psf

Fall 2025 Testing

Reach	Boring #	Near Station	Depth	Soil Type	Testing Labs Name	ϕ' (deg)	c' (psf)
Trky Crk	ADU-58	13+50	6-7.9	Fat Clay	Terracon	20	28
Trky Crk	ADU-60	109+40	8-10	Fat Clay	Terracon	28	3
Mainstem	ADU-62	276+00	3-4.9	Fat Clay	Terracon	18	23

Average 2025 Testing: $\phi' = 22^\circ$, $C' = 18$ psf

Average (All Testing)

$\phi' = 26.8^\circ$, $C' = 149.7$ psf

So Original Assumptions reasonable for Feasibility Level Blanket Strength

Effective strength: $\phi' = 25^\circ$, $C' = 0$ psf from GRR

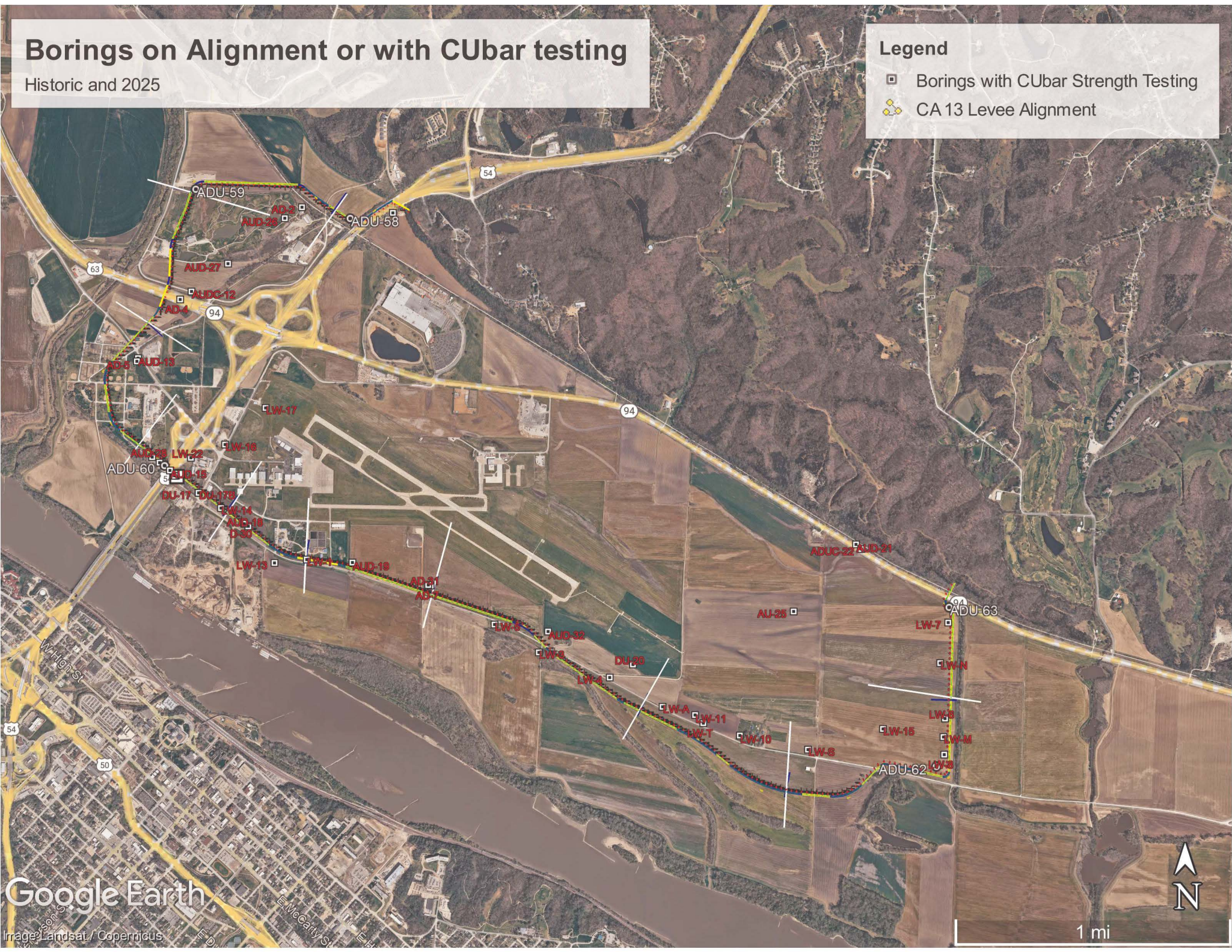
Borings on Alignment or with CUBar testing

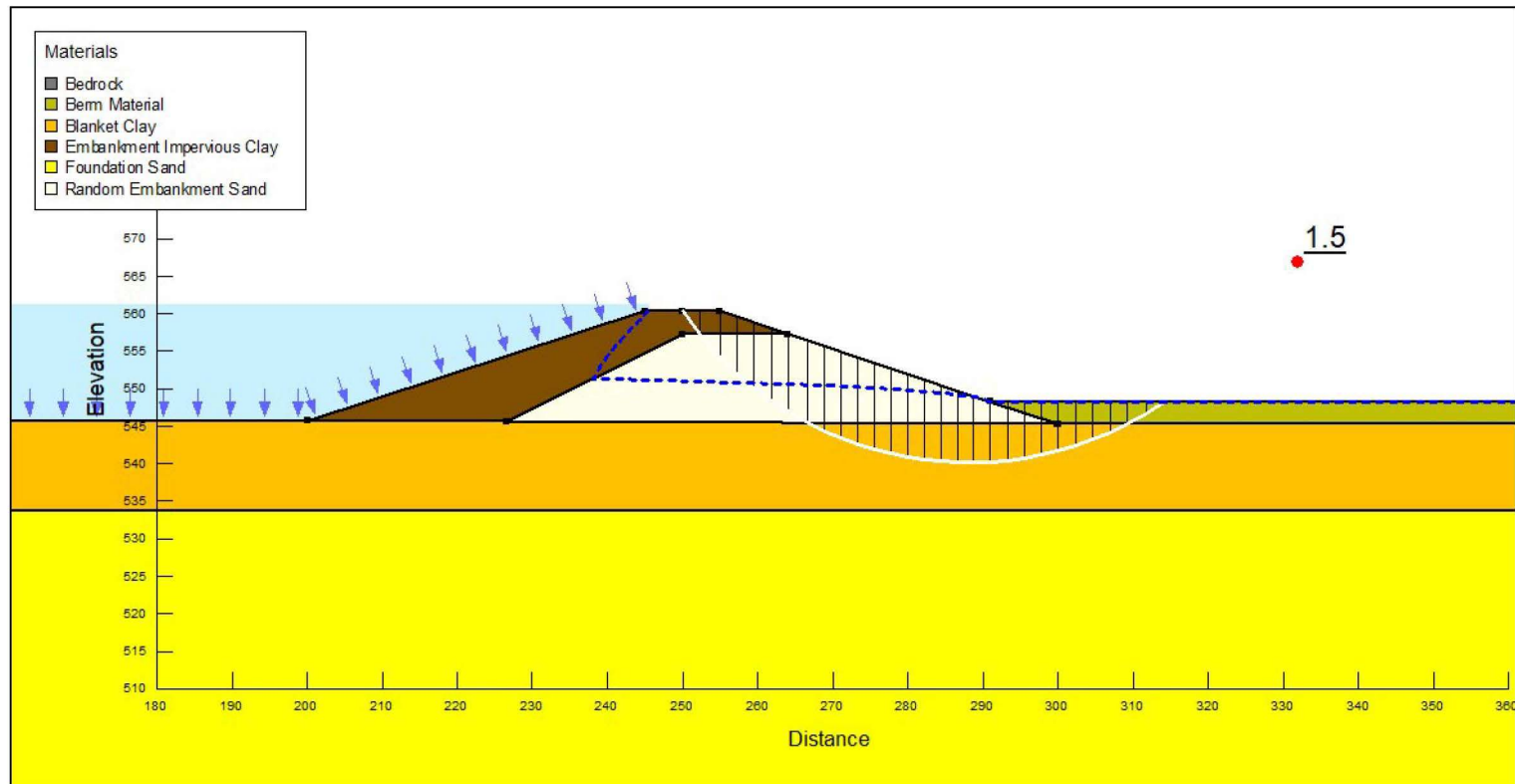
Historic and 2025

Legend

 Borings with CUBar Strength Testing

 CA 13 Levee Alignment





CA13, Federal Interest Plan
 Trk CrkReach, 0+00 to 110+00
 Max ht with underseepage berm

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Created By: Mehnert, James F CIV CENWK CENWD (USA)
Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)
Revision Number: 191
Date: 06/27/2025
Time: 09:12:35 AM
Tool Version: 23.1.2.11
File Name: Stability CA13_TrkyCrkTieback_stat103_UnderseepBerm.gsz
Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Spencer
Settings
 PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
 Unit Weight of Water: 62.430189 pcf
Slip Surface
 Direction of movement: Left to Right
 Use Passive Mode: No
 Slip Surface Option: Entry and Exit
 Critical slip surfaces saved: 1
 Optimize Critical Slip Surface Location: No
 Tension Crack Option: Tension Crack Angle
 Tension Crack Angle: 120 °
 Filled with water (0 to 1): 1
 Tension Crack Fluid Unit Weight: 62.430189 pcf
Distribution
 F of S Calculation Option: Constant
Convergence
 Geometry Settings
 Minimum Slip Surface Depth: 0.1 ft
 Number of Columns: 30
 Factor of Safety Convergence Settings
 Maximum Number of Iterations: 100
 Tolerable difference in F of S: 0.001
 Under-Relaxation Criteria
 Initial Rate: 1

Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 130 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 32 °

Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Berm Material

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (245, 561.3) ft
Left-Zone Right Coordinate: (253, 561.3) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (297, 548.3) ft
Right-Zone Right Coordinate: (384, 548.3) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 534) ft
Right Coordinate: (600, 545.3) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

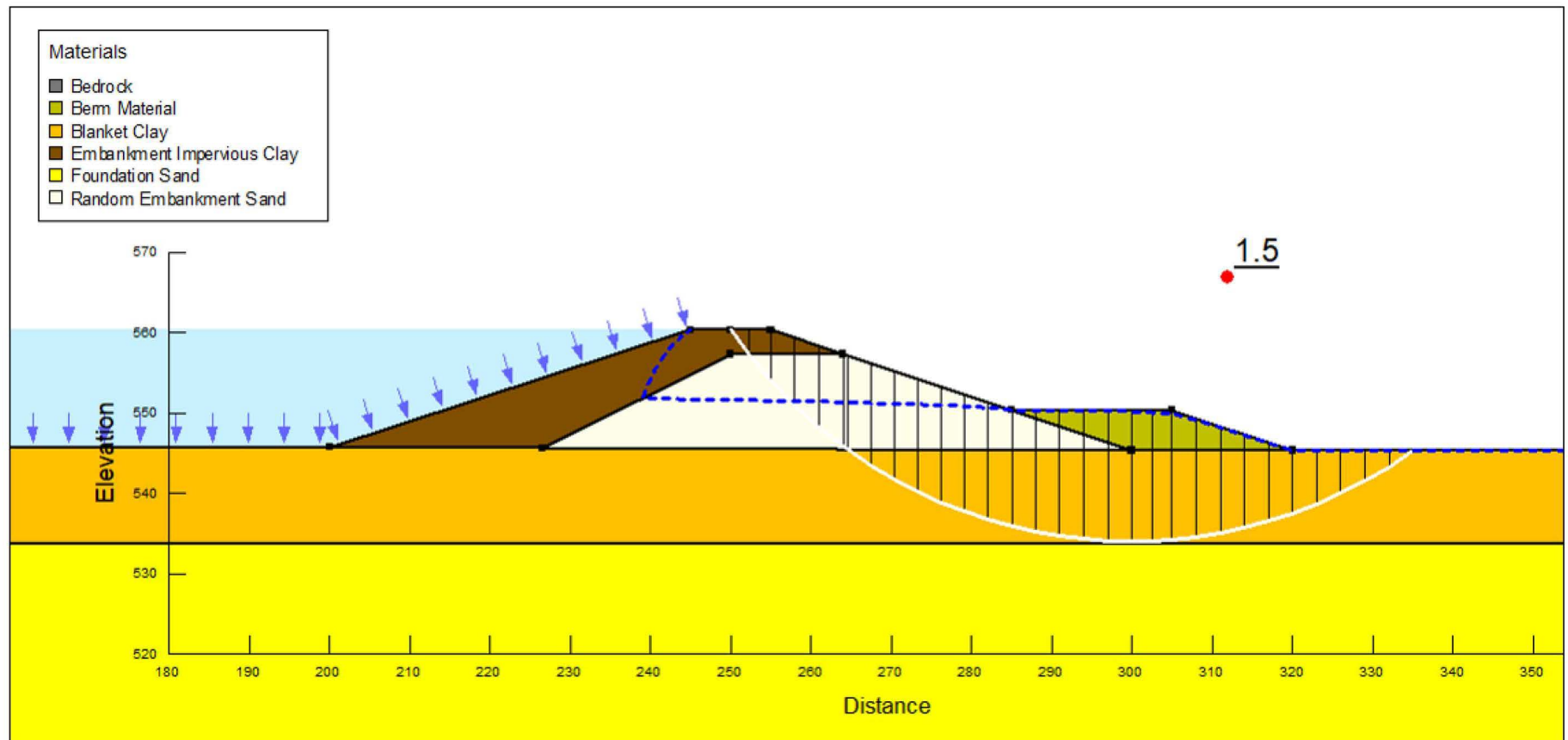
Points

	X	Y
Point 1	0 ft	534 ft
Point 2	200 ft	545.7 ft
Point 3	226.4 ft	545.6 ft
Point 4	304.8 ft	545.3 ft
Point 5	600 ft	545.3 ft
Point 6	0 ft	533.7 ft
Point 7	600 ft	533.7 ft
Point 8	0 ft	455 ft
Point 9	600 ft	455 ft
Point 10	0 ft	445 ft
Point 11	600 ft	445 ft
Point 12	245 ft	561.3 ft
Point 13	250 ft	561.3 ft
Point 14	255 ft	561.3 ft
Point 15	251.8 ft	558.3 ft
Point 16	265.8 ft	558.3 ft
Point 17	295.8 ft	548.3 ft
Point 18	436.8 ft	548.3 ft
Point 19	445.8 ft	545.3 ft
Point 20	10 ft	545.7 ft
Point 21	4.25 ft	534 ft

Regions

	Material	Points	Area
Region 1	Blanket Clay	1,21,20,2,3,4,19,5,7,6	6,977.6 ft ²
Region 2	Foundation Sand	6,7,9,8	47,220 ft ²

Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,17,4	592.65 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	325.45 ft ²
Region 6	Berm Material	17,18,19,4	423 ft ²



Trk Crk, 15'tall with stability berm, $h_t=10$ ft below crest (3 min. h_t = for shorter levee h_t s), width=20'

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 213

Date: 06/27/2025

Time: 10:44:52 AM

Tool Version: 23.1.2.11

File Name: Stability CA13_TrkyCrkTieback_15ft levee StabBerm.gsz

Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\

Last Solved Date: 06/27/2025

Last Solved Time: 10:45:08 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Spencer

Settings

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: Tension Crack Angle

Tension Crack Angle: 120 °

Filled with water (0 to 1): 1

Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Columns: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 130 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 32 °

Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Berm Material

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (245, 560.3) ft
Left-Zone Right Coordinate: (250, 560.3) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (285, 550.3) ft
Right-Zone Right Coordinate: (352, 545.3) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 534) ft
Right Coordinate: (600, 545.3) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	534 ft
Point 2	200 ft	545.7 ft
Point 3	226.6 ft	545.6 ft
Point 4	300 ft	545.3 ft
Point 5	600 ft	545.3 ft
Point 6	0 ft	533.7 ft
Point 7	600 ft	533.7 ft
Point 8	0 ft	455 ft
Point 9	600 ft	455 ft
Point 10	0 ft	445 ft
Point 11	600 ft	445 ft
Point 12	245 ft	560.3 ft
Point 13	250 ft	560.3 ft
Point 14	255 ft	560.3 ft
Point 15	250 ft	557.3 ft
Point 16	264 ft	557.3 ft
Point 17	285 ft	550.3 ft
Point 18	305 ft	550.3 ft
Point 19	320 ft	545.3 ft
Point 20	10 ft	545.7 ft
Point 21	4.25 ft	534 ft

Regions

	Material	Points	Area
--	----------	--------	------

Region 1	Blanket Clay	1,21,20,2,3,4,19,5,7,6	6,977 ft ²
Region 2	Foundation Sand	6,7,9,8	47,220 ft ²
Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,17,4	516.9 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	296.78 ft ²
Region 6	Berm Material	17,18,19,4	100 ft ²

Slip Results

Slip Surfaces Analysed: 205 of 405 converged

Current Slip Surface

Slip Surface: 393

Factor of Safety: 1.5

Volume: 951.94132 ft³

Weight: 117,226.1 lbf

Resisting Moment: 1,690,390.4 lbf·ft

Activating Moment: 1,158,969.2 lbf·ft

Resisting Force: 24,951.556 lbf

Activating Force: 17,106.242 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (335.04715, 545.3) ft

Entry: (250, 560.3) ft

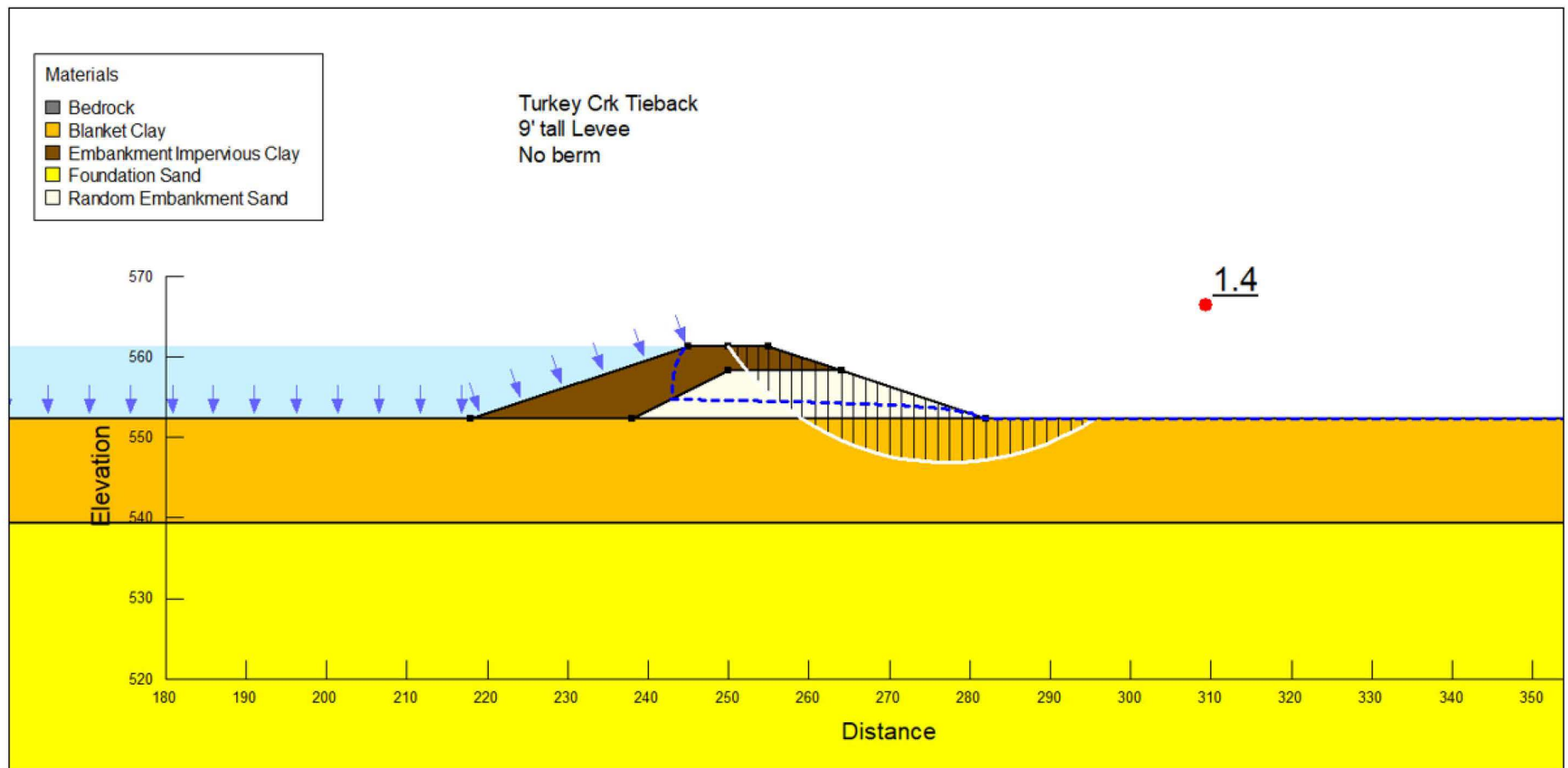
Radius: 60.519784 ft

Center: (299.88889, 594.55993) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	251.09942 ft	558.80000 ft	-428.14576 psf	117.44413 psf	54.765099 psf	0 psf	0 psf	Embankment Impervious Clay
Column 2	253.59942 ft	555.63445 ft	-255.59451 psf	363.77249 psf	227.31028 psf	0 psf	0 psf	Random Embankment Sand
Column 3	256.50000 ft	552.42429 ft	-58.654638 psf	617.19812 psf	385.66819 psf	0 psf	0 psf	Random Embankment Sand
Column 4	259.50000 ft	549.53415 ft	117.99297 psf	847.93848 psf	456.12058 psf	0 psf	0 psf	Random Embankment Sand
Column 5	262.50000 ft	547.00918 ft	271.60843 psf	1,059.1401 psf	492.10443 psf	0 psf	0 psf	Random Embankment Sand
Column 6	264.26419 ft	545.63736 ft	354.7783 psf	1,172.4879 psf	510.96168 psf	0 psf	0 psf	Random Embankment Sand
Column 7	265.99064 ft	544.45568 ft	434.97251 psf	1,295.4255 psf	401.23583 psf	0 psf	0 psf	Blanket Clay
Column 8	268.91516 ft	542.59481 ft	564.15497 psf	1,419.6152 psf	398.90766 psf	0 psf	0 psf	Blanket Clay

