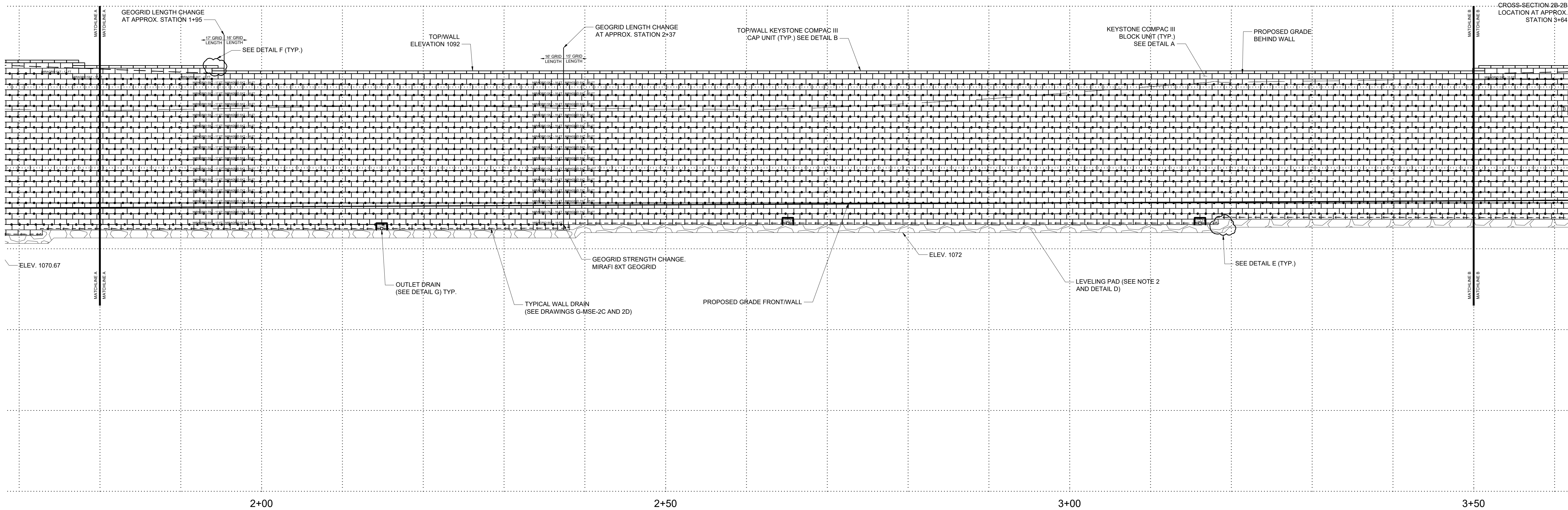


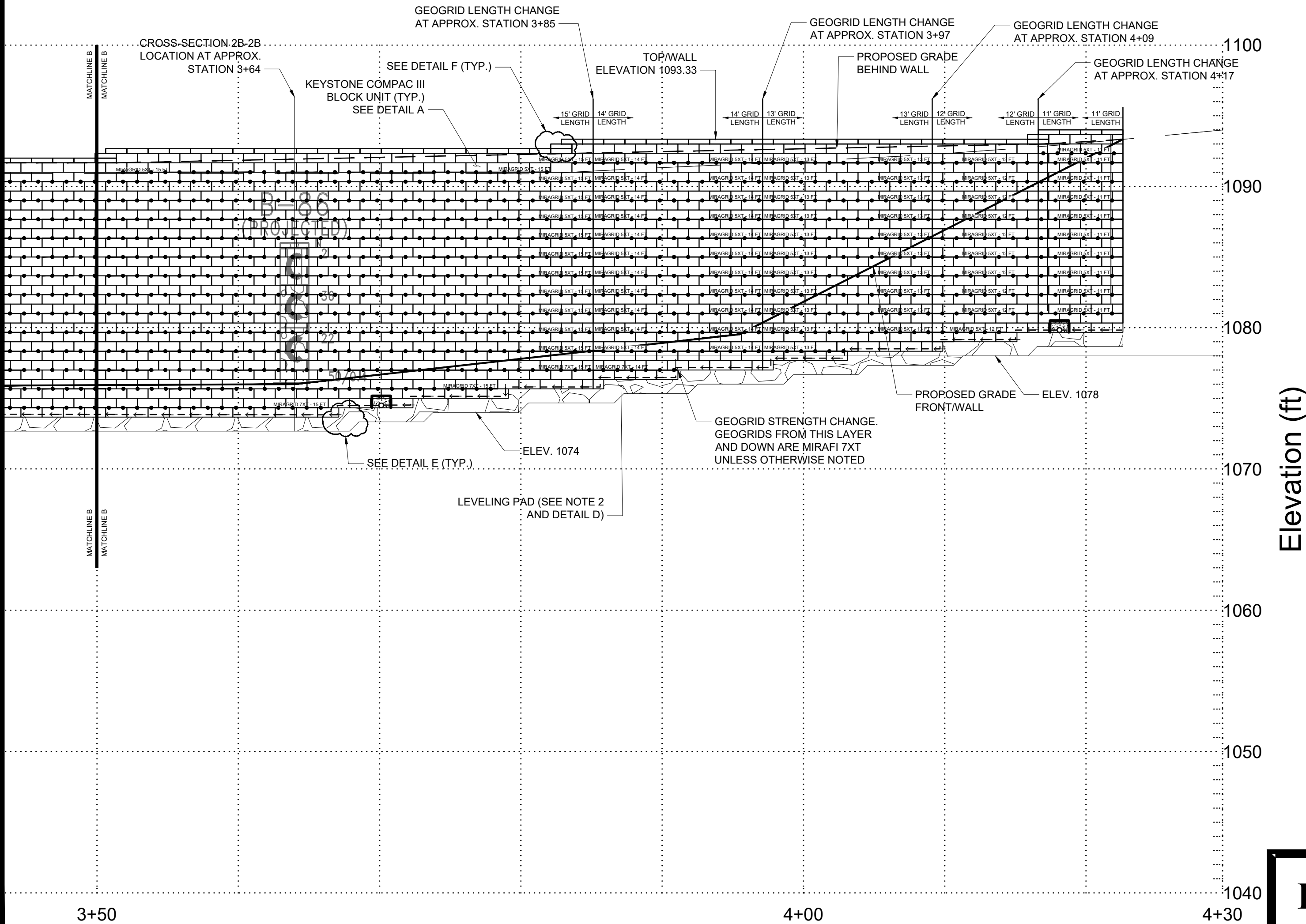


PROPOSED MECHANICALLY-STABILIZED EARTH (MSE) RETAINING WALL NO. 2 ELEVATION VIEW ALONG CROSS-SECTION E2-E2



NOTES:

- SUBSURFACE CONDITIONS DEPICTED ON THIS DRAWING ARE REPRESENTATIVE ONLY AT BORING LOCATIONS. CONDITIONS BETWEEN BORINGS ARE ESTIMATED BASED ON INTERPOLATION BETWEEN THE BORINGS, EXTRAPOLATION BEYOND THE BORINGS AND PROJECTIONS ALONG CONTOUR LINES. ACTUAL SUBSURFACE CONDITIONS WILL VARY FROM THOSE HEREON SHOWN.
- LEVELING PAD MATERIAL SHALL CONSIST OF PROPERLY COMPACTED CRUSHED LIMESTONE MEETING GRADATION REQUIREMENTS FOR PENNDOT NO. 2A AND MEET DURABILITY REQUIREMENTS FOR PENNDOT TYPE C COARSE AGGREGATE. SEE DETAIL D.
- ALL BLOCK COURSES SHALL BE THOROUGHLY CLEANED/SWEPT PRIOR TO INSTALLATION OF NEXT COURSE TO ENSURE NO STONES/PARTICLES ARE TRAPPED BETWEEN COURSES.
- CONTRACTOR SHALL PROVIDE SHORING AND BRACING FOR TEMPORARY CUT SLOPES, AS NECESSARY, DURING CONSTRUCTION.
- THESE DRAWINGS SHOULD ONLY BE USED IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS BY GARVIN BOWARD BEITKO ENGINEERING, INC. AS SHOWN ON DRAWING G-MSE-1 THROUGH G-MSE-3.
- SEE DRAWING G-MSE-3 FOR STICK LOG LEGEND/KEY.
- MSE WALL DRAINS SHALL HAVE MINIMUM 2% FALL TO OUTLET DRAINS.