Column 9	271.83967 ft	540.95805 ft	678.00141 psf	1,518.9059 psf	392.12023 psf	0 psf	0 psf	Blanket Clay
Column 10	274.76419 ft	539.52531 ft	777.97655 psf	1,594.7473 psf	380.86645 psf	0 psf	0 psf	Blanket Clay
Column 11	277.68871 ft	538.28094 ft	865.1727 psf	1,648.2028 psf	365.13294 psf	0 psf	0 psf	Blanket Clay
Column 12	280.61322 ft	537.21263 ft	940.32756 psf	1,680.0253 psf	344.9267 psf	0 psf	0 psf	Blanket Clay
Column 13	283.53774 ft	536.31066 ft	1,003.9459 psf	1,690.7162 psf	320.24628 psf	0 psf	0 psf	Blanket Clay
Column 14	286.50000 ft	535.55980 ft	1,056.8908 psf	1,736.873 psf	317.08087 psf	0 psf	0 psf	Blanket Clay
Column 15	289.50000 ft	534.95794 ft	1,099.1207 psf	1,822.1004 psf	337.131 psf	0 psf	0 psf	Blanket Clay
Column 16	292.50000 ft	534.51191 ft	1,129.9912 psf	1,890.9746 psf	354.85239 psf	0 psf	0 psf	Blanket Clay
Column 17	295.50000 ft	534.21824 ft	1,149.6285 psf	1,943.4207 psf	370.15139 psf	0 psf	0 psf	Blanket Clay
Column 18	298.50000 ft	534.07469 ft	1,158.015 psf	1,979.2396 psf	382.94328 psf	0 psf	0 psf	Blanket Clay
Column 19	301.25000 ft	534.06838 ft	1,156.0414 psf	2,002.2693 psf	394.60256 psf	0 psf	0 psf	Blanket Clay
Column 20	303.75000 ft	534.17643 ft	1,145.0365 psf	2,015.004 psf	405.67248 psf	0 psf	0 psf	Blanket Clay
Column 21	306.50000 ft	534.42126 ft	1,121.9876 psf	1,947.7634 psf	385.06557 psf	0 psf	0 psf	Blanket Clay
Column 22	309.50000 ft	534.82751 ft	1,083.5046 psf	1,792.0692 psf	330.40908 psf	0 psf	0 psf	Blanket Clay
Column 23	312.50000 ft	535.38855 ft	1,028.8431 psf	1,610.0496 psf	271.02104 psf	0 psf	0 psf	Blanket Clay
Column 24	315.50000 ft	536.10887 ft	956.19778 psf	1,399.8563 psf	206.88139 psf	0 psf	0 psf	Blanket Clay
Column 25	318.50000 ft	536.99444 ft	864.12291 psf	1,159.0207 psf	137.51311 psf	0 psf	0 psf	Blanket Clay
Column 26	321.50472 ft	538.05502 ft	751.61274 psf	961.77541 psf	98.000459 psf	0 psf	0 psf	Blanket Clay
Column 27	324.51415 ft	539.30120 ft	618.7628 psf	812.39587 psf	90.292581 psf	0 psf	0 psf	Blanket Clay
Column 28	327.52358 ft	540.74444 ft	466.29077 psf	631.57572 psf	77.073636 psf	0 psf	0 psf	Blanket Clay
Column 29	330.53301 ft	542.40117 ft	294.51622 psf	413.10494 psf	55.298826 psf	0 psf	0 psf	Blanket Clay
Column 30	333.54244 ft	544.29261 ft	101.70588 psf	148.35479 psf	21.752748 psf	0 psf	0 psf	Blanket Clay



0+00 to 110+00, 9' tall, No Berm Needed

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Created By: Mehnert, James F CIV CENWK CENWD (USA)
Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)
Revision Number: 189
Date: 06/27/2025
Time: 11:48:05 AM
Tool Version: 23.1.2.11
File Name: Stability CA13_TrkyCrkTieback_9'tallLevee_noBerm.gsz
Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\
Last Solved Date: 06/27/2025
Last Solved Time: 11:48:14 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Spencer
Settings
 PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
 Unit Weight of Water: 62.430189 pcf
Slip Surface
 Direction of movement: Left to Right
 Use Passive Mode: No
 Slip Surface Option: Entry and Exit
 Critical slip surfaces saved: 1
 Optimize Critical Slip Surface Location: No
 Tension Crack Option: Tension Crack Angle
 Tension Crack Angle: 120 °
 Filled with water (0 to 1): 1
 Tension Crack Fluid Unit Weight: 62.430189 pcf
Distribution
 F of S Calculation Option: Constant
Convergence
 Geometry Settings
 Minimum Slip Surface Depth: 0.1 ft
 Number of Columns: 30
 Factor of Safety Convergence Settings
 Maximum Number of Iterations: 100
 Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 130 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 32 °

Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (245, 561.3) ft

Left-Zone Right Coordinate: (250, 561.3) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (288, 552.3) ft

Right-Zone Right Coordinate: (348, 552.3) ft

Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 541) ft
Right Coordinate: (600, 552.3) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	541 ft
Point 2	218 ft	552.3 ft
Point 3	238 ft	552.3 ft
Point 4	282 ft	552.3 ft
Point 5	600 ft	552.3 ft
Point 6	0 ft	539.3 ft
Point 7	600 ft	539.3 ft
Point 8	0 ft	455 ft
Point 9	600 ft	455 ft
Point 10	0 ft	445 ft
Point 11	600 ft	445 ft
Point 12	245 ft	561.3 ft
Point 13	250 ft	561.3 ft
Point 14	255 ft	561.3 ft
Point 15	250 ft	558.3 ft
Point 16	264 ft	558.3 ft
Point 17	0.1 ft	541 ft
Point 18	10 ft	552.3 ft

Regions

	Material	Points	Area
Region 1	Blanket Clay	1,17,18,2,3,4,5,7,6	7,742.9 ft ²
Region 2	Foundation Sand	6,7,9,8	50,580 ft ²
Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,4	174 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	159 ft ²

Slip Results

Slip Surfaces Analysed: 200 of 405 converged

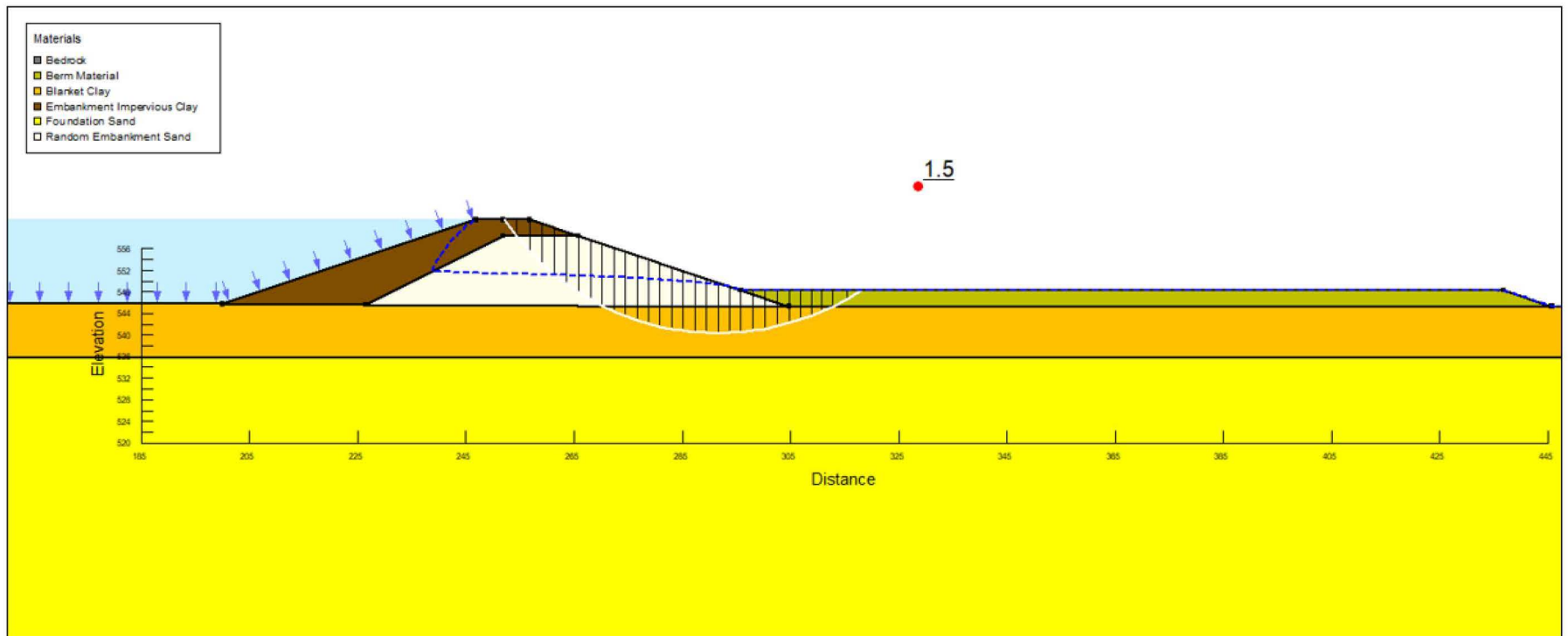
Current Slip Surface

Slip Surface: 368
 Factor of Safety: 1.4
 Volume: 265.66551 ft³
 Weight: 33,061.809 lbf
 Resisting Moment: 334,366.31 lbf-ft
 Activating Moment: 238,809.46 lbf-ft
 Resisting Force: 9,004.5209 lbf
 Activating Force: 6,430.8239 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (295.5, 552.3) ft
 Entry: (250, 561.3) ft
 Radius: 32.990529 ft
 Center: (277.30303, 579.81809) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	250.57402 ft	560.50554 ft	-342.14748 psf	60.426483 psf	28.177332 psf	0 psf	0 psf	Embankment Impervious Clay
Column 2	251.72207 ft	559.00554 ft	-272.92131 psf	183.28216 psf	85.465877 psf	0 psf	0 psf	Embankment Impervious Clay
Column 3	252.97207 ft	557.56104 ft	-190.92732 psf	294.42203 psf	183.97531 psf	0 psf	0 psf	Random Embankment Sand
Column 4	254.32402 ft	556.16535 ft	-105.65213 psf	427.99947 psf	267.44375 psf	0 psf	0 psf	Random Embankment Sand
Column 5	255.68434 ft	554.91455 ft	-29.461281 psf	538.59885 psf	336.55391 psf	0 psf	0 psf	Random Embankment Sand
Column 6	257.05303 ft	553.78809 ft	38.915313 psf	631.14976 psf	370.06916 psf	0 psf	0 psf	Random Embankment Sand
Column 7	258.42171 ft	552.77785 ft	99.985392 psf	718.50117 psf	386.49155 psf	0 psf	0 psf	Random Embankment Sand
Column 8	259.92171 ft	551.79410 ft	163.34224 psf	823.79663 psf	307.97494 psf	0 psf	0 psf	Blanket Clay
Column 9	261.55303 ft	550.84482 ft	227.8778 psf	890.89782 psf	309.17131 psf	0 psf	0 psf	Blanket Clay
Column 10	263.18434 ft	550.01502 ft	283.83535 psf	944.54685 psf	308.09484 psf	0 psf	0 psf	Blanket Clay
Column 11	264.75000 ft	549.31991 ft	330.23654 psf	983.17892 psf	304.47203 psf	0 psf	0 psf	Blanket Clay
Column 12	266.25000 ft	548.74444 ft	368.21258 psf	1,008.1653 psf	298.41488 psf	0 psf	0 psf	Blanket Clay
Column 13	267.75000 ft	548.25069 ft	400.20281 psf	1,022.9679 psf	290.40012 psf	0 psf	0 psf	Blanket Clay
Column 14	269.25000 ft	547.83488 ft	426.55144 psf	1,027.7754 psf	280.35534 psf	0 psf	0 psf	Blanket Clay

Column 15	270.75000 ft	547.49399 ft	447.31549 psf	1,022.6783 psf	268.29609 psf	0 psf	0 psf	Blanket Clay
Column 16	272.25000 ft	547.22567 ft	462.64731 psf	1,007.6886 psf	254.15694 psf	0 psf	0 psf	Blanket Clay
Column 17	273.75000 ft	547.02812 ft	472.6646 psf	982.73321 psf	237.8489 psf	0 psf	0 psf	Blanket Clay
Column 18	275.25000 ft	546.90008 ft	477.34226 psf	947.65502 psf	219.31044 psf	0 psf	0 psf	Blanket Clay
Column 19	276.75000 ft	546.84073 ft	476.69883 psf	902.20545 psf	198.417 psf	0 psf	0 psf	Blanket Clay
Column 20	278.25000 ft	546.84969 ft	470.74259 psf	846.0316 psf	175.00014 psf	0 psf	0 psf	Blanket Clay
Column 21	279.75000 ft	546.92703 ft	459.46535 psf	778.65902 psf	148.84246 psf	0 psf	0 psf	Blanket Clay
Column 22	281.25000 ft	547.07323 ft	442.88576 psf	699.46246 psf	119.64368 psf	0 psf	0 psf	Blanket Clay
Column 23	282.75000 ft	547.28922 ft	421.02366 psf	645.53506 psf	104.69139 psf	0 psf	0 psf	Blanket Clay
Column 24	284.25000 ft	547.57641 ft	393.71044 psf	619.17488 psf	105.1358 psf	0 psf	0 psf	Blanket Clay
Column 25	285.75000 ft	547.93672 ft	361.08285 psf	582.73225 psf	103.35682 psf	0 psf	0 psf	Blanket Clay
Column 26	287.25000 ft	548.37268 ft	323.01577 psf	535.25811 psf	98.970229 psf	0 psf	0 psf	Blanket Clay
Column 27	288.75000 ft	548.88748 ft	279.12299 psf	475.57573 psf	91.607421 psf	0 psf	0 psf	Blanket Clay
Column 28	290.25000 ft	549.48517 ft	229.21123 psf	402.08202 psf	80.610976 psf	0 psf	0 psf	Blanket Clay
Column 29	291.75000 ft	550.17076 ft	172.73048 psf	312.70691 psf	65.27208 psf	0 psf	0 psf	Blanket Clay
Column 30	293.25000 ft	550.95055 ft	109.12016 psf	204.57174 psf	44.509805 psf	0 psf	0 psf	Blanket Clay
Column 31	294.75000 ft	551.83243 ft	37.708798 psf	73.549346 psf	16.712722 psf	0 psf	0 psf	Blanket Clay



112+00 – 278+00, Max ht, Underseepage Berm

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Created By: Mehnert, James F CIV CENWK CENWD (USA)
Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)
Revision Number: 185
Date: 06/27/2025
Time: 02:11:50 PM
Tool Version: 23.1.2.11
File Name: Stability CA13_Mainstem_stat124_noStabBerm_underseepBerm.gsz
Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\
Last Solved Date: 06/27/2025
Last Solved Time: 02:12:00 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Spencer
Settings
 PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
 Unit Weight of Water: 62.430189 pcf
Slip Surface
 Direction of movement: Left to Right
 Use Passive Mode: No
 Slip Surface Option: Entry and Exit
 Critical slip surfaces saved: 1
 Optimize Critical Slip Surface Location: No
 Tension Crack Option: Tension Crack Angle
 Tension Crack Angle: 120 °
 Filled with water (0 to 1): 1
 Tension Crack Fluid Unit Weight: 62.430189 pcf
Distribution
 F of S Calculation Option: Constant
Convergence
 Geometry Settings
 Minimum Slip Surface Depth: 0.1 ft
 Number of Columns: 30
 Factor of Safety Convergence Settings
 Maximum Number of Iterations: 100
 Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 130 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 32 °

Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Berm Material

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (246, 561.03333) ft
Left-Zone Right Coordinate: (253, 561.3) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (298, 548.3) ft
Right-Zone Right Coordinate: (378.03729, 548.3) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 536.2) ft
Right Coordinate: (600, 545.3) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	536.2 ft
Point 2	200 ft	545.7 ft
Point 3	226.4 ft	545.6 ft
Point 4	304.8 ft	545.3 ft
Point 5	600 ft	545.3 ft
Point 6	0 ft	535.7 ft
Point 7	600 ft	535.7 ft
Point 8	0 ft	455 ft
Point 9	600 ft	455 ft
Point 10	0 ft	445 ft
Point 11	600 ft	445 ft
Point 12	246.8 ft	561.3 ft
Point 13	251.8 ft	561.3 ft
Point 14	256.8 ft	561.3 ft
Point 15	251.8 ft	558.3 ft
Point 16	265.8 ft	558.3 ft
Point 17	295.8 ft	548.3 ft
Point 18	445.8 ft	545.3 ft
Point 19	40 ft	545.7 ft
Point 20	7.5 ft	536.2 ft
Point 21	436.8 ft	548.3 ft

Regions

	Material	Points	Area
--	----------	--------	------

Region 1	Blanket Clay	1,20,19,2,3,4,18,5,7,6	5,635.4 ft ²
Region 2	Foundation Sand	6,7,9,8	48,420 ft ²
Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,17,4	592.65 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	314.11 ft ²
Region 6	Berm Material	17,21,18,4	423 ft ²

Slip Results

Slip Surfaces Analysed: 208 of 405 converged

Current Slip Surface

Slip Surface: 328

Factor of Safety: 1.5

Volume: 523.48427 ft³

Weight: 66,047.365 lbf

Resisting Moment: 984,589.76 lbf·ft

Activating Moment: 673,107.47 lbf·ft

Resisting Force: 18,225.669 lbf

Activating Force: 12,459.282 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (318.00932, 548.3) ft

Entry: (252.11959, 561.3) ft

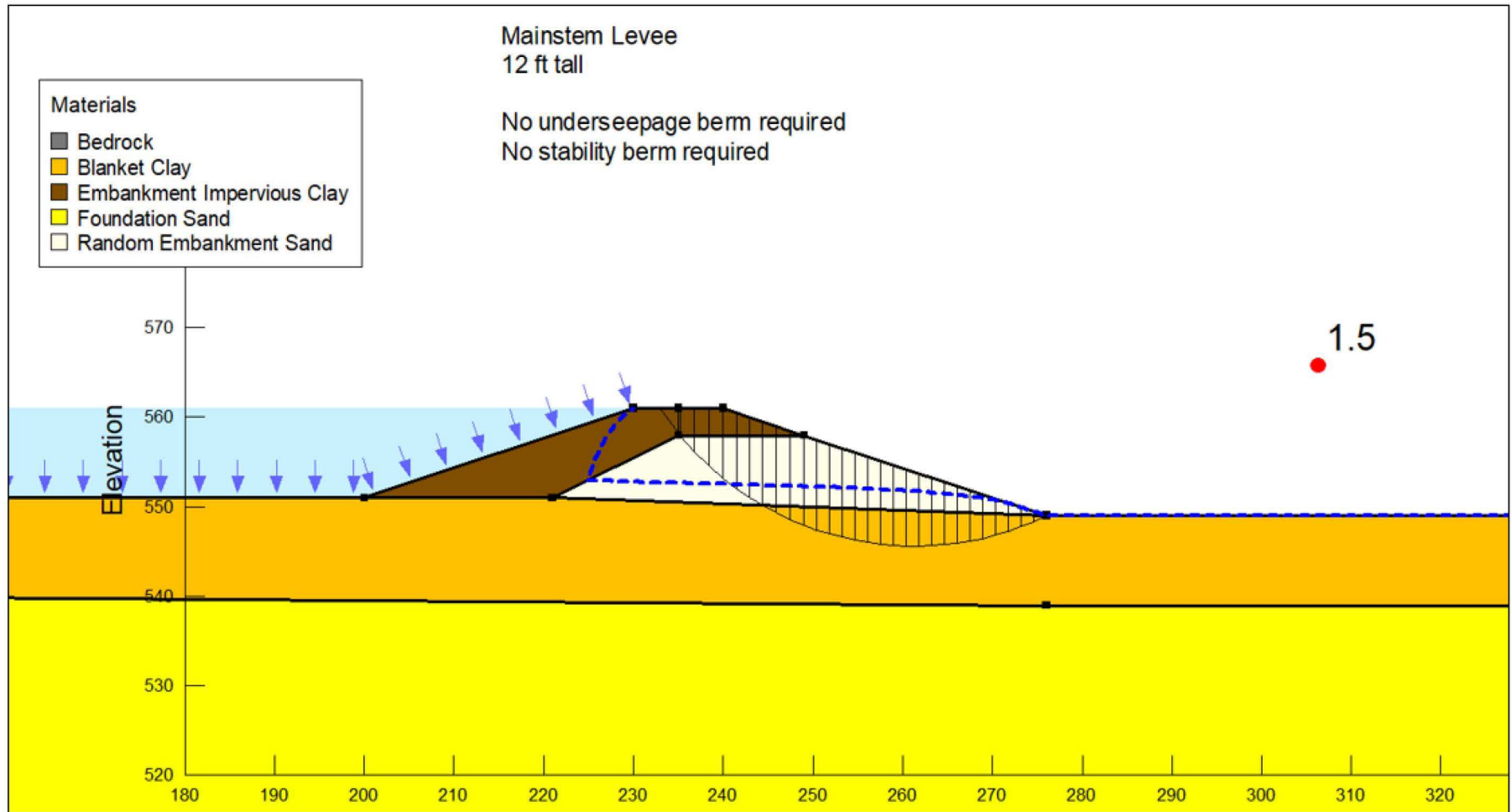
Radius: 47.753118 ft

Center: (291.63649, 588.10998) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	253.22512 ft	559.80000 ft	-507.93033 psf	116.72119 psf	54.427986 psf	0 psf	0 psf	Embankment Impervious Clay
Column 2	255.56533 ft	556.87420 ft	-350.31533 psf	346.97655 psf	216.81501 psf	0 psf	0 psf	Random Embankment Sand
Column 3	257.92500 ft	554.32581 ft	-195.05972 psf	555.17764 psf	346.91349 psf	0 psf	0 psf	Random Embankment Sand
Column 4	260.17500 ft	552.21712 ft	-67.252836 psf	707.24773 psf	441.93743 psf	0 psf	0 psf	Random Embankment Sand
Column 5	262.42500 ft	550.36047 ft	44.587243 psf	852.98753 psf	505.14457 psf	0 psf	0 psf	Random Embankment Sand
Column 6	264.67500 ft	548.71988 ft	142.66825 psf	991.37034 psf	530.32792 psf	0 psf	0 psf	Random Embankment Sand
Column 7	266.90317 ft	547.28156 ft	227.8564 psf	1,107.6427 psf	549.75149 psf	0 psf	0 psf	Random Embankment Sand

Column 8	269.10950 ft	546.02281 ft	301.56287 psf	1,203.2483 psf	563.4356 psf	0 psf	0 psf	Random Embankment Sand
Column 9	271.27880 ft	544.92971 ft	374.47262 psf	1,302.9956 psf	432.97738 psf	0 psf	0 psf	Blanket Clay
Column 10	273.41108 ft	543.98669 ft	446.82076 psf	1,352.2573 psf	422.21201 psf	0 psf	0 psf	Blanket Clay
Column 11	275.54336 ft	543.16458 ft	509.50911 psf	1,386.5748 psf	408.98243 psf	0 psf	0 psf	Blanket Clay
Column 12	277.67563 ft	542.45681 ft	562.97838 psf	1,406.3899 psf	393.28924 psf	0 psf	0 psf	Blanket Clay
Column 13	279.80791 ft	541.85812 ft	607.60014 psf	1,412.0071 psf	375.10115 psf	0 psf	0 psf	Blanket Clay
Column 14	281.94019 ft	541.36432 ft	643.53301 psf	1,403.6037 psf	354.42681 psf	0 psf	0 psf	Blanket Clay
Column 15	284.07247 ft	540.97209 ft	671.04629 psf	1,381.2467 psf	331.17189 psf	0 psf	0 psf	Blanket Clay
Column 16	286.20475 ft	540.67892 ft	690.1239 psf	1,344.89 psf	305.32244 psf	0 psf	0 psf	Blanket Clay
Column 17	288.33703 ft	540.48297 ft	700.86939 psf	1,294.3772 psf	276.75725 psf	0 psf	0 psf	Blanket Clay
Column 18	290.46930 ft	540.38304 ft	703.34118 psf	1,229.4308 psf	245.3196 psf	0 psf	0 psf	Blanket Clay
Column 19	292.60158 ft	540.37852 ft	697.57305 psf	1,149.6389 psf	210.80176 psf	0 psf	0 psf	Blanket Clay
Column 20	294.73386 ft	540.46939 ft	683.665 psf	1,054.4291 psf	172.89012 psf	0 psf	0 psf	Blanket Clay
Column 21	296.92500 ft	540.66410 ft	660.83802 psf	989.97978 psf	153.48132 psf	0 psf	0 psf	Blanket Clay
Column 22	299.17500 ft	540.96941 ft	628.786 psf	958.21806 psf	153.61669 psf	0 psf	0 psf	Blanket Clay
Column 23	301.42500 ft	541.38499 ft	587.81166 psf	911.80669 psf	151.08136 psf	0 psf	0 psf	Blanket Clay
Column 24	303.67500 ft	541.91384 ft	537.68971 psf	849.64987 psf	145.46941 psf	0 psf	0 psf	Blanket Clay
Column 25	305.79933 ft	542.51744 ft	482.16208 psf	779.77956 psf	138.78131 psf	0 psf	0 psf	Blanket Clay
Column 26	307.79798 ft	543.18739 ft	421.5891 psf	703.13354 psf	131.28633 psf	0 psf	0 psf	Blanket Clay
Column 27	309.79664 ft	543.95794 ft	352.18868 psf	610.75111 psf	120.56964 psf	0 psf	0 psf	Blanket Clay
Column 28	311.79529 ft	544.83449 ft	272.76659 psf	500.92075 psf	106.39003 psf	0 psf	0 psf	Blanket Clay
Column 29	314.09829 ft	545.99531 ft	177.08544 psf	344.72713 psf	78.172602 psf	0 psf	0 psf	Berm Material
Column 30	316.70565 ft	547.49531 ft	61.84692 psf	125.36556 psf	29.619226 psf	0 psf	0 psf	Berm Material



112+00 – 278+00, 12' tall, No Berm

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Created By: Mehnert, James F CIV CENWK CENWD (USA)
Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)
Revision Number: 257
Date: 06/10/2025
Time: 10:32:25 AM
Tool Version: 23.1.2.11
File Name: Stability CA13_Mainstem_based on stat124_12ft tall no berms.gsz
Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\
Last Solved Date: 06/10/2025
Last Solved Time: 10:32:38 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Spencer
Settings
PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right
Use Passive Mode: No
Slip Surface Option: Entry and Exit
Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Angle
Tension Crack Angle: 120 °
Filled with water (0 to 1): 1
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft
Number of Columns: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 130 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 32 °

Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (230, 561) ft

Left-Zone Right Coordinate: (238, 561) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (276, 549) ft

Right-Zone Right Coordinate: (352, 549) ft

Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 541.75) ft
Right Coordinate: (600, 549) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	541.75 ft
Point 2	200 ft	551 ft
Point 3	221 ft	551 ft
Point 4	276 ft	549 ft
Point 5	600 ft	549 ft
Point 6	0 ft	541 ft
Point 7	600 ft	539 ft
Point 8	0 ft	445 ft
Point 9	600 ft	445 ft
Point 10	0 ft	435 ft
Point 11	600 ft	435 ft
Point 12	230 ft	561 ft
Point 13	235 ft	561 ft
Point 14	240 ft	561 ft
Point 15	235 ft	558 ft
Point 16	249 ft	558 ft
Point 17	276 ft	539 ft
Point 18	30 ft	551 ft
Point 19	10 ft	541.75 ft

Regions

	Material	Points	Area
Region 1	Blanket Clay	1,19,18,2,3,4,5,7,17,6	6,036 ft ²
Region 2	Foundation Sand	6,17,7,9,8	56,676 ft ²
Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,4	269.5 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	179.5 ft ²

Slip Results

Slip Surfaces Analysed: 236 of 405 converged

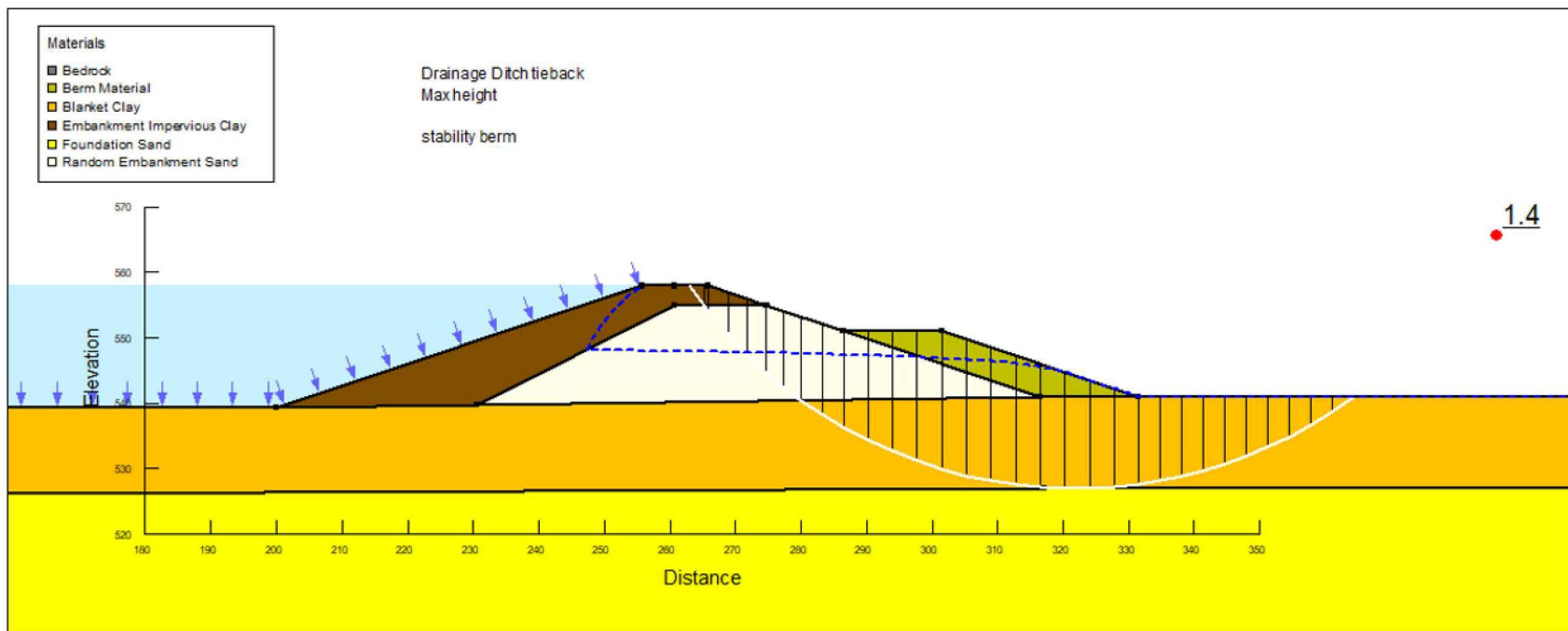
Current Slip Surface

Slip Surface: 138
 Factor of Safety: 1.5
 Volume: 300.86919 ft³
 Weight: 38,113.918 lbf
 Resisting Moment: 462,773.79 lbf-ft
 Activating Moment: 317,384.75 lbf-ft
 Resisting Force: 12,320.138 lbf
 Activating Force: 8,454.5627 lbf
 Slip Rank: 40 of 405 slip surfaces
 Exit: (276, 549) ft
 Entry: (233, 561) ft
 Radius: 33.639968 ft
 Center: (261.26497, 579.24114) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	234.00000 ft	559.61106 ft	-365.31857 psf	102.12438 psf	47.621381 psf	0 psf	0 psf	Embankment Impervious Clay
Column 2	235.08965 ft	558.11106 ft	-337.70771 psf	223.4991 psf	104.21934 psf	0 psf	0 psf	Embankment Impervious Clay
Column 3	235.98276 ft	557.08326 ft	-278.51763 psf	297.91061 psf	186.15521 psf	0 psf	0 psf	Random Embankment Sand
Column 4	237.58965 ft	555.36968 ft	-173.74122 psf	459.82449 psf	287.33023 psf	0 psf	0 psf	Random Embankment Sand
Column 5	239.19655 ft	553.87387 ft	-82.710008 psf	616.70149 psf	385.35786 psf	0 psf	0 psf	Random Embankment Sand
Column 6	240.72873 ft	552.61289 ft	-6.3188189 psf	740.06611 psf	462.44463 psf	0 psf	0 psf	Random Embankment Sand
Column 7	242.18620 ft	551.54881 ft	57.831425 psf	835.38651 psf	485.87035 psf	0 psf	0 psf	Random Embankment Sand
Column 8	243.64367 ft	550.59842 ft	114.8192 psf	920.45949 psf	503.41992 psf	0 psf	0 psf	Random Embankment Sand
Column 9	245.14367 ft	549.72879 ft	171.61889 psf	1,016.54 psf	393.9932 psf	0 psf	0 psf	Blanket Clay
Column 10	246.68620 ft	548.93644 ft	227.89967 psf	1,074.5358 psf	394.7929 psf	0 psf	0 psf	Blanket Clay
Column 11	248.22873 ft	548.24107 ft	276.96731 psf	1,121.5764 psf	393.84769 psf	0 psf	0 psf	Blanket Clay
Column 12	249.71053 ft	547.65681 ft	317.839 psf	1,155.9643 psf	390.82422 psf	0 psf	0 psf	Blanket Clay
Column 13	251.13158 ft	547.17236 ft	351.31179 psf	1,178.6841 psf	385.81006 psf	0 psf	0 psf	Blanket Clay

Column 14	252.55263 ft	546.75727 ft	379.47952 psf	1,192.7385 psf	379.22889 psf	0 psf	0 psf	Blanket Clay
Column 15	253.97368 ft	546.40891 ft	402.57083 psf	1,198.2109 psf	371.01305 psf	0 psf	0 psf	Blanket Clay
Column 16	255.39474 ft	546.12517 ft	420.57346 psf	1,195.12 psf	361.17697 psf	0 psf	0 psf	Blanket Clay
Column 17	256.81579 ft	545.90439 ft	433.58494 psf	1,183.4234 psf	349.6554 psf	0 psf	0 psf	Blanket Clay
Column 18	258.23684 ft	545.74533 ft	441.55693 psf	1,163.0187 psf	336.42315 psf	0 psf	0 psf	Blanket Clay
Column 19	259.65789 ft	545.64711 ft	444.50182 psf	1,133.7355 psf	321.39492 psf	0 psf	0 psf	Blanket Clay
Column 20	261.07895 ft	545.60919 ft	442.30535 psf	1,095.3373 psf	304.51378 psf	0 psf	0 psf	Blanket Clay
Column 21	262.50000 ft	545.63137 ft	434.82485 psf	1,047.5111 psf	285.70031 psf	0 psf	0 psf	Blanket Clay
Column 22	263.92105 ft	545.71376 ft	421.90464 psf	989.85329 psf	264.8388 psf	0 psf	0 psf	Blanket Clay
Column 23	265.34211 ft	545.85683 ft	403.13269 psf	921.88294 psf	241.89721 psf	0 psf	0 psf	Blanket Clay
Column 24	266.76316 ft	546.06134 ft	378.26687 psf	842.97493 psf	216.69693 psf	0 psf	0 psf	Blanket Clay
Column 25	268.18421 ft	546.32846 ft	346.68028 psf	752.40577 psf	189.1929 psf	0 psf	0 psf	Blanket Clay
Column 26	269.60526 ft	546.65971 ft	308.02224 psf	649.21608 psf	159.1013 psf	0 psf	0 psf	Blanket Clay
Column 27	271.02632 ft	547.05710 ft	260.93707 psf	532.4048 psf	126.58748 psf	0 psf	0 psf	Blanket Clay
Column 28	272.44737 ft	547.52310 ft	204.29249 psf	400.66173 psf	91.568479 psf	0 psf	0 psf	Blanket Clay
Column 29	273.86842 ft	548.06080 ft	135.61087 psf	252.68047 psf	54.590453 psf	0 psf	0 psf	Blanket Clay
Column 30	275.28947 ft	548.67400 ft	50.702203 psf	87.363154 psf	17.095282 psf	0 psf	0 psf	Blanket Clay



278+00- 315+00, Max ht, Stability Berm with Ht 7' below crest, width = 15'

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Created By: Mehnert, James F CIV CENWK CENWD (USA)
Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)
Revision Number: 197
Date: 06/13/2025
Time: 10:46:54 AM
Tool Version: 23.1.2.11
File Name: Stability CA13_DDTieback_stat293_10fthigh by 15ftwideBerm_7ft below crest.gsz
Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\
Last Solved Date: 06/13/2025
Last Solved Time: 10:47:04 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Spencer
Settings
 PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
 Unit Weight of Water: 62.430189 pcf
Slip Surface
 Direction of movement: Left to Right
 Use Passive Mode: No
 Slip Surface Option: Entry and Exit
 Critical slip surfaces saved: 1
 Optimize Critical Slip Surface Location: No
 Tension Crack Option: Tension Crack Line
 Filled with water (0 to 1): 1
 Tension Crack Fluid Unit Weight: 62.430189 pcf
Distribution
 F of S Calculation Option: Constant
Convergence
 Geometry Settings
 Minimum Slip Surface Depth: 0.1 ft
 Number of Columns: 30
 Factor of Safety Convergence Settings
 Maximum Number of Iterations: 100
 Tolerable difference in F of S: 0.001
 Under-Relaxation Criteria

Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 130 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Berm Material

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (256.8, 557.9) ft
Left-Zone Right Coordinate: (263, 557.9) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (331.05, 541.15) ft
Right-Zone Right Coordinate: (464, 541) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 527.2) ft
Right Coordinate: (600, 541) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	527.2 ft
Point 2	200 ft	539.3 ft
Point 3	230.5 ft	539.75 ft
Point 4	316.5 ft	541 ft
Point 5	600 ft	541 ft
Point 6	0 ft	525.3 ft
Point 7	600 ft	527 ft
Point 8	0 ft	440 ft
Point 9	600 ft	440 ft
Point 10	0 ft	430 ft
Point 11	600 ft	430 ft
Point 12	255.8 ft	557.9 ft
Point 13	260.8 ft	557.9 ft
Point 14	265.8 ft	557.9 ft
Point 15	260.8 ft	554.9 ft
Point 16	274.8 ft	554.9 ft
Point 17	286.5 ft	551 ft
Point 18	301.5 ft	551 ft
Point 19	331.5 ft	541 ft
Point 20	15 ft	539.3 ft
Point 21	3 ft	527.2 ft
Point 22	317 ft	527 ft

Regions

	Material	Points	Area
Region 1	Blanket Clay	1,21,20,2,3,4,19,5,7,22,6	8,121.8 ft ²
Region 2	Foundation Sand	6,22,7,9,8	51,931 ft ²
Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,17,4	729.81 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	390.42 ft ²
Region 6	Berm Material	17,18,19,4	150 ft ²

Slip Results

Slip Surfaces Analysed: 333 of 405 converged

Current Slip Surface

Slip Surface: 373

Factor of Safety: 1.4

Volume: 1,308.1058 ft³

Weight: 159,750.18 lbf

Resisting Moment: 2,653,002.4 lbf·ft

Activating Moment: 1,888,906.2 lbf·ft

Resisting Force: 33,189.349 lbf

Activating Force: 23,629.849 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (364.26924, 541) ft

Entry: (263, 557.9) ft

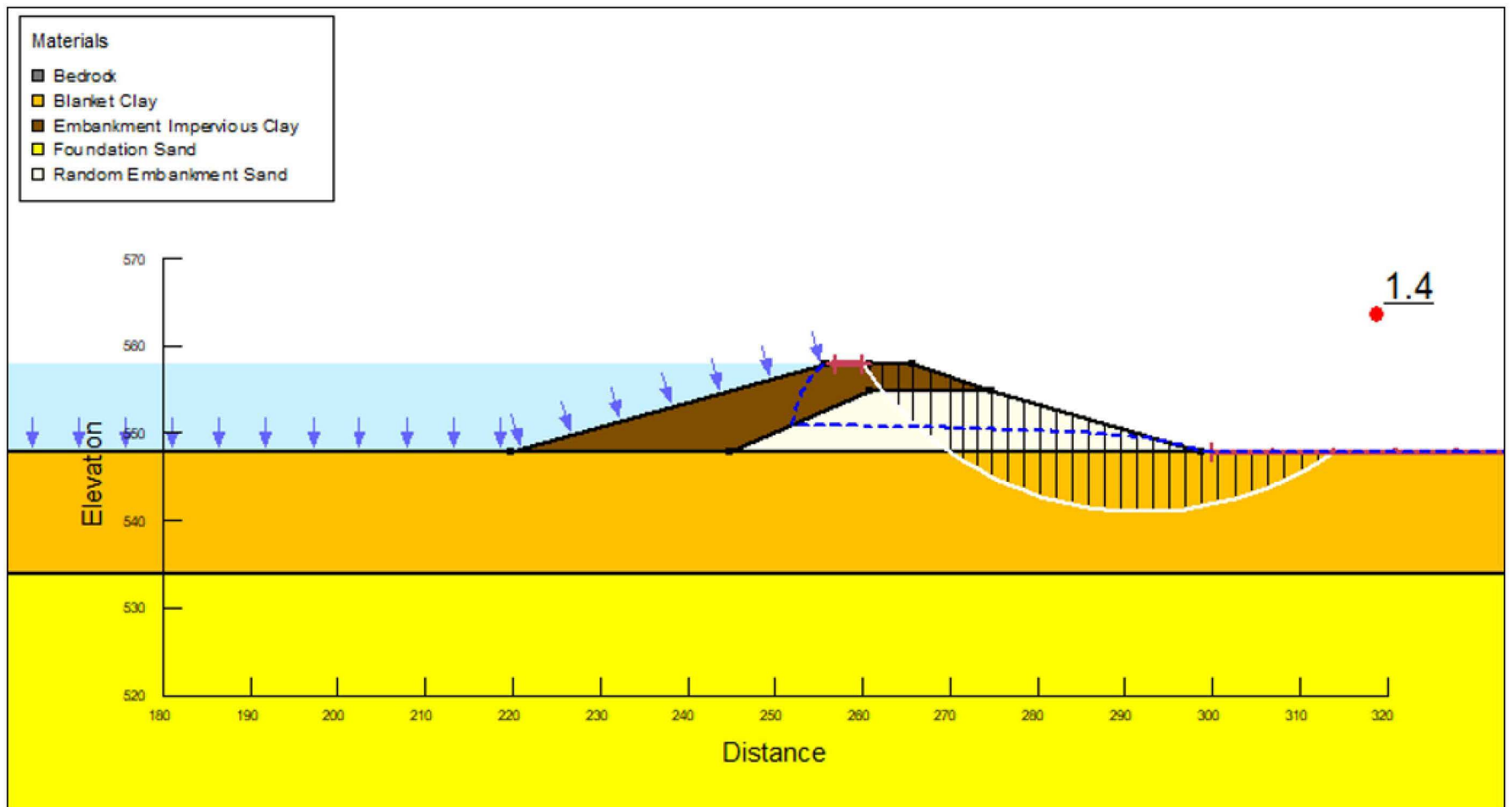
Radius: 71.481109 ft

Center: (321.82245, 598.51364) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	264.09427 ft	556.40000 ft	-522.50915 psf	117.74077 psf	54.903422 psf	0 psf	0 psf	Embankment Impervious Clay
Column 2	265.49427 ft	554.50866 ft	-413.97022 psf	253.52266 psf	158.41854 psf	0 psf	0 psf	Random Embankment Sand
Column 3	267.30000 ft	552.34587 ft	-280.96893 psf	397.21644 psf	248.20838 psf	0 psf	0 psf	Random Embankment Sand
Column 4	270.30000 ft	549.01316 ft	-76.356502 psf	617.9893 psf	386.16257 psf	0 psf	0 psf	Random Embankment Sand
Column 5	273.30000 ft	546.06419 ft	104.06254 psf	846.01893 psf	463.62581 psf	0 psf	0 psf	Random Embankment Sand
Column 6	276.12550 ft	543.57399 ft	255.83232 psf	1,051.6825 psf	497.30238 psf	0 psf	0 psf	Random Embankment Sand
Column 7	278.77650 ft	541.47122 ft	383.48109 psf	1,220.1089 psf	522.78305 psf	0 psf	0 psf	Random Embankment

								Sand
Column 8	281.70150 ft	539.38563 ft	515.85999 psf	1,416.3743 psf	419.91673 psf	0 psf	0 psf	Blanket Clay
Column 9	284.90050 ft	537.33498 ft	651.72185 psf	1,549.622 psf	418.69772 psf	0 psf	0 psf	Blanket Clay
Column 10	288.37500 ft	535.37637 ft	781.6292 psf	1,724.3963 psf	439.61951 psf	0 psf	0 psf	Blanket Clay
Column 11	292.12500 ft	533.52626 ft	904.58818 psf	1,942.9763 psf	484.20835 psf	0 psf	0 psf	Blanket Clay
Column 12	295.87500 ft	531.93865 ft	1,010.3571 psf	2,137.082 psf	525.40047 psf	0 psf	0 psf	Blanket Clay
Column 13	299.62500 ft	530.59508 ft	1,100.1964 psf	2,307.7349 psf	563.08444 psf	0 psf	0 psf	Blanket Clay
Column 14	303.37500 ft	529.48123 ft	1,175.0777 psf	2,389.1285 psf	566.12114 psf	0 psf	0 psf	Blanket Clay
Column 15	307.12500 ft	528.58609 ft	1,235.7573 psf	2,376.741 psf	532.0494 psf	0 psf	0 psf	Blanket Clay
Column 16	310.87500 ft	527.90131 ft	1,282.7322 psf	2,335.5902 psf	490.95577 psf	0 psf	0 psf	Blanket Clay
Column 17	314.62500 ft	527.42079 ft	1,316.177 psf	2,265.489 psf	442.67148 psf	0 psf	0 psf	Blanket Clay
Column 18	318.37500 ft	527.14040 ft	1,335.6229 psf	2,175.8053 psf	391.78349 psf	0 psf	0 psf	Blanket Clay
Column 19	322.12500 ft	527.05777 ft	1,339.9041 psf	2,066.5266 psf	338.82961 psf	0 psf	0 psf	Blanket Clay
Column 20	325.87500 ft	527.17222 ft	1,327.6899 psf	1,927.05 psf	279.48619 psf	0 psf	0 psf	Blanket Clay
Column 21	329.62500 ft	527.48470 ft	1,297.3342 psf	1,756.0861 psf	213.91951 psf	0 psf	0 psf	Blanket Clay
Column 22	333.13846 ft	527.95343 ft	1,251.7893 psf	1,637.8134 psf	180.00597 psf	0 psf	0 psf	Blanket Clay
Column 23	336.41539 ft	528.55799 ft	1,192.7951 psf	1,580.4983 psf	180.78895 psf	0 psf	0 psf	Blanket Clay
Column 24	339.69231 ft	529.32294 ft	1,118.0485 psf	1,502.3656 psf	179.21002 psf	0 psf	0 psf	Blanket Clay
Column 25	342.96924 ft	530.25369 ft	1,027.2984 psf	1,401.9492 psf	174.70251 psf	0 psf	0 psf	Blanket Clay
Column 26	346.24616 ft	531.35717 ft	920.20099 psf	1,277.3439 psf	166.53847 psf	0 psf	0 psf	Blanket Clay
Column 27	349.52308 ft	532.64206 ft	796.15961 psf	1,126.0845 psf	153.8465 psf	0 psf	0 psf	Blanket Clay
Column 28	352.80001 ft	534.11928 ft	654.30513 psf	944.93143 psf	135.52127 psf	0 psf	0 psf	Blanket Clay
Column 29	356.07693 ft	535.80245 ft	493.42932 psf	729.53741 psf	110.09901 psf	0 psf	0 psf	Blanket Clay
Column 30	359.35386 ft	537.70875 ft	311.97258 psf	473.8639 psf	75.491164 psf	0 psf	0 psf	Blanket Clay
Column 31	362.63078 ft	539.86004 ft	107.9014 psf	169.17798 psf	28.573736 psf	0 psf	0 psf	Blanket Clay



278+00- 315+00, 10' tall levee, No Berm

Slope Stability

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Created By: Mehnert, James F CIV CENWK CENWD (USA)
Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)
Revision Number: 247
Date: 06/13/2025
Time: 11:15:06 AM
Tool Version: 23.1.2.11
File Name: Stability CA13_DDTieback_10ft based on stat293_NoBerm.gsz
Directory: K:\MissionProjects\civ\LOMO Jeff City L-142\6.0 Engineering-Design\6.2 Discipline\6.2.1 Geotechnical\4b STABILITY_REV\
Last Solved Date: 06/13/2025
Last Solved Time: 11:15:18 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Spencer
Settings
 PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
 Unit Weight of Water: 62.430189 pcf
Slip Surface
 Direction of movement: Left to Right
 Use Passive Mode: No
 Slip Surface Option: Entry and Exit
 Critical slip surfaces saved: 1
 Optimize Critical Slip Surface Location: No
 Tension Crack Option: Tension Crack Angle
 Tension Crack Angle: 120 °
 Filled with water (0 to 1): 1
 Tension Crack Fluid Unit Weight: 62.430189 pcf
Distribution
 F of S Calculation Option: Constant
Convergence
 Geometry Settings
 Minimum Slip Surface Depth: 0.1 ft
 Number of Columns: 30
 Factor of Safety Convergence Settings
 Maximum Number of Iterations: 100
 Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Bedrock

Slope Stability Material Model: Bedrock (Impenetrable)

Foundation Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Blanket Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Random Embankment Sand

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 130 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 32 °

Phi-B: 0 °

Embankment Impervious Clay

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 25 °

Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (256.8, 557.9) ft

Left-Zone Right Coordinate: (260, 557.9) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (300, 547.9) ft

Right-Zone Right Coordinate: (356, 547.9) ft

Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 534.9) ft
Right Coordinate: (600, 547.9) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	534.9 ft
Point 2	219.8 ft	547.9 ft
Point 3	244.8 ft	547.9 ft
Point 4	298.8 ft	547.9 ft
Point 5	600 ft	547.9 ft
Point 6	0 ft	533.9 ft
Point 7	600 ft	533.9 ft
Point 8	0 ft	440 ft
Point 9	600 ft	440 ft
Point 10	0 ft	430 ft
Point 11	600 ft	430 ft
Point 12	255.8 ft	557.9 ft
Point 13	260.8 ft	557.9 ft
Point 14	265.8 ft	557.9 ft
Point 15	260.8 ft	554.9 ft
Point 16	274.8 ft	554.9 ft
Point 17	30 ft	547.9 ft
Point 18	1 ft	534.9 ft

Regions

	Material	Points	Area
Region 1	Blanket Clay	1,18,17,2,3,4,5,7,6	8,198.5 ft ²
Region 2	Foundation Sand	6,7,9,8	56,340 ft ²
Region 3	Bedrock	8,9,11,10	6,000 ft ²
Region 4	Random Embankment Sand	3,15,16,4	238 ft ²
Region 5	Embankment Impervious Clay	2,12,13,14,16,15,3	202.5 ft ²

Slip Results

Slip Surfaces Analysed: 168 of 405 converged

Current Slip Surface

Slip Surface: 373
 Factor of Safety: 1.4
 Volume: 380.17797 ft³
 Weight: 47,230.458 lbf
 Resisting Moment: 529,240.08 lbf-ft
 Activating Moment: 369,589.72 lbf-ft
 Resisting Force: 12,164.498 lbf
 Activating Force: 8,494.5669 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (314, 547.9) ft
 Entry: (260, 557.9) ft
 Radius: 38.721166 ft
 Center: (291.97117, 579.7443) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	260.40000 ft	557.33643 ft	-359.48857 psf	43.157311 psf	20.124585 psf	0 psf	0 psf	Embankment Impervious Clay
Column 2	261.53559 ft	555.83643 ft	-301.69183 psf	164.694 psf	76.798074 psf	0 psf	0 psf	Embankment Impervious Clay
Column 3	263.15338 ft	553.91569 ft	-198.12455 psf	315.23823 psf	196.98271 psf	0 psf	0 psf	Random Embankment Sand
Column 4	264.91779 ft	552.06900 ft	-85.301825 psf	491.08113 psf	306.86155 psf	0 psf	0 psf	Random Embankment Sand
Column 5	266.83558 ft	550.32192 ft	20.997792 psf	648.36912 psf	392.02512 psf	0 psf	0 psf	Random Embankment Sand
Column 6	268.90675 ft	548.66861 ft	121.12888 psf	791.42997 psf	418.85061 psf	0 psf	0 psf	Random Embankment Sand
Column 7	270.75194 ft	547.36936 ft	203.98233 psf	928.22067 psf	337.71788 psf	0 psf	0 psf	Blanket Clay
Column 8	272.37117 ft	546.36335 ft	272.90664 psf	1,000.4616 psf	339.26446 psf	0 psf	0 psf	Blanket Clay
Column 9	273.99039 ft	545.46333 ft	334.28018 psf	1,060.9042 psf	338.83036 psf	0 psf	0 psf	Blanket Clay
Column 10	275.72308 ft	544.61178 ft	391.99608 psf	1,115.7804 psf	337.50616 psf	0 psf	0 psf	Blanket Clay
Column 11	277.56923 ft	543.81486 ft	445.57948 psf	1,164.233 psf	335.11364 psf	0 psf	0 psf	Blanket Clay
Column 12	279.41538 ft	543.12833 ft	491.25514 psf	1,199.6321 psf	330.32162 psf	0 psf	0 psf	Blanket Clay
Column 13	281.26154 ft	542.54604 ft	529.3796 psf	1,222.3405 psf	323.13299 psf	0 psf	0 psf	Blanket Clay
Column 14	283.10769 ft	542.06316 ft	560.21679 psf	1,232.5923 psf	313.53386 psf	0 psf	0 psf	Blanket Clay

Column 15	284.95385 ft	541.67587 ft	583.99443 psf	1,230.5058 psf	301.4732 psf	0 psf	0 psf	Blanket Clay
Column 16	286.80000 ft	541.38129 ft	600.80728 psf	1,216.0877 psf	286.90999 psf	0 psf	0 psf	Blanket Clay
Column 17	288.64615 ft	541.17728 ft	610.66503 psf	1,189.239 psf	269.79346 psf	0 psf	0 psf	Blanket Clay
Column 18	290.49231 ft	541.06241 ft	613.60898 psf	1,149.7485 psf	250.00594 psf	0 psf	0 psf	Blanket Clay
Column 19	292.33846 ft	541.03588 ft	609.61113 psf	1,097.2835 psf	227.40537 psf	0 psf	0 psf	Blanket Clay
Column 20	294.18462 ft	541.09750 ft	598.59804 psf	1,031.3746 psf	201.80703 psf	0 psf	0 psf	Blanket Clay
Column 21	296.03077 ft	541.24771 ft	580.47044 psf	951.39022 psf	172.96273 psf	0 psf	0 psf	Blanket Clay
Column 22	297.87692 ft	541.48755 ft	555.14552 psf	856.49606 psf	140.52206 psf	0 psf	0 psf	Blanket Clay
Column 23	299.75000 ft	541.82493 ft	522.02889 psf	786.22242 psf	123.19547 psf	0 psf	0 psf	Blanket Clay
Column 24	301.65000 ft	542.26515 ft	480.69538 psf	742.51158 psf	122.0869 psf	0 psf	0 psf	Blanket Clay
Column 25	303.55000 ft	542.80830 ft	431.56459 psf	684.27649 psf	117.8415 psf	0 psf	0 psf	Blanket Clay
Column 26	305.45000 ft	543.45900 ft	374.17149 psf	609.95934 psf	109.94968 psf	0 psf	0 psf	Blanket Clay
Column 27	307.35000 ft	544.22320 ft	308.23547 psf	517.42138 psf	97.544991 psf	0 psf	0 psf	Blanket Clay
Column 28	309.25000 ft	545.10843 ft	233.04111 psf	403.82735 psf	79.638932 psf	0 psf	0 psf	Blanket Clay
Column 29	311.15000 ft	546.12429 ft	147.71383 psf	265.19285 psf	54.781365 psf	0 psf	0 psf	Blanket Clay
Column 30	313.05000 ft	547.28311 ft	51.165445 psf	95.669947 psf	20.75279 psf	0 psf	0 psf	Blanket Clay

CA 1 and CA 2 (Not Selected)
Stability Analysis

The diagram illustrates a coastal profile with various geological features. The legend identifies the following components:

- Foundation Crags and Sills:** Yellow area.
- Foundation Sand:** Light blue area.
- Lunar Fracture:** Green line.
- Rock:** Grey area.

The profile shows a dune crest (green line) and a dune body (yellow area). The elevation of the dune crest is marked as 'Elev 550'. The elevation of the dune body is marked as 'Elev 540'. The elevation of the rock is marked as 'Elev 500'. A scale bar at the bottom indicates distances of 1, 2, 3, 4, and 5 units. A red line with arrows points to the dune crest, and a green line with arrows points to the dune body.

Color	Name
	Foundation Clays and Silts
	Foundation Sands
	Loose Impurities
	Rock

Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 54

Date: 01/17/2025

Time: 02:47:59 PM

Tool Version: 11.4.2.250

File Name: STABILITY CapitalView_stage34_0 to 190_30deg.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/17/2025

Last Solved Time: 02:48:12 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Levee Impervious

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (111, 555.2) ft

Left-Zone Right Coordinate: (118, 555.2) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (135, 550) ft

Right-Zone Right Coordinate: (200, 550) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 545) ft

Right Coordinate: (300, 550) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	545 ft
Point 2	15 ft	545 ft
Point 3	20 ft	550 ft
Point 4	95 ft	550 ft
Point 5	110 ft	555.2 ft
Point 6	120 ft	555.2 ft
Point 7	135 ft	550 ft
Point 8	300 ft	550 ft
Point 9	0 ft	540 ft
Point 10	5 ft	540 ft
Point 11	300 ft	540 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft

Regions

	Material	Points	Area
Region 1	Levee Impervious	4,5,6,7	130 ft ²
Region 2	Foundation Clays and Silts	1,2,3,4,7,8,11,10,9	2,912.5 ft ²
Region 3	Foundation Sands	9,10,11,13,12	12,000 ft ²
Region 4	Rock	12,13,14,15	3,000 ft ²

Slip Results

Slip Surfaces Analysed: 325 of 405 converged

Current Slip Surface

Slip Surface: 362

Factor of Safety: 1.4

Volume: 26.785284 ft³

Weight: 3,082.2463 lbf

Resisting Moment: 29,577.136 lbf·ft

Activating Moment: 20,686.68 lbf·ft

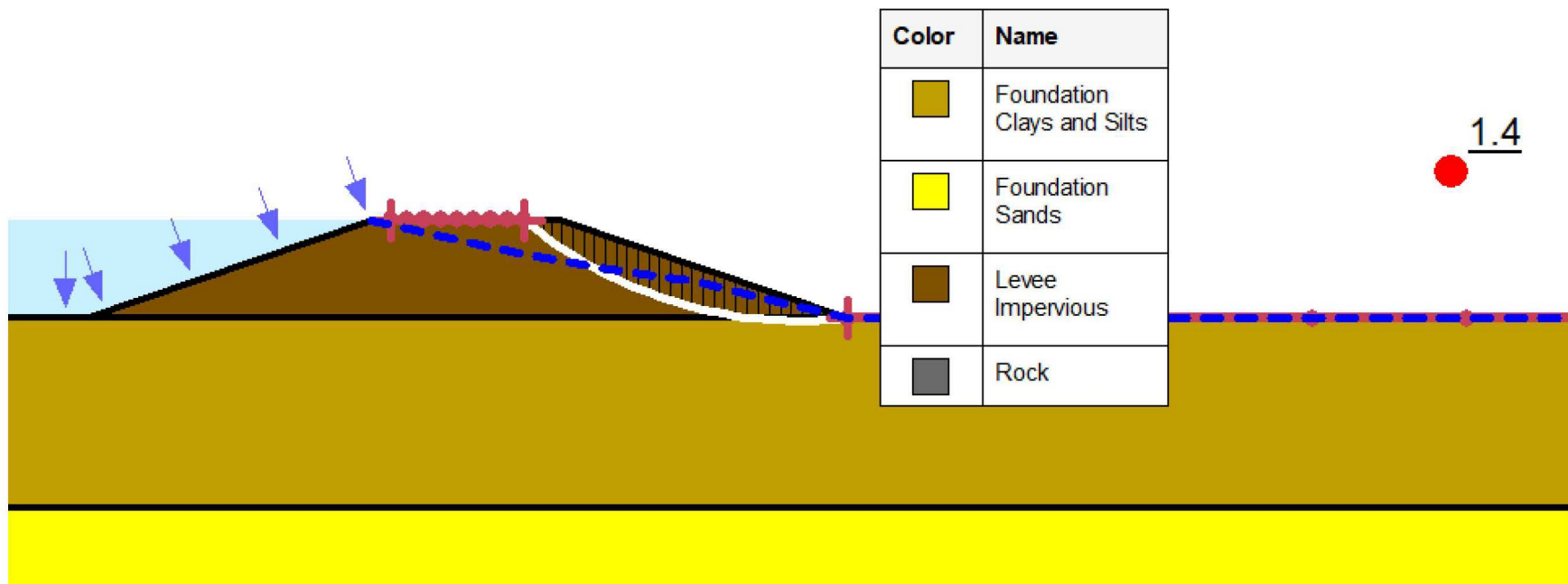
Resisting Force: 1,211.9232 lbf
 Activating Force: 847.68547 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (135, 550) ft
 Entry: (118, 555.2) ft
 Radius: 22.748267 ft
 Center: (132.62497, 572.62394) ft

Slip Slices

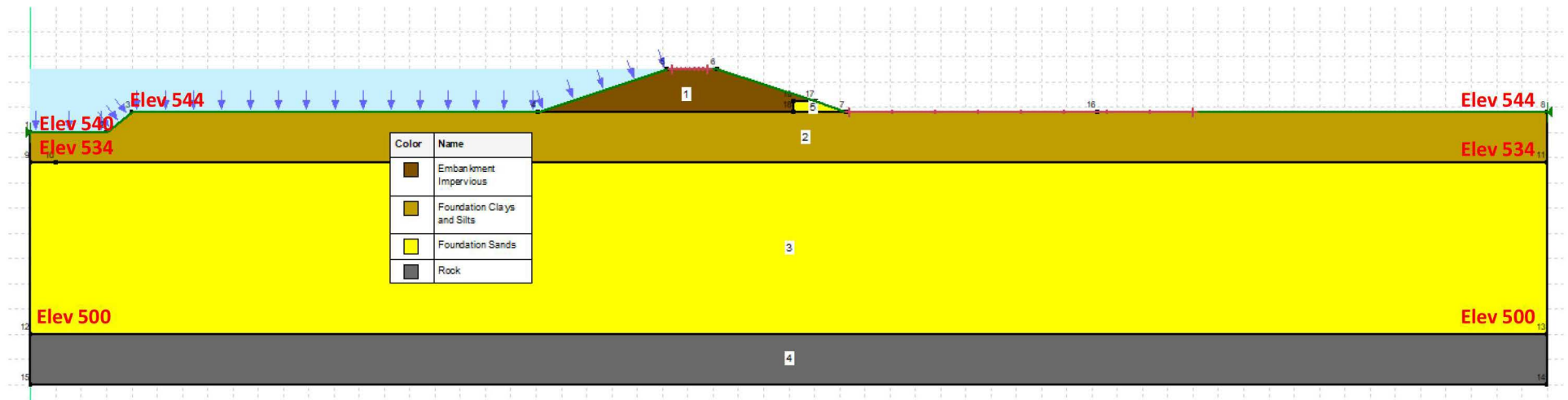
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	118.25 ft	554.99613 ft	-103.11226 psf	17.459293 psf	10.080128 psf	0 psf	0 psf	Levee Impervious
Slice 2	118.75 ft	554.59981 ft	-84.259808 psf	51.530741 psf	29.751287 psf	0 psf	0 psf	Levee Impervious
Slice 3	119.25 ft	554.22562 ft	-66.708458 psf	83.927374 psf	48.455492 psf	0 psf	0 psf	Levee Impervious
Slice 4	119.75 ft	553.87223 ft	-50.354627 psf	114.95916 psf	66.371703 psf	0 psf	0 psf	Levee Impervious
Slice 5	120.28472 ft	553.5167 ft	-34.134664 psf	138.15459 psf	79.763587 psf	0 psf	0 psf	Levee Impervious
Slice 6	120.85416 ft	553.16062 ft	-18.104619 psf	153.43406 psf	88.585194 psf	0 psf	0 psf	Levee Impervious
Slice 7	121.4236 ft	552.82733 ft	-3.316741 psf	167.46975 psf	96.688708 psf	0 psf	0 psf	Levee Impervious
Slice 8	121.99304 ft	552.51569 ft	10.307338 psf	181.28659 psf	98.714917 psf	0 psf	0 psf	Levee Impervious
Slice 9	122.56249 ft	552.2247 ft	22.833271 psf	193.7147 psf	98.658439 psf	0 psf	0 psf	Levee Impervious
Slice 10	123.13193 ft	551.95349 ft	34.326791 psf	204.51664 psf	98.259153 psf	0 psf	0 psf	Levee Impervious
Slice 11	123.70137 ft	551.7013 ft	45.050102 psf	213.80093 psf	97.428335 psf	0 psf	0 psf	Levee Impervious
Slice 12	124.27081 ft	551.46743 ft	54.625608 psf	221.59813 psf	96.401633 psf	0 psf	0 psf	Levee Impervious
Slice 13	124.84025 ft	551.2513 ft	63.091024 psf	227.92297 psf	95.165768 psf	0 psf	0 psf	Levee Impervious
Slice 14	125.40969 ft	551.05236 ft	70.479749 psf	232.7445 psf	93.683595 psf	0 psf	0 psf	Levee Impervious

Slice 15	125.97913 ft	550.87014 ft	76.094521 psf	236.00444 psf	92.324033 psf	0 psf	0 psf	Levee Impervious
Slice 16	126.54857 ft	550.70423 ft	77.695842 psf	237.68728 psf	92.371103 psf	0 psf	0 psf	Levee Impervious
Slice 17	127.11802 ft	550.55426 ft	78.377406 psf	237.61027 psf	91.93314 psf	0 psf	0 psf	Levee Impervious
Slice 18	127.68746 ft	550.4199 ft	78.157863 psf	235.5847 psf	90.890429 psf	0 psf	0 psf	Levee Impervious
Slice 19	128.2569 ft	550.30088 ft	77.053496 psf	231.41601 psf	89.121241 psf	0 psf	0 psf	Levee Impervious
Slice 20	128.82634 ft	550.19694 ft	75.078403 psf	224.91912 psf	86.51058 psf	0 psf	0 psf	Levee Impervious
Slice 21	129.39578 ft	550.10788 ft	72.244652 psf	215.93503 psf	82.959678 psf	0 psf	0 psf	Levee Impervious
Slice 22	129.96522 ft	550.03352 ft	68.562403 psf	204.34727 psf	78.395429 psf	0 psf	0 psf	Levee Impervious
Slice 23	130.54682 ft	549.97276 ft	64.190645 psf	189.86729 psf	72.559446 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	131.14058 ft	549.92611 ft	59.084783 psf	172.33895 psf	65.387323 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	131.73434 ft	549.89506 ft	52.977258 psf	151.95644 psf	57.145656 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	132.32809 ft	549.87955 ft	45.833634 psf	128.9012 psf	47.959082 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	132.92185 ft	549.87955 ft	37.617818 psf	103.42659 psf	37.99471 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	133.51561 ft	549.89506 ft	28.291958 psf	75.838831 psf	27.4512 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	134.10936 ft	549.92611 ft	17.816328 psf	46.47248 psf	16.544637 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	134.70312 ft	549.97276 ft	6.1491852 psf	15.663244 psf	5.4929444 psf	0 psf	0 psf	Foundation Clays and Silts

CA1 and CA 2 (not selected), 0+00 to 190+00



CA 1 and 2 (Not Selected), Sta 190+00 to 310+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 87

Date: 01/21/2025

Time: 03:15:02 PM

Tool Version: 11.4.2.250

File Name: STABILITY CapitalView_stage34_190to 310_sand drain_30.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/21/2025

Last Solved Time: 03:15:14 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Embankment Impervious

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (127, 552.5) ft

Left-Zone Right Coordinate: (134, 552.5) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (162, 544) ft

Right-Zone Right Coordinate: (230, 544) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 540) ft

Right Coordinate: (300, 544) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	540 ft
Point 2	15 ft	540 ft
Point 3	20 ft	544 ft
Point 4	100.4 ft	544 ft
Point 5	125.9 ft	552.5 ft
Point 6	135.9 ft	552.5 ft
Point 7	161.4 ft	544 ft
Point 8	300 ft	544 ft
Point 9	0 ft	534 ft
Point 10	5 ft	534 ft
Point 11	300 ft	534 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	211 ft	544 ft
Point 17	155.4 ft	546 ft
Point 18	151 ft	544 ft
Point 19	151 ft	546 ft

Regions

	Material	Points	Area
Region 1	Embankment Impervious	4,5,6,17,19,18	286.95 ft²
Region 2	Foundation Clays and Silts	1,2,3,4,18,7,16,8,11,10,9	2,930 ft²
Region 3	Foundation Sands	9,10,11,13,12	10,200 ft²
Region 4	Rock	12,13,14,15	3,000 ft²
Region 5	Foundation Sands	19,17,7,18	14.8 ft²

Slip Results

Slip Surfaces Analysed: 324 of 405 converged

Current Slip Surface

Slip Surface: 368

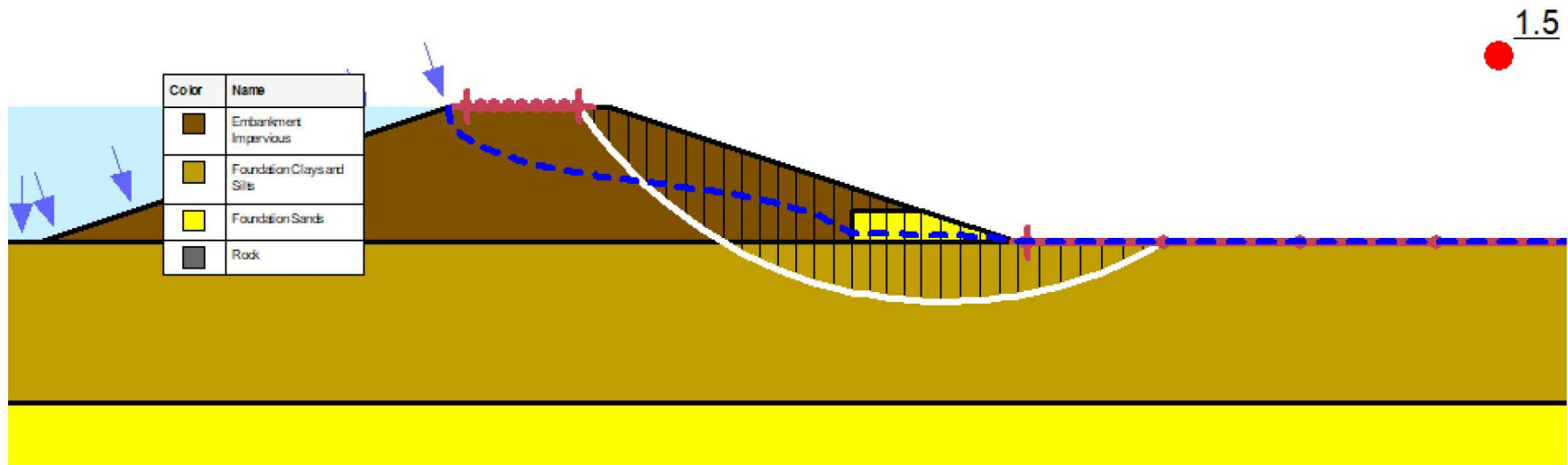
Factor of Safety: 1.5
 Volume: 160.72971 ft³
 Weight: 18,975.592 lbf
 Resisting Moment: 178,107.87 lbf·ft
 Activating Moment: 120,043.04 lbf·ft
 Resisting Force: 5,884.1274 lbf
 Activating Force: 3,965.3848 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (170.5, 544) ft
 Entry: (134, 552.5) ft
 Radius: 27.322448 ft
 Center: (156.75995, 567.61625) ft

Slip Slices

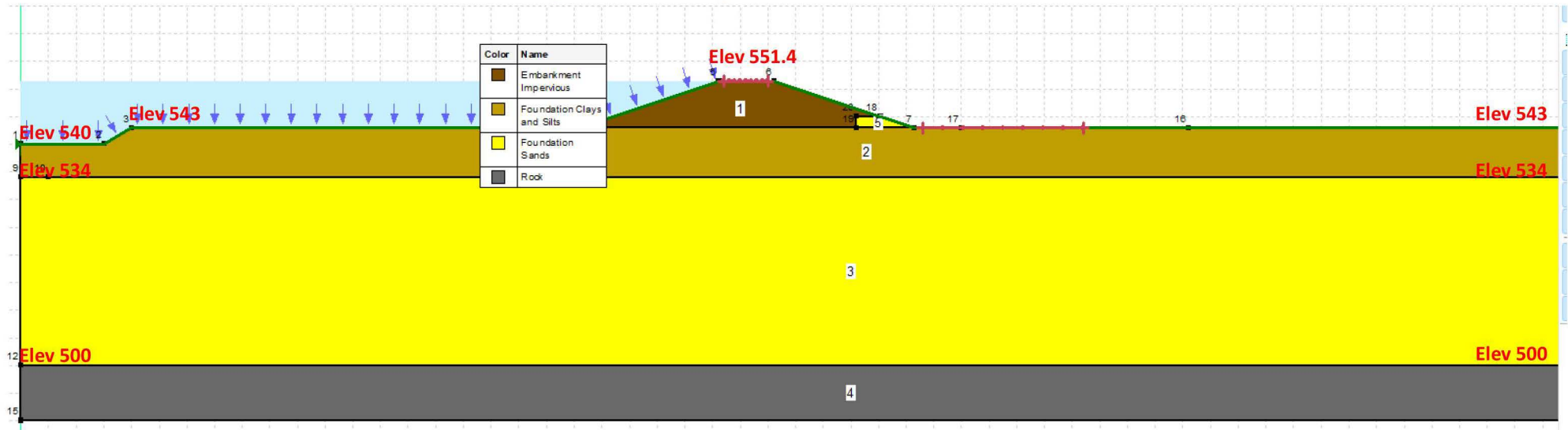
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	134.475 ft	551.82948 ft	-211.3583 psf	49.052491 psf	28.320469 psf	0 psf	0 psf	Embankment Impervious
Slice 2	135.425 ft	550.56464 ft	-144.13054 psf	145.1968 psf	83.82941 psf	0 psf	0 psf	Embankment Impervious
Slice 3	136.49332 ft	549.31334 ft	-79.319029 psf	229.27531 psf	132.37216 psf	0 psf	0 psf	Embankment Impervious
Slice 4	137.67997 ft	548.07698 ft	-15.628802 psf	300.67753 psf	173.59625 psf	0 psf	0 psf	Embankment Impervious
Slice 5	138.86662 ft	546.98306 ft	40.883784 psf	372.46936 psf	191.44102 psf	0 psf	0 psf	Embankment Impervious
Slice 6	140.05327 ft	546.00975 ft	91.403103 psf	436.72485 psf	199.37161 psf	0 psf	0 psf	Embankment Impervious
Slice 7	141.23992 ft	545.14126 ft	136.59607 psf	491.72388 psf	205.03314 psf	0 psf	0 psf	Embankment Impervious
Slice 8	142.42657 ft	544.36577 ft	176.90157 psf	539.02548 psf	209.07234 psf	0 psf	0 psf	Embankment Impervious
Slice 9	143.5899 ft	543.68629 ft	211.11532 psf	580.2479 psf	213.11879 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 10	144.72992 ft	543.09296 ft	238.65982 psf	616.2982 psf	218.02962 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 11	145.86993 ft	542.56555 ft	261.42704 psf	647.39495 psf	222.83868 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 12	147.00995 ft	542.09995 ft	279.1436 psf	673.82418 psf	227.86894 psf	0 psf	0 psf	Foundation Clays and Silts

Slice 13	148.14996 ft	541.69283 ft	292.43775 psf	695.72499 psf	232.838 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 14	149.28998 ft	541.34146 ft	302.30902 psf	713.0079 psf	237.11711 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 15	150.42999 ft	541.04362 ft	310.77334 psf	725.32801 psf	239.34325 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 16	151.55 ft	540.80098 ft	318.37173 psf	751.63881 psf	250.14687 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 17	152.65 ft	540.61041 ft	324.91937 psf	752.87392 psf	247.07967 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 18	153.75 ft	540.46574 ft	330.12263 psf	747.5679 psf	241.01214 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 19	154.85 ft	540.36621 ft	333.23647 psf	735.02281 psf	231.97145 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 20	156 ft	540.31097 ft	333.51451 psf	711.11145 psf	218.00569 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 21	157.2 ft	540.30393 ft	330.24721 psf	674.05211 psf	198.49585 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 22	158.4 ft	540.34969 ft	322.89919 psf	625.89027 psf	174.93198 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 23	159.6 ft	540.4485 ft	311.19334 psf	566.15324 psf	147.20117 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	160.8 ft	540.60095 ft	295.06207 psf	494.6128 psf	115.21067 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	162.05 ft	540.819 ft	273.54458 psf	440.35997 psf	96.310908 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	163.35 ft	541.10891 ft	246.40662 psf	403.63367 psf	90.775081 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	164.65 ft	541.46663 ft	214.4814 psf	354.57773 psf	80.884651 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	165.95 ft	541.895 ft	177.37355 psf	293.51378 psf	67.053592 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	167.25 ft	542.39762 ft	134.52808 psf	221.20227 psf	50.041367 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	168.55 ft	542.97905 ft	85.485453 psf	138.71227 psf	30.730517 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 31	169.85 ft	543.64505 ft	29.654443 psf	47.356262 psf	10.22015 psf	0 psf	0 psf	Foundation Clays and Silts

CA1 and CA 2 (not selected), 190+00 to 310+00



CA 1 and 2 (Not Selected), Sta 310+00 to 366+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 96

Date: 01/17/2025

Time: 02:59:17 PM

Tool Version: 11.4.2.250

File Name: STABILITY CapitalView_stage34_310 to 366_sand drain_30deg.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/17/2025

Last Solved Time: 02:59:26 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Berm Fill

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 10 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (127, 551.4) ft

Left-Zone Right Coordinate: (135, 551.4) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (163.01743, 543) ft

Right-Zone Right Coordinate: (192, 543) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 540) ft

Right Coordinate: (300, 543) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	540 ft
Point 2	15 ft	540 ft
Point 3	20 ft	543 ft
Point 4	101 ft	543 ft
Point 5	126.2 ft	551.4 ft
Point 6	136.2 ft	551.4 ft
Point 7	161.4 ft	543 ft
Point 8	300 ft	543 ft
Point 9	0 ft	534 ft
Point 10	5 ft	534 ft
Point 11	300 ft	534 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	211 ft	543 ft
Point 17	170 ft	543 ft
Point 18	155.4 ft	545 ft
Point 19	151 ft	543 ft
Point 20	151 ft	545 ft

Regions

	Material	Points	Area
Region 1	Berm Fill	4,5,6,18,20,19	280.88 ft²
Region 2	Foundation Clays and Silts	1,2,3,4,19,7,17,16,8,11,10,9	2,647.5 ft²
Region 3	Foundation Sands	9,10,11,13,12	10,200 ft²
Region 4	Rock	12,13,14,15	3,000 ft²
Region 5	Foundation Sands	20,18,7,19	14.8 ft²

Slip Results

Slip Surfaces Analysed: 324 of 405 converged

Current Slip Surface

Slip Surface: 373

Factor of Safety: 1.5

Volume: 145.82805 ft³

Weight: 17,227.122 lbf

Resisting Moment: 158,543.13 lbf·ft

Activating Moment: 106,671.84 lbf·ft

Resisting Force: 5,372.4845 lbf

Activating Force: 3,614.3511 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (170.26307, 543) ft

Entry: (135, 551.4) ft

Radius: 26.528159 ft

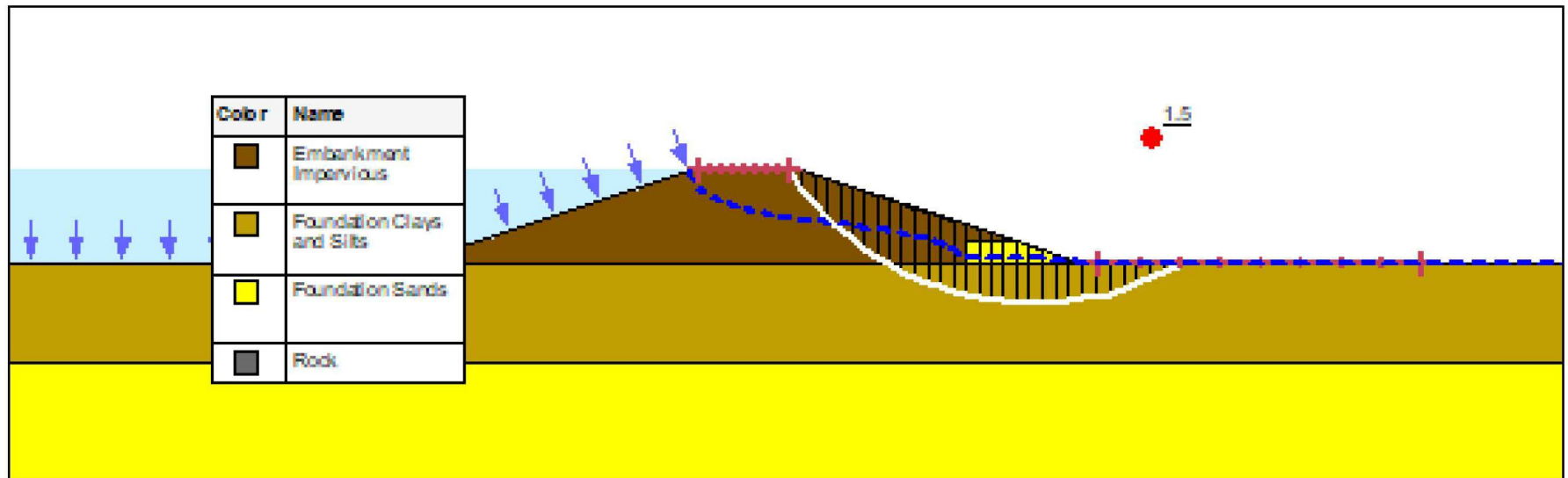
Center: (157.12027, 566.04366) ft

Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	135.6 ft	550.56577 ft	-207.81809 psf	55.313028 psf	31.934992 psf	10 psf	0 psf	Berm Fill
Slice 2	136.75553 ft	549.0652 ft	-127.70886 psf	157.60594 psf	90.993834 psf	10 psf	0 psf	Berm Fill
Slice 3	137.8666 ft	547.81219 ft	-62.146306 psf	230.53231 psf	133.09789 psf	10 psf	0 psf	Berm Fill
Slice 4	138.97767 ft	546.70435 ft	-4.3426089 psf	295.02302 psf	170.33162 psf	10 psf	0 psf	Berm Fill
Slice 5	140.08874 ft	545.7177 ft	47.21436 psf	361.96614 psf	181.72202 psf	10 psf	0 psf	Berm Fill
Slice 6	141.19981 ft	544.83518 ft	93.377283 psf	420.10478 psf	188.63621 psf	10 psf	0 psf	Berm Fill
Slice 7	142.31087 ft	544.04419 ft	134.59801 psf	470.13284 psf	193.72113 psf	10 psf	0 psf	Berm Fill
Slice 8	143.42194 ft	543.33511 ft	171.51816 psf	513.36371 psf	197.36462 psf	10 psf	0 psf	Berm Fill
Slice 9	144.56269 ft	542.68539 ft	203.70674 psf	554.41893 psf	202.48378 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 10	145.73311 ft	542.09254 ft	230.04214 psf	589.69854 psf	207.64771 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 11	146.90353 ft	541.57001 ft	251.07445 psf	619.64014 psf	212.7915 psf	0 psf	0 psf	Foundation Clays and Silts

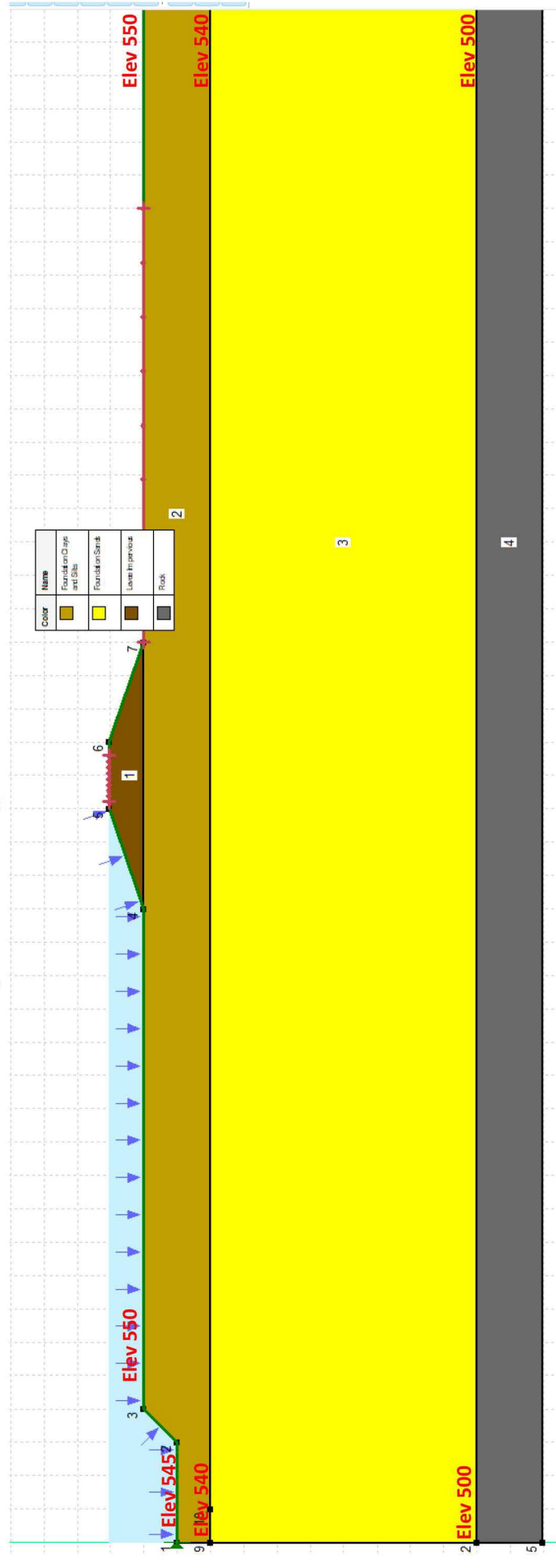
Slice 12	148.07395 ft	541.11336 ft	266.379 psf	644.50683 psf	218.3122 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 13	149.24437 ft	540.71901 ft	277.52738 psf	664.40361 psf	223.3631 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 14	150.41479 ft	540.38408 ft	287.19591 psf	679.09064 psf	226.26053 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 15	151.55 ft	540.113 ft	296.62172 psf	707.1788 psf	237.03524 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 16	152.65 ft	539.90081 ft	305.2668 psf	710.26063 psf	233.8233 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 17	153.75 ft	539.7363 ft	312.33524 psf	706.84729 psf	227.77164 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 18	154.85 ft	539.61859 ft	317.26777 psf	696.23077 psf	218.79439 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 19	156 ft	539.54597 ft	319.26712 psf	674.38693 psf	205.02852 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 20	157.2 ft	539.5224 ft	317.56052 psf	639.51837 psf	185.88245 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 21	158.4 ft	539.55319 ft	311.47434 psf	593.52996 psf	162.84489 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 22	159.6 ft	539.63852 ft	300.74102 psf	535.91492 psf	135.77771 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 23	160.8 ft	539.77893 ft	285.32122 psf	466.41301 psf	104.5534 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	162.01429 ft	539.97833 ft	265.06004 psf	414.87548 psf	86.495988 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	163.24286 ft	540.23942 ft	239.92607 psf	382.30804 psf	82.20427 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	164.47143 ft	540.56239 ft	210.43614 psf	338.60712 psf	73.999552 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	165.7 ft	540.94963 ft	176.16992 psf	284.01328 psf	62.26339 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	166.92857 ft	541.40419 ft	136.61111 psf	219.13712 psf	47.646413 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	168.15714 ft	541.92988 ft	91.355875 psf	144.85861 psf	30.889819 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	169.38571 ft	542.53149 ft	39.907811 psf	62.281019 psf	12.917178 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 31	170.13154 ft	542.92597 ft	6.2984887 psf	9.6618036 psf	1.9418108 psf	0 psf	0 psf	Foundation Clays and Silts

CA1 and CA 2 (not selected), 310+00 to 366+00



CA 4 and CA 5 (Not Selected)
Stability Analysis

CA 1 and 2 (Not Selected), Sta 0+00 to 190+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 54

Date: 01/17/2025

Time: 02:47:59 PM

Tool Version: 11.4.2.250

File Name: STABILITY CapitalView_stage34_0 to 190_30deg.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/17/2025

Last Solved Time: 02:48:12 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft
Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Levee Impervious

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (111, 555.2) ft

Left-Zone Right Coordinate: (118, 555.2) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (135, 550) ft

Right-Zone Right Coordinate: (200, 550) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 545) ft

Right Coordinate: (300, 550) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	545 ft
Point 2	15 ft	545 ft
Point 3	20 ft	550 ft
Point 4	95 ft	550 ft
Point 5	110 ft	555.2 ft
Point 6	120 ft	555.2 ft
Point 7	135 ft	550 ft
Point 8	300 ft	550 ft
Point 9	0 ft	540 ft
Point 10	5 ft	540 ft
Point 11	300 ft	540 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft

Regions

	Material	Points	Area
Region 1	Levee Impervious	4,5,6,7	130 ft ²
Region 2	Foundation Clays and Silts	1,2,3,4,7,8,11,10,9	2,912.5 ft ²
Region 3	Foundation Sands	9,10,11,13,12	12,000 ft ²
Region 4	Rock	12,13,14,15	3,000 ft ²

Slip Results

Slip Surfaces Analysed: 325 of 405 converged

Current Slip Surface

Slip Surface: 362

Factor of Safety: 1.4

Volume: 26.785284 ft³

Weight: 3,082.2463 lbf

Resisting Moment: 29,577.136 lbf·ft

Activating Moment: 20,686.68 lbf·ft

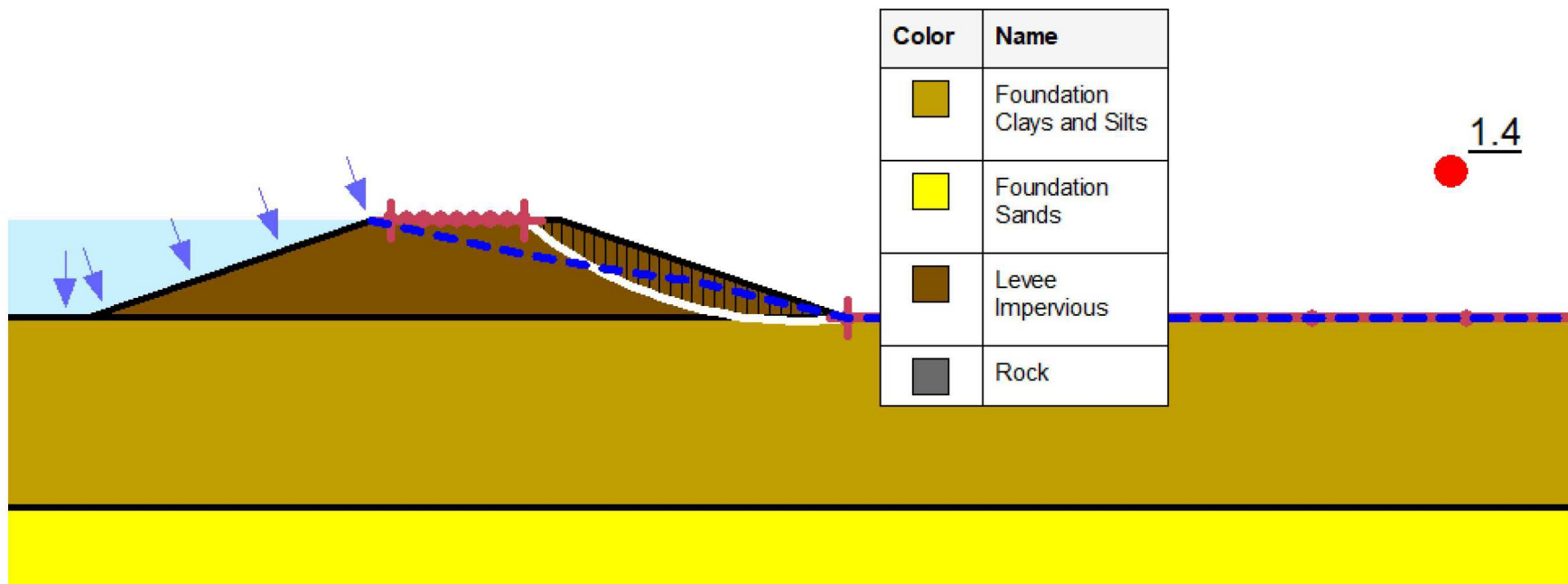
Resisting Force: 1,211.9232 lbf
 Activating Force: 847.68547 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (135, 550) ft
 Entry: (118, 555.2) ft
 Radius: 22.748267 ft
 Center: (132.62497, 572.62394) ft

Slip Slices

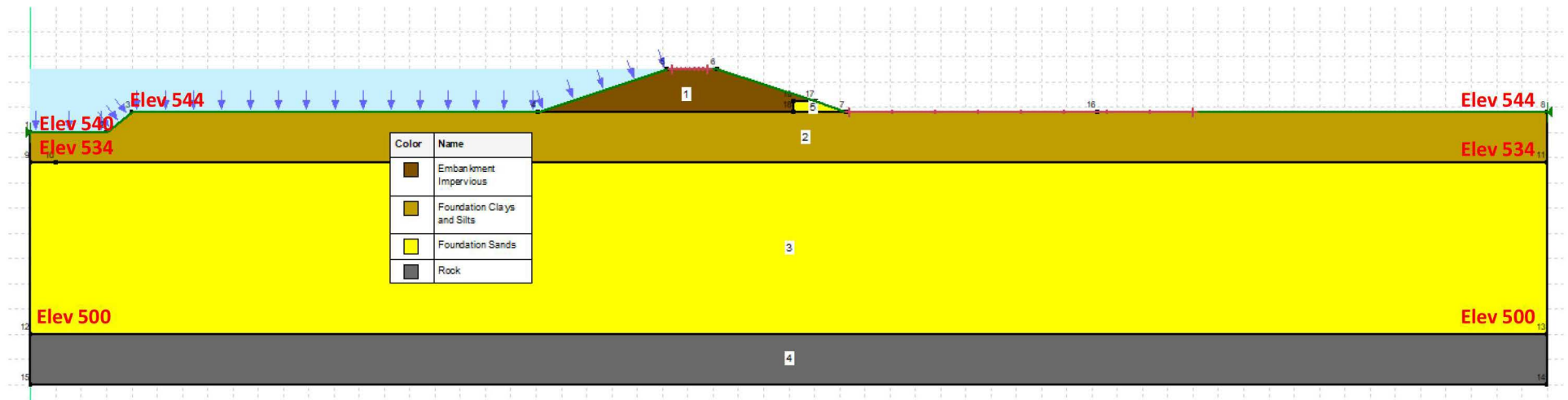
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	118.25 ft	554.99613 ft	-103.11226 psf	17.459293 psf	10.080128 psf	0 psf	0 psf	Levee Impervious
Slice 2	118.75 ft	554.59981 ft	-84.259808 psf	51.530741 psf	29.751287 psf	0 psf	0 psf	Levee Impervious
Slice 3	119.25 ft	554.22562 ft	-66.708458 psf	83.927374 psf	48.455492 psf	0 psf	0 psf	Levee Impervious
Slice 4	119.75 ft	553.87223 ft	-50.354627 psf	114.95916 psf	66.371703 psf	0 psf	0 psf	Levee Impervious
Slice 5	120.28472 ft	553.5167 ft	-34.134664 psf	138.15459 psf	79.763587 psf	0 psf	0 psf	Levee Impervious
Slice 6	120.85416 ft	553.16062 ft	-18.104619 psf	153.43406 psf	88.585194 psf	0 psf	0 psf	Levee Impervious
Slice 7	121.4236 ft	552.82733 ft	-3.316741 psf	167.46975 psf	96.688708 psf	0 psf	0 psf	Levee Impervious
Slice 8	121.99304 ft	552.51569 ft	10.307338 psf	181.28659 psf	98.714917 psf	0 psf	0 psf	Levee Impervious
Slice 9	122.56249 ft	552.2247 ft	22.833271 psf	193.7147 psf	98.658439 psf	0 psf	0 psf	Levee Impervious
Slice 10	123.13193 ft	551.95349 ft	34.326791 psf	204.51664 psf	98.259153 psf	0 psf	0 psf	Levee Impervious
Slice 11	123.70137 ft	551.7013 ft	45.050102 psf	213.80093 psf	97.428335 psf	0 psf	0 psf	Levee Impervious
Slice 12	124.27081 ft	551.46743 ft	54.625608 psf	221.59813 psf	96.401633 psf	0 psf	0 psf	Levee Impervious
Slice 13	124.84025 ft	551.2513 ft	63.091024 psf	227.92297 psf	95.165768 psf	0 psf	0 psf	Levee Impervious
Slice 14	125.40969 ft	551.05236 ft	70.479749 psf	232.7445 psf	93.683595 psf	0 psf	0 psf	Levee Impervious

Slice 15	125.97913 ft	550.87014 ft	76.094521 psf	236.00444 psf	92.324033 psf	0 psf	0 psf	Levee Impervious
Slice 16	126.54857 ft	550.70423 ft	77.695842 psf	237.68728 psf	92.371103 psf	0 psf	0 psf	Levee Impervious
Slice 17	127.11802 ft	550.55426 ft	78.377406 psf	237.61027 psf	91.93314 psf	0 psf	0 psf	Levee Impervious
Slice 18	127.68746 ft	550.4199 ft	78.157863 psf	235.5847 psf	90.890429 psf	0 psf	0 psf	Levee Impervious
Slice 19	128.2569 ft	550.30088 ft	77.053496 psf	231.41601 psf	89.121241 psf	0 psf	0 psf	Levee Impervious
Slice 20	128.82634 ft	550.19694 ft	75.078403 psf	224.91912 psf	86.51058 psf	0 psf	0 psf	Levee Impervious
Slice 21	129.39578 ft	550.10788 ft	72.244652 psf	215.93503 psf	82.959678 psf	0 psf	0 psf	Levee Impervious
Slice 22	129.96522 ft	550.03352 ft	68.562403 psf	204.34727 psf	78.395429 psf	0 psf	0 psf	Levee Impervious
Slice 23	130.54682 ft	549.97276 ft	64.190645 psf	189.86729 psf	72.559446 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	131.14058 ft	549.92611 ft	59.084783 psf	172.33895 psf	65.387323 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	131.73434 ft	549.89506 ft	52.977258 psf	151.95644 psf	57.145656 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	132.32809 ft	549.87955 ft	45.833634 psf	128.9012 psf	47.959082 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	132.92185 ft	549.87955 ft	37.617818 psf	103.42659 psf	37.99471 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	133.51561 ft	549.89506 ft	28.291958 psf	75.838831 psf	27.4512 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	134.10936 ft	549.92611 ft	17.816328 psf	46.47248 psf	16.544637 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	134.70312 ft	549.97276 ft	6.1491852 psf	15.663244 psf	5.4929444 psf	0 psf	0 psf	Foundation Clays and Silts

CA1 and CA 2 (not selected), 0+00 to 190+00



CA 1 and 2 (Not Selected), Sta 190+00 to 310+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 87

Date: 01/21/2025

Time: 03:15:02 PM

Tool Version: 11.4.2.250

File Name: STABILITY CapitalView_stage34_190to 310_sand drain_30.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/21/2025

Last Solved Time: 03:15:14 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Embankment Impervious

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (127, 552.5) ft

Left-Zone Right Coordinate: (134, 552.5) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (162, 544) ft

Right-Zone Right Coordinate: (230, 544) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 540) ft

Right Coordinate: (300, 544) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	540 ft
Point 2	15 ft	540 ft
Point 3	20 ft	544 ft
Point 4	100.4 ft	544 ft
Point 5	125.9 ft	552.5 ft
Point 6	135.9 ft	552.5 ft
Point 7	161.4 ft	544 ft
Point 8	300 ft	544 ft
Point 9	0 ft	534 ft
Point 10	5 ft	534 ft
Point 11	300 ft	534 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	211 ft	544 ft
Point 17	155.4 ft	546 ft
Point 18	151 ft	544 ft
Point 19	151 ft	546 ft

Regions

	Material	Points	Area
Region 1	Embankment Impervious	4,5,6,17,19,18	286.95 ft²
Region 2	Foundation Clays and Silts	1,2,3,4,18,7,16,8,11,10,9	2,930 ft²
Region 3	Foundation Sands	9,10,11,13,12	10,200 ft²
Region 4	Rock	12,13,14,15	3,000 ft²
Region 5	Foundation Sands	19,17,7,18	14.8 ft²

Slip Results

Slip Surfaces Analysed: 324 of 405 converged

Current Slip Surface

Slip Surface: 368

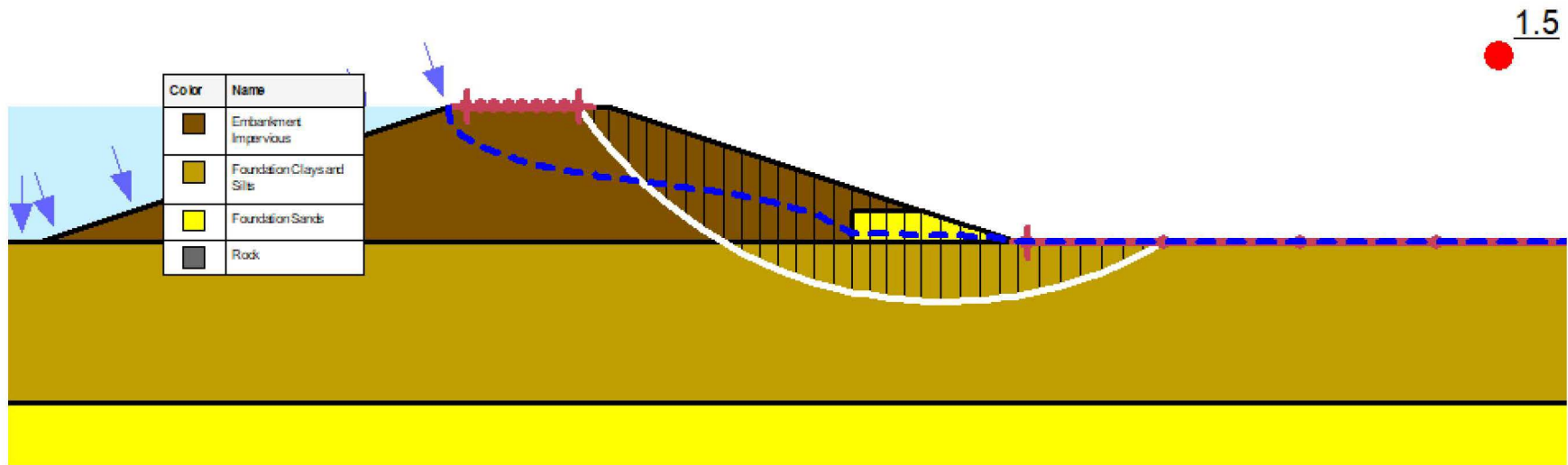
Factor of Safety: 1.5
 Volume: 160.72971 ft³
 Weight: 18,975.592 lbf
 Resisting Moment: 178,107.87 lbf·ft
 Activating Moment: 120,043.04 lbf·ft
 Resisting Force: 5,884.1274 lbf
 Activating Force: 3,965.3848 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (170.5, 544) ft
 Entry: (134, 552.5) ft
 Radius: 27.322448 ft
 Center: (156.75995, 567.61625) ft

Slip Slices

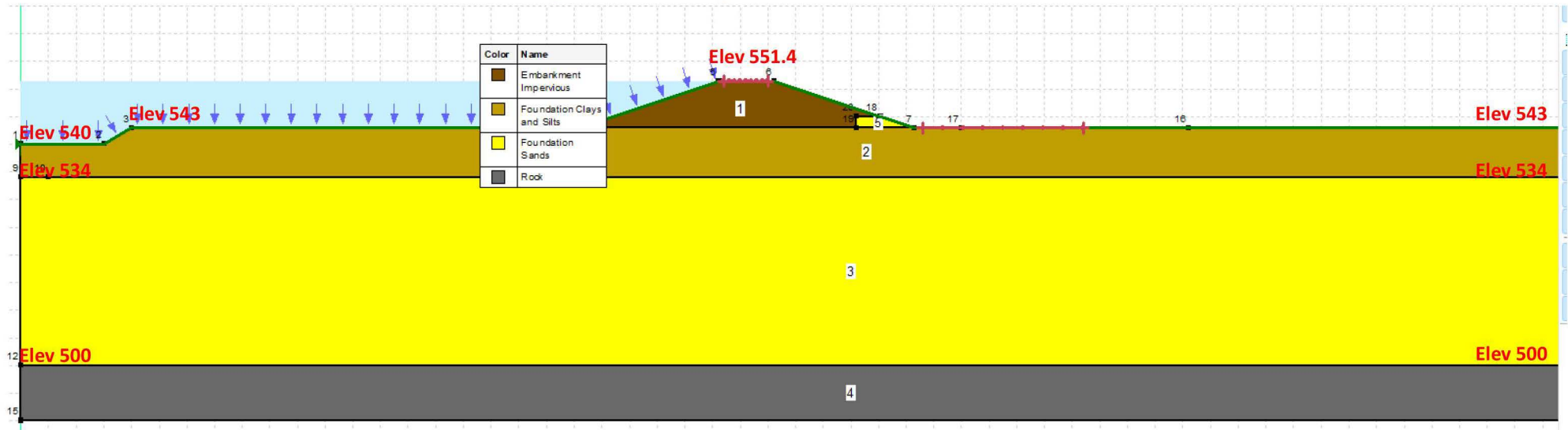
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	134.475 ft	551.82948 ft	-211.3583 psf	49.052491 psf	28.320469 psf	0 psf	0 psf	Embankment Impervious
Slice 2	135.425 ft	550.56464 ft	-144.13054 psf	145.1968 psf	83.82941 psf	0 psf	0 psf	Embankment Impervious
Slice 3	136.49332 ft	549.31334 ft	-79.319029 psf	229.27531 psf	132.37216 psf	0 psf	0 psf	Embankment Impervious
Slice 4	137.67997 ft	548.07698 ft	-15.628802 psf	300.67753 psf	173.59625 psf	0 psf	0 psf	Embankment Impervious
Slice 5	138.86662 ft	546.98306 ft	40.883784 psf	372.46936 psf	191.44102 psf	0 psf	0 psf	Embankment Impervious
Slice 6	140.05327 ft	546.00975 ft	91.403103 psf	436.72485 psf	199.37161 psf	0 psf	0 psf	Embankment Impervious
Slice 7	141.23992 ft	545.14126 ft	136.59607 psf	491.72388 psf	205.03314 psf	0 psf	0 psf	Embankment Impervious
Slice 8	142.42657 ft	544.36577 ft	176.90157 psf	539.02548 psf	209.07234 psf	0 psf	0 psf	Embankment Impervious
Slice 9	143.5899 ft	543.68629 ft	211.11532 psf	580.2479 psf	213.11879 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 10	144.72992 ft	543.09296 ft	238.65982 psf	616.2982 psf	218.02962 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 11	145.86993 ft	542.56555 ft	261.42704 psf	647.39495 psf	222.83868 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 12	147.00995 ft	542.09995 ft	279.1436 psf	673.82418 psf	227.86894 psf	0 psf	0 psf	Foundation Clays and Silts

Slice 13	148.14996 ft	541.69283 ft	292.43775 psf	695.72499 psf	232.838 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 14	149.28998 ft	541.34146 ft	302.30902 psf	713.0079 psf	237.11711 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 15	150.42999 ft	541.04362 ft	310.77334 psf	725.32801 psf	239.34325 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 16	151.55 ft	540.80098 ft	318.37173 psf	751.63881 psf	250.14687 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 17	152.65 ft	540.61041 ft	324.91937 psf	752.87392 psf	247.07967 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 18	153.75 ft	540.46574 ft	330.12263 psf	747.5679 psf	241.01214 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 19	154.85 ft	540.36621 ft	333.23647 psf	735.02281 psf	231.97145 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 20	156 ft	540.31097 ft	333.51451 psf	711.11145 psf	218.00569 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 21	157.2 ft	540.30393 ft	330.24721 psf	674.05211 psf	198.49585 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 22	158.4 ft	540.34969 ft	322.89919 psf	625.89027 psf	174.93198 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 23	159.6 ft	540.4485 ft	311.19334 psf	566.15324 psf	147.20117 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	160.8 ft	540.60095 ft	295.06207 psf	494.6128 psf	115.21067 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	162.05 ft	540.819 ft	273.54458 psf	440.35997 psf	96.310908 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	163.35 ft	541.10891 ft	246.40662 psf	403.63367 psf	90.775081 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	164.65 ft	541.46663 ft	214.4814 psf	354.57773 psf	80.884651 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	165.95 ft	541.895 ft	177.37355 psf	293.51378 psf	67.053592 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	167.25 ft	542.39762 ft	134.52808 psf	221.20227 psf	50.041367 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	168.55 ft	542.97905 ft	85.485453 psf	138.71227 psf	30.730517 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 31	169.85 ft	543.64505 ft	29.654443 psf	47.356262 psf	10.22015 psf	0 psf	0 psf	Foundation Clays and Silts

CA1 and CA 2 (not selected), 190+00 to 310+00



CA 1 and 2 (Not Selected), Sta 310+00 to 366+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 96

Date: 01/17/2025

Time: 02:59:17 PM

Tool Version: 11.4.2.250

File Name: STABILITY CapitalView_stage34_310 to 366_sand drain_30deg.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/17/2025

Last Solved Time: 02:59:26 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Berm Fill

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 10 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (127, 551.4) ft

Left-Zone Right Coordinate: (135, 551.4) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (163.01743, 543) ft

Right-Zone Right Coordinate: (192, 543) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 540) ft

Right Coordinate: (300, 543) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	540 ft
Point 2	15 ft	540 ft
Point 3	20 ft	543 ft
Point 4	101 ft	543 ft
Point 5	126.2 ft	551.4 ft
Point 6	136.2 ft	551.4 ft
Point 7	161.4 ft	543 ft
Point 8	300 ft	543 ft
Point 9	0 ft	534 ft
Point 10	5 ft	534 ft
Point 11	300 ft	534 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	211 ft	543 ft
Point 17	170 ft	543 ft
Point 18	155.4 ft	545 ft
Point 19	151 ft	543 ft
Point 20	151 ft	545 ft

Regions

	Material	Points	Area
Region 1	Berm Fill	4,5,6,18,20,19	280.88 ft ²
Region 2	Foundation Clays and Silts	1,2,3,4,19,7,17,16,8,11,10,9	2,647.5 ft ²
Region 3	Foundation Sands	9,10,11,13,12	10,200 ft ²
Region 4	Rock	12,13,14,15	3,000 ft ²
Region 5	Foundation Sands	20,18,7,19	14.8 ft ²

Slip Results

Slip Surfaces Analysed: 324 of 405 converged

Current Slip Surface

Slip Surface: 373

Factor of Safety: 1.5

Volume: 145.82805 ft³

Weight: 17,227.122 lbf

Resisting Moment: 158,543.13 lbf·ft

Activating Moment: 106,671.84 lbf·ft

Resisting Force: 5,372.4845 lbf

Activating Force: 3,614.3511 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (170.26307, 543) ft

Entry: (135, 551.4) ft

Radius: 26.528159 ft

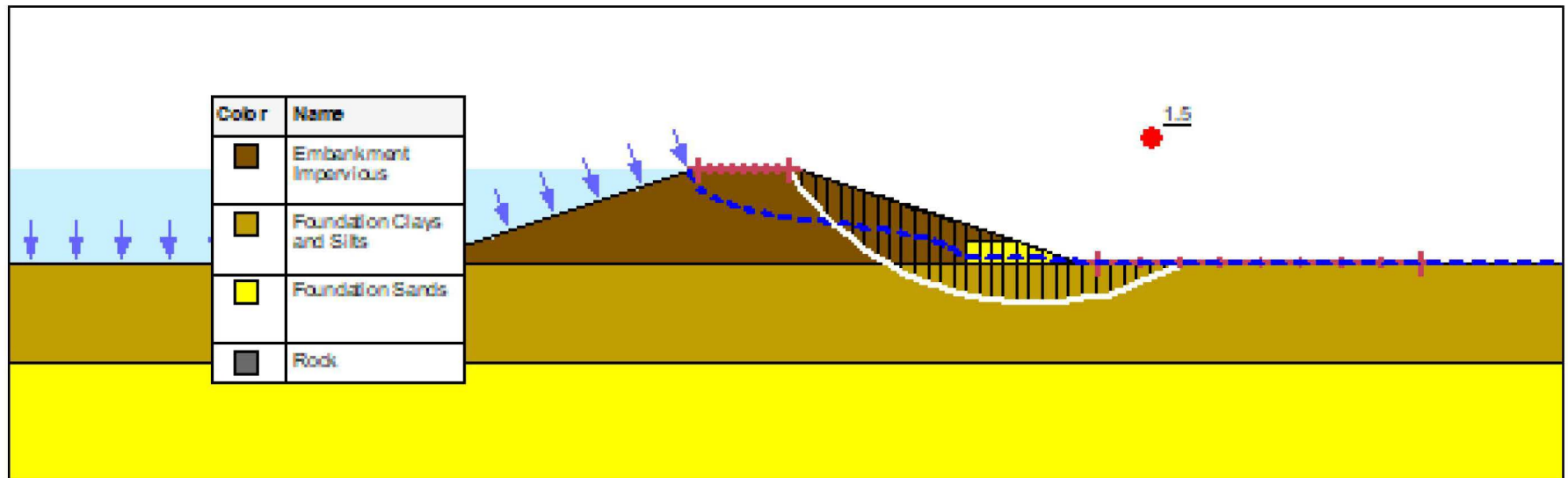
Center: (157.12027, 566.04366) ft

Slip Slices

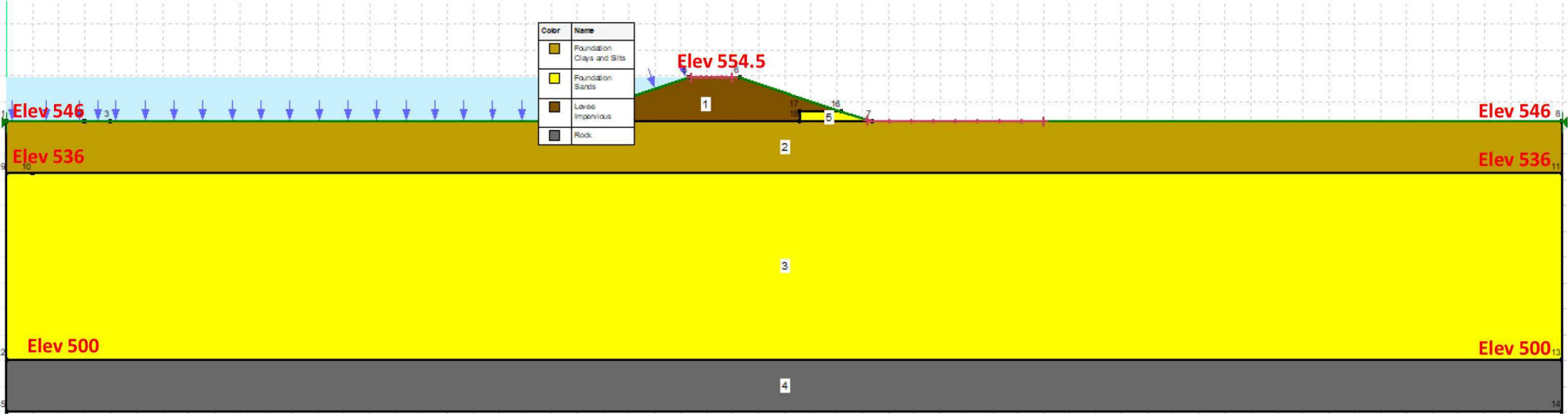
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	135.6 ft	550.56577 ft	-207.81809 psf	55.313028 psf	31.934992 psf	10 psf	0 psf	Berm Fill
Slice 2	136.75553 ft	549.0652 ft	-127.70886 psf	157.60594 psf	90.993834 psf	10 psf	0 psf	Berm Fill
Slice 3	137.8666 ft	547.81219 ft	-62.146306 psf	230.53231 psf	133.09789 psf	10 psf	0 psf	Berm Fill
Slice 4	138.97767 ft	546.70435 ft	-4.3426089 psf	295.02302 psf	170.33162 psf	10 psf	0 psf	Berm Fill
Slice 5	140.08874 ft	545.7177 ft	47.21436 psf	361.96614 psf	181.72202 psf	10 psf	0 psf	Berm Fill
Slice 6	141.19981 ft	544.83518 ft	93.377283 psf	420.10478 psf	188.63621 psf	10 psf	0 psf	Berm Fill
Slice 7	142.31087 ft	544.04419 ft	134.59801 psf	470.13284 psf	193.72113 psf	10 psf	0 psf	Berm Fill
Slice 8	143.42194 ft	543.33511 ft	171.51816 psf	513.36371 psf	197.36462 psf	10 psf	0 psf	Berm Fill
Slice 9	144.56269 ft	542.68539 ft	203.70674 psf	554.41893 psf	202.48378 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 10	145.73311 ft	542.09254 ft	230.04214 psf	589.69854 psf	207.64771 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 11	146.90353 ft	541.57001 ft	251.07445 psf	619.64014 psf	212.7915 psf	0 psf	0 psf	Foundation Clays and Silts

Slice 12	148.07395 ft	541.11336 ft	266.379 psf	644.50683 psf	218.3122 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 13	149.24437 ft	540.71901 ft	277.52738 psf	664.40361 psf	223.3631 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 14	150.41479 ft	540.38408 ft	287.19591 psf	679.09064 psf	226.26053 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 15	151.55 ft	540.113 ft	296.62172 psf	707.1788 psf	237.03524 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 16	152.65 ft	539.90081 ft	305.2668 psf	710.26063 psf	233.8233 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 17	153.75 ft	539.7363 ft	312.33524 psf	706.84729 psf	227.77164 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 18	154.85 ft	539.61859 ft	317.26777 psf	696.23077 psf	218.79439 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 19	156 ft	539.54597 ft	319.26712 psf	674.38693 psf	205.02852 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 20	157.2 ft	539.5224 ft	317.56052 psf	639.51837 psf	185.88245 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 21	158.4 ft	539.55319 ft	311.47434 psf	593.52996 psf	162.84489 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 22	159.6 ft	539.63852 ft	300.74102 psf	535.91492 psf	135.77771 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 23	160.8 ft	539.77893 ft	285.32122 psf	466.41301 psf	104.5534 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	162.01429 ft	539.97833 ft	265.06004 psf	414.87548 psf	86.495988 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	163.24286 ft	540.23942 ft	239.92607 psf	382.30804 psf	82.20427 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	164.47143 ft	540.56239 ft	210.43614 psf	338.60712 psf	73.999552 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	165.7 ft	540.94963 ft	176.16992 psf	284.01328 psf	62.26339 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	166.92857 ft	541.40419 ft	136.61111 psf	219.13712 psf	47.646413 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	168.15714 ft	541.92988 ft	91.355875 psf	144.85861 psf	30.889819 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	169.38571 ft	542.53149 ft	39.907811 psf	62.281019 psf	12.917178 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 31	170.13154 ft	542.92597 ft	6.2984887 psf	9.6618036 psf	1.9418108 psf	0 psf	0 psf	Foundation Clays and Silts

CA1 and CA 2 (not selected), 310+00 to 366+00



CA 4 and 5 (Not Selected), Sta 0+00 to 114+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 58

Date: 01/21/2025

Time: 03:01:18 PM

Tool Version: 11.4.2.250

File Name: STABILITY Optimization_stage37_Sta0 to 114_30.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1

Optimize Critical Slip Surface Location: No

Tension Crack Option: Tension Crack Line

Filled with water (0 to 1): 0

Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Levee Impervious

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (132, 554.5) ft

Left-Zone Right Coordinate: (140, 554.5) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (165.98948, 546.33684) ft

Right-Zone Right Coordinate: (200.05085, 546) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 546) ft

Right Coordinate: (300, 546) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

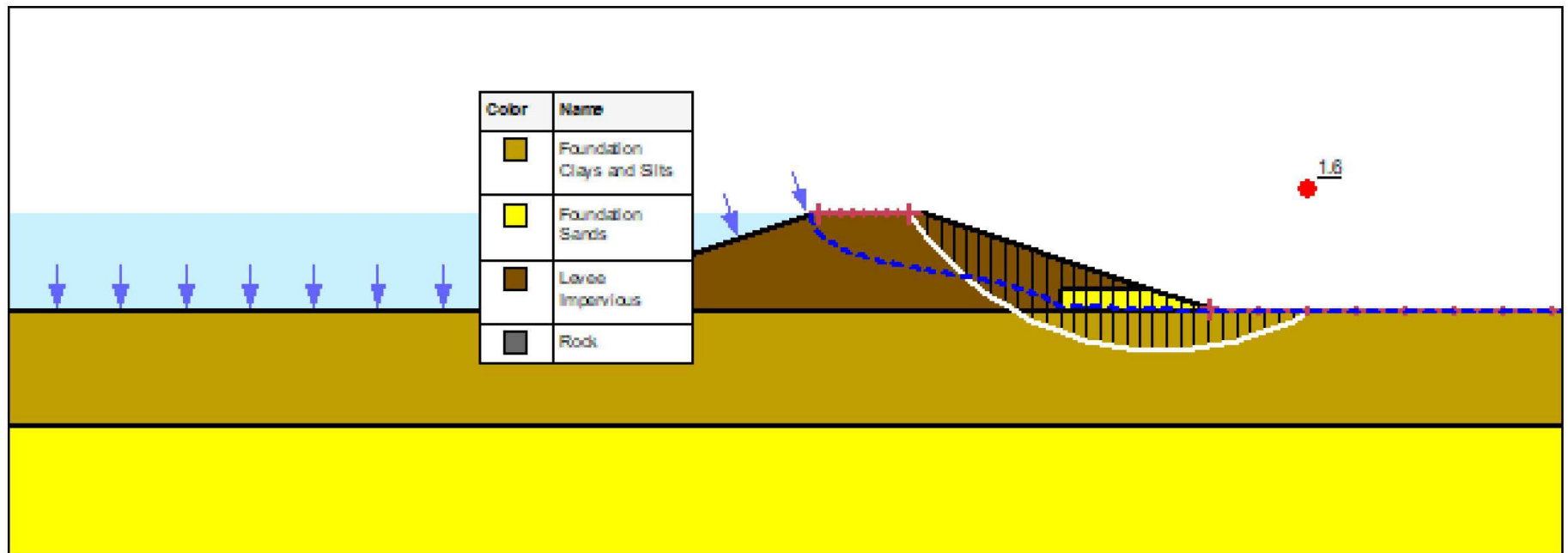
Points

	X	Y
Point 1	0 ft	546 ft
Point 2	15 ft	546 ft
Point 3	20 ft	546 ft
Point 4	106 ft	546 ft
Point 5	131.5 ft	554.5 ft
Point 6	141.5 ft	554.5 ft
Point 7	167 ft	546 ft
Point 8	300 ft	546 ft
Point 9	0 ft	536 ft
Point 10	5 ft	536 ft
Point 11	300 ft	536 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	161 ft	548 ft
Point 17	153 ft	548 ft
Point 18	153 ft	546 ft

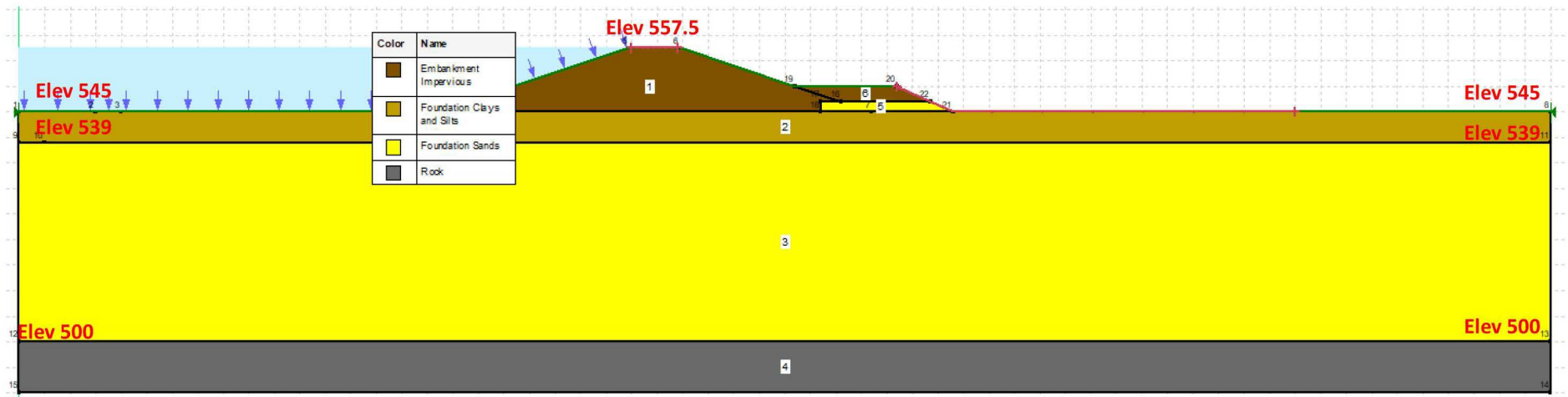
Regions

	Material	Points	Area
Region 1	Levee Impervious	4,5,6,16,17,18	279.75 ft ²
Region 2	Foundation Clays and Silts	1,2,3,4,18,7,8,11,10,9	3,000 ft ²
Region 3	Foundation Sands	9,10,11,13,12	10,800 ft ²
Region 4	Rock	12,13,14,15	3,000 ft ²
Region 5	Foundation Sands	17,16,7,18	22 ft ²

CA 4 and CA 5 (not selected), 0+00 to 114+00



CA 4 and 5 (Not Selected), Sta 114+00 to 301+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 61

Date: 01/21/2025

Time: 04:09:58 PM

Tool Version: 11.4.2.250

File Name: STABILITY Optimization_stage37_Sta114 to 301_30deg.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/21/2025

Last Solved Time: 04:10:04 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Embankment Impervious

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (120, 557.5) ft

Left-Zone Right Coordinate: (129, 557.5) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (172, 550) ft

Right-Zone Right Coordinate: (250, 545) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 545) ft

Right Coordinate: (300, 545) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	545 ft
Point 2	15 ft	545 ft
Point 3	20 ft	545 ft
Point 4	82 ft	545 ft
Point 5	119.5 ft	557.5 ft
Point 6	129.5 ft	557.5 ft
Point 7	167 ft	545 ft
Point 8	300 ft	545 ft
Point 9	0 ft	539 ft
Point 10	5 ft	539 ft
Point 11	300 ft	539 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	161 ft	547 ft
Point 17	157 ft	546.99883 ft
Point 18	157 ft	545 ft
Point 19	152 ft	550 ft
Point 20	172 ft	550 ft
Point 21	183 ft	545 ft
Point 22	178.6 ft	547 ft

Regions

	Material	Points	Area
Region 1	Embankment Impervious	4,5,6,19,16,17,18	579.75 ft ²
Region 2	Foundation Clays and Silts	1,2,3,4,18,7,21,8,11,10,9	1,800 ft ²
Region 3	Foundation Sands	9,10,11,13,12	11,700 ft ²
Region 4	Rock	12,13,14,15	3,000 ft ²
Region 5	Foundation Sands	17,16,22,21,7,18	47.598 ft ²
Region 6	Embankment Impervious	19,20,22,16	56.4 ft ²

Slip Results

Slip Surfaces Analysed: 324 of 405 converged

Current Slip Surface

Slip Surface: 22

Factor of Safety: 2.0

Volume: 550.50204 ft³

Weight: 65,003.03 lbf

Resisting Moment: 2,020,801.5 lbf·ft

Activating Moment: 995,703.33 lbf·ft

Resisting Force: 19,138.684 lbf

Activating Force: 9,430.6854 lbf

Slip Rank: 1 of 405 slip surfaces

Exit: (210.45848, 545) ft

Entry: (120, 557.5) ft

Radius: 100.74711 ft

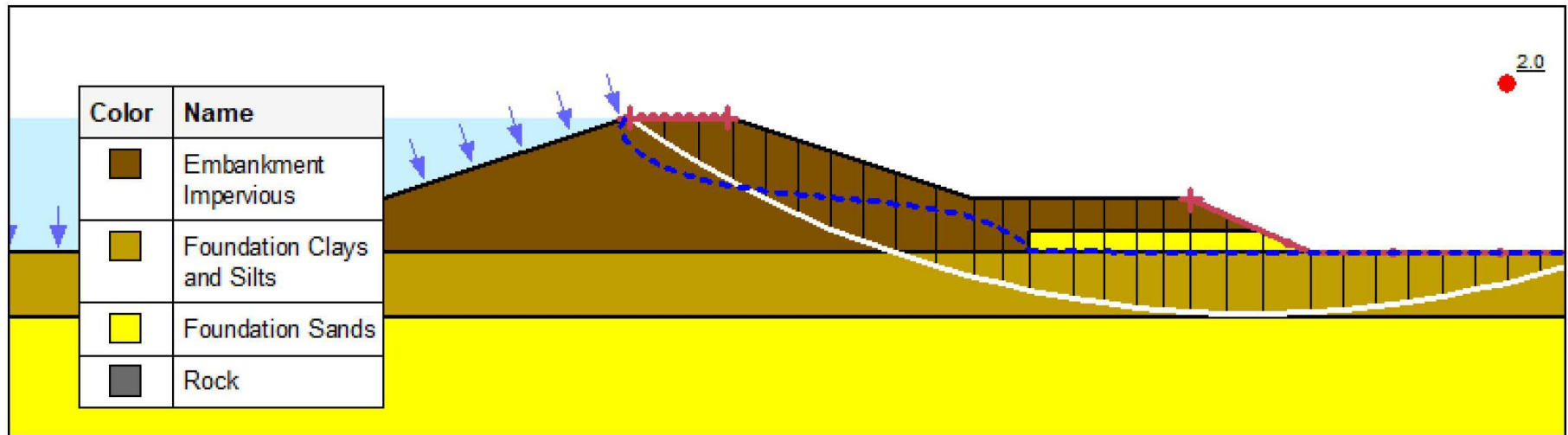
Center: (177.52235, 640.2113) ft

Slip Slices

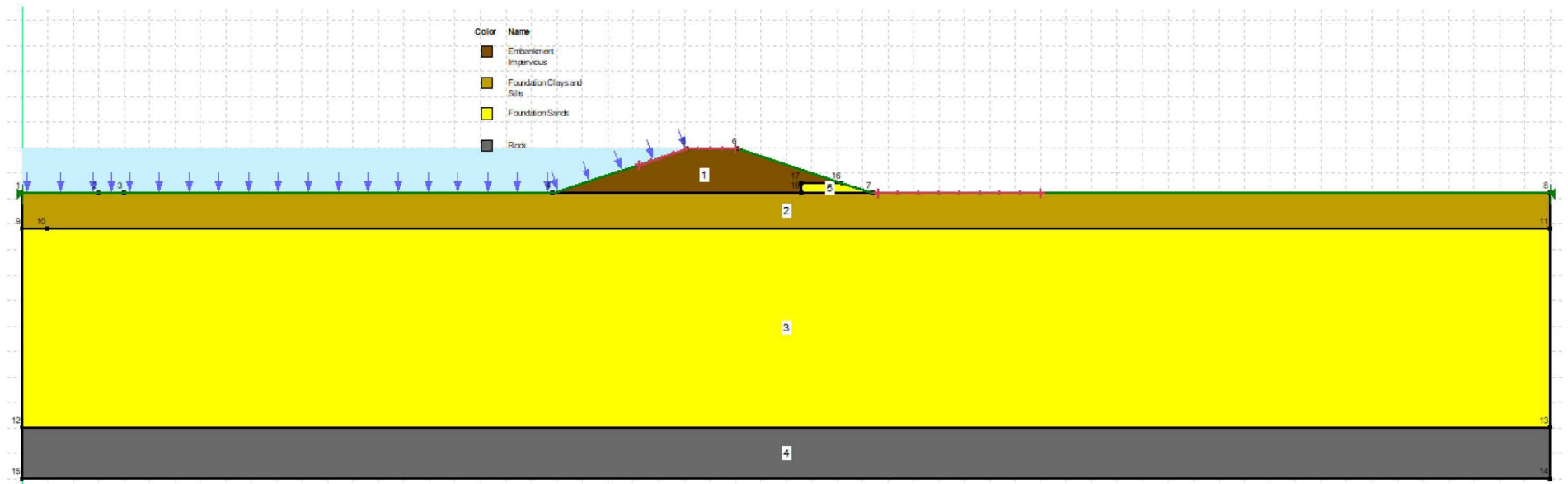
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	121.58333 ft	556.44268 ft	-112.51375 psf	101.52472 psf	58.615327 psf	0 psf	0 psf	Embankment Impervious
Slice 2	124.75 ft	554.41151 ft	-99.242 psf	298.26221 psf	172.20177 psf	0 psf	0 psf	Embankment Impervious
Slice 3	127.91667 ft	552.54177 ft	-50.891761 psf	481.87629 psf	278.21141 psf	0 psf	0 psf	Embankment Impervious
Slice 4	131.00862 ft	550.86053 ft	9.0636297 psf	601.61863 psf	342.11179 psf	0 psf	0 psf	Embankment Impervious
Slice 5	134.02587 ft	549.35296 ft	72.675936 psf	661.72778 psf	340.08924 psf	0 psf	0 psf	Embankment Impervious
Slice 6	137.04311 ft	547.9687 ft	137.45122 psf	709.75463 psf	330.41953 psf	0 psf	0 psf	Embankment Impervious
Slice 7	140.06036 ft	546.70227 ft	200.7833 psf	745.95718 psf	314.75629 psf	0 psf	0 psf	Embankment Impervious
Slice 8	143.0776 ft	545.54894 ft	260.76648 psf	770.59298 psf	294.34846 psf	0 psf	0 psf	Embankment Impervious
Slice 9	146.43967 ft	544.39872 ft	319.50385 psf	786.61521 psf	269.68687 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 10	150.14656 ft	543.27402 ft	367.35739 psf	790.94983 psf	244.56121 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 11	153.25 ft	542.44027 ft	390.34319 psf	827.35186 psf	252.30707 psf	0 psf	0 psf	Foundation Clays and Silts

Slice 12	155.75 ft	541.85325 ft	399.76016 psf	902.46888 psf	290.23901 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 13	159 ft	541.2024 ft	427.61683 psf	1,009.678 psf	336.0532 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 14	162.5 ft	540.60202 ft	476.62072 psf	1,095.5826 psf	357.35778 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 15	165.5 ft	540.1955 ft	513.6343 psf	1,157.8754 psf	371.95275 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 16	168.25 ft	539.89965 ft	540.87093 psf	1,206.5065 psf	384.30487 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 17	170.75 ft	539.69988 ft	558.87951 psf	1,242.588 psf	394.73931 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 18	173.65 ft	539.55218 ft	571.15948 psf	1,184.8985 psf	354.34238 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 19	176.95 ft	539.47933 ft	575.26469 psf	1,026.4399 psf	260.48614 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 20	180.8 ft	539.54158 ft	564.92848 psf	805.88673 psf	139.11731 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 21	184.52547 ft	539.71952 ft	543.09124 psf	656.36922 psf	65.401072 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 22	187.57641 ft	539.97884 ft	513.87115 psf	627.50721 psf	65.607807 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 23	190.62735 ft	540.33201 ft	475.44558 psf	585.53536 psf	63.560362 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	193.6783 ft	540.78003 ft	427.82894 psf	530.30763 psf	59.166099 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	196.72924 ft	541.32419 ft	370.99602 psf	461.84306 psf	52.450559 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	199.78018 ft	541.96608 ft	304.88704 psf	380.33079 psf	43.557467 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	202.83112 ft	542.70765 ft	229.40139 psf	286.12102 psf	32.747095 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	205.88206 ft	543.55118 ft	144.40076 psf	179.70002 psf	20.380038 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	208.93301 ft	544.49937 ft	49.701218 psf	61.652589 psf	6.9001272 psf	0 psf	0 psf	Foundation Clays and Silts

CA 4 and CA 5 (not selected), 114+00 to 301+00



CA 4 and 5 (Not Selected), Sta 301+00 to 366+00



Slope Stability

Report generated using GeoStudio 2022.1. Copyright © 2022 Bentley Systems, Incorporated.

File Information

File Version: 11.04

Created By: Mehnert, James F CIV CENWK CENWD (USA)

Last Edited By: Mehnert, James F CIV CENWK CENWD (USA)

Revision Number: 55

Date: 01/21/2025

Time: 04:17:31 PM

Tool Version: 11.4.2.250

File Name: STABILITY Optimization_stage37_Sta301 to 337_30deg.gsz

Directory: C:\Users\G5ECXJFM\OneDrive - US Army Corps of Engineers\Documents\000000 PROJECTS\Jefferson City_L142\4 STABILITY\000 As used in Report regarding Stability\

Last Solved Date: 01/21/2025

Last Solved Time: 04:18:01 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W

Parent: Steady-State Seepage

Analysis Type: Morgenstern-Price

Settings

Side Function

Interslice force function option: Half-Sine

PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]

Unit Weight of Water: 62.430189 pcf

Slip Surface

Direction of movement: Left to Right

Use Passive Mode: No

Slip Surface Option: Entry and Exit

Critical slip surfaces saved: 1
Optimize Critical Slip Surface Location: No
Tension Crack Option: Tension Crack Line
Filled with water (0 to 1): 0
Tension Crack Fluid Unit Weight: 62.430189 pcf

Distribution

F of S Calculation Option: Constant

Convergence

Geometry Settings

Minimum Slip Surface Depth: 0.1 ft

Number of Slices: 30

Factor of Safety Convergence Settings

Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001

Under-Relaxation Criteria

Initial Rate: 1

Minimum Rate: 0.1

Rate Reduction Factor: 0.65

Reduction Frequency (iterations): 50

Solution Settings

Search Method: Root Finder

Tolerable difference between starting and converged F of S: 3

Maximum iterations to calculate converged lambda: 20

Max Absolute Lambda: 2

Materials

Embankment Impervious

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Clays and Silts

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 120 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Foundation Sands

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf

Effective Cohesion: 0 psf

Effective Friction Angle: 30 °

Phi-B: 0 °

Rock

Slope Stability Material Model: Bedrock (Impenetrable)

Slip Surface Entry and Exit

Left Type: Range

Left-Zone Left Coordinate: (121.17719, 551.65906) ft

Left-Zone Right Coordinate: (140, 554.8) ft

Left-Zone Increment: 8

Right Type: Range

Right-Zone Left Coordinate: (168, 546) ft

Right-Zone Right Coordinate: (200, 546) ft

Right-Zone Increment: 8

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 546) ft

Right Coordinate: (300, 546) ft

Tension Crack Line

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	546 ft
Point 2	15 ft	546 ft
Point 3	20 ft	546 ft
Point 4	104.2 ft	546 ft
Point 5	130.6 ft	554.8 ft
Point 6	140.6 ft	554.8 ft
Point 7	167 ft	546 ft
Point 8	300 ft	546 ft
Point 9	0 ft	539 ft
Point 10	5 ft	539 ft
Point 11	300 ft	539 ft
Point 12	0 ft	500 ft
Point 13	300 ft	500 ft
Point 14	300 ft	490 ft
Point 15	0 ft	490 ft
Point 16	161 ft	548 ft
Point 17	153 ft	548 ft
Point 18	153 ft	546 ft

Regions

	Material	Points	Area
Region 1	Embankment Impervious	4,5,6,16,17,18	298.32 ft ²
Region 2	Foundation Clays and Silts	1,2,3,4,18,7,8,11,10,9	2,100 ft ²
Region 3	Foundation Sands	9,10,11,13,12	11,700 ft ²
Region 4	Rock	12,13,14,15	3,000 ft ²
Region 5	Foundation Sands	17,16,7,18	22 ft ²

Slip Results

Slip Surfaces Analysed: 318 of 405 converged

Current Slip Surface

Slip Surface: 373

Factor of Safety: 1.5

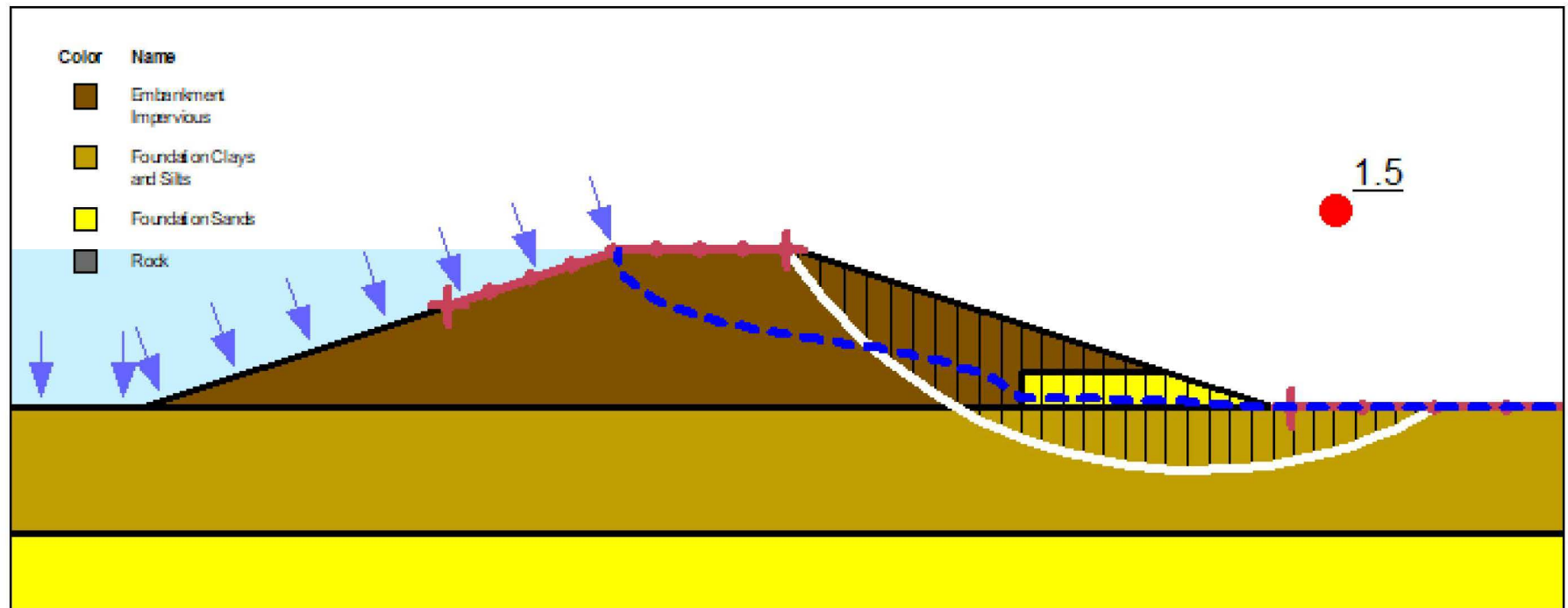
Volume: 147.9126 ft³
 Weight: 17,537.826 lbf
 Resisting Moment: 165,741.73 lbf·ft
 Activating Moment: 112,661.08 lbf·ft
 Resisting Force: 5,481.9979 lbf
 Activating Force: 3,725.9012 lbf
 Slip Rank: 1 of 405 slip surfaces
 Exit: (176, 546) ft
 Entry: (140, 554.8) ft
 Radius: 27.241607 ft
 Center: (162.74161, 569.79748) ft

Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	140.3 ft	554.36378 ft	-256.31148 psf	31.621487 psf	18.256674 psf	0 psf	0 psf	Embankment Impervious
Slice 2	141.23452 ft	553.1098 ft	-190.07904 psf	109.547 psf	63.246987 psf	0 psf	0 psf	Embankment Impervious
Slice 3	142.50355 ft	551.58688 ft	-111.94626 psf	196.32858 psf	113.35036 psf	0 psf	0 psf	Embankment Impervious
Slice 4	143.77258 ft	550.26549 ft	-45.081549 psf	271.57194 psf	156.79213 psf	0 psf	0 psf	Embankment Impervious
Slice 5	145.04161 ft	549.10647 ft	13.170423 psf	340.3384 psf	188.89052 psf	0 psf	0 psf	Embankment Impervious
Slice 6	146.31064 ft	548.08354 ft	64.127898 psf	407.28219 psf	198.12023 psf	0 psf	0 psf	Embankment Impervious
Slice 7	147.57967 ft	547.17808 ft	108.60963 psf	463.9515 psf	205.15673 psf	0 psf	0 psf	Embankment Impervious
Slice 8	148.8487 ft	546.37638 ft	147.22861 psf	512.2108 psf	210.72257 psf	0 psf	0 psf	Embankment Impervious
Slice 9	150.06934 ft	545.69187 ft	174.87466 psf	552.8883 psf	218.24628 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 10	151.24161 ft	545.1107 ft	188.56073 psf	587.21702 psf	230.16432 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 11	152.41387 ft	544.59745 ft	200.90577 psf	617.18428 psf	240.33851 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 12	153.57143 ft	544.1529 ft	221.44635 psf	660.42492 psf	253.44439 psf	0 psf	0 psf	Foundation Clays and Silts

Slice 13	154.71429 ft	543.77231 ft	244.92341 psf	681.29023 psf	251.9365 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 14	155.85714 ft	543.44676 ft	267.6775 psf	696.73298 psf	247.7153 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 15	157 ft	543.17423 ft	287.85853 psf	706.25933 psf	241.56382 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 16	158.14286 ft	542.95311 ft	304.47864 psf	709.34586 psf	233.7502 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 17	159.28571 ft	542.78211 ft	317.04788 psf	705.39654 psf	224.2132 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 18	160.42857 ft	542.66031 ft	325.4606 psf	693.73579 psf	212.62378 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 19	161.6 ft	542.58643 ft	329.58857 psf	670.78898 psf	196.99215 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 20	162.8 ft	542.56255 ft	329.14685 psf	635.13518 psf	176.66245 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 21	164 ft	542.59159 ft	323.88949 psf	588.53396 psf	152.79255 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 22	165.2 ft	542.67372 ft	313.84983 psf	530.50783 psf	125.08755 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 23	166.4 ft	542.80943 ft	299.0837 psf	460.84779 psf	93.394539 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 24	167.5625 ft	542.99193 ft	280.40184 psf	410.92089 psf	75.355207 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 25	168.6875 ft	543.21893 ft	258.00794 psf	382.71662 psf	72.00059 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 26	169.8125 ft	543.49599 ft	231.43644 psf	345.53762 psf	65.876347 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 27	170.9375 ft	543.82472 ft	200.47698 psf	299.5385 psf	57.193192 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 28	172.0625 ft	544.2071 ft	164.84797 psf	245.13493 psf	46.353699 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 29	173.1875 ft	544.64559 ft	124.28018 psf	182.96067 psf	33.879194 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 30	174.3125 ft	545.1432 ft	78.479649 psf	113.82711 psf	20.407864 psf	0 psf	0 psf	Foundation Clays and Silts
Slice 31	175.4375 ft	545.7036 ft	27.104067 psf	38.664679 psf	6.6745227 psf	0 psf	0 psf	Foundation Clays and Silts

CA 4 and CA 5 (not selected), 301+00 to 366+00



Comparison of CA13 Berm Coverage to Benchmark Data

Table 1: Benchmark Data (MoRiv levees without relief wells or floodwall sections)

Levee Unit	Length of levee in Unit (ft)	Underseepage (ft)	% Underseep Berm for levee Unit in Question	Stability (ft)	% Stability Berm for levee Unit in Question
L246	175926	24625	14	47500	27
R351	68300	0	0	31475	46
Birmingham	54000	7000	13	26629	49
L408	103300	0	0	27929	27
R440	56300	0	0	38130	68
L448-443	44321	0	0	28600	65
L476	53400	0	0	32200	60
R482	43300	26600	61	35200	81
L488	60666	26041	43	26041	43
R500	21885	19185	88	19185	88
New Haven	2100	0	0	660	31
Chariton (mainstem project)	56239	10264	18	25750	46
Totals	739737	113715		313549	

Berm Type	Average Percentage
Average % Underseepage Berm	15%
Average % Stability Berm	42%

% CAB
58%
43%

Possible reason that Benchmark levees had a average underseepage berm average lower than CAB

FS underseepage requirement on benchmark levees = 1.1
 " " " CAB = 1.6 required RMW

Table 2. CA13 Stability Berm Coverage

Station	Length of levee (ft)	Labeled Stability Berm (ft)	labeled underseepage but required to Achieve Stability FS	Total berm Length required to achieve Required Stability FS (ft)
0+00 to 12+31	1,230	0	0	0
12+31 to 18+31	600	0	600	600
18+31 to 75+20	5,689	5,689	0	5,689
75+20 to 78+83	363	0	363	363
78+83 to 100+68	2,185	2,185	0	2,185
100+68 to 110+00	932	0	932	932
110 to 112+00	200	0	0	0
112+00 to 278+00	16,600	0	0	0
278+00 to 315+00	3,700	3,700	0	3,700
315+00 to 316+52	152	0	0	0
Totals	31,651	11,574	1,895	13,469

**Average CA 13 Stability
Berm Coverage=**

43%

Table 3: CA13 Underseepage Berm Coverage

Station	Length of levee (ft)	Length of Underseepage Berm (ft)
0+00 to 12+31	1,230	0
12+31 to 18+31	600	600
18+31 to 75+20	5,689	0
75+20 to 78+83	363	363
78+83 to 100+68	2,185	0
100+68 to 110+00	932	932
110 to 112+00	200	0
112+00 to 278+00	16,600	16,600
278+00 to 315+00	3,700	0
315+00 to 316+52	152	0
Totals	31,651	18,495

**Average CA 13
Underseepage Berm
Coverage =**

58%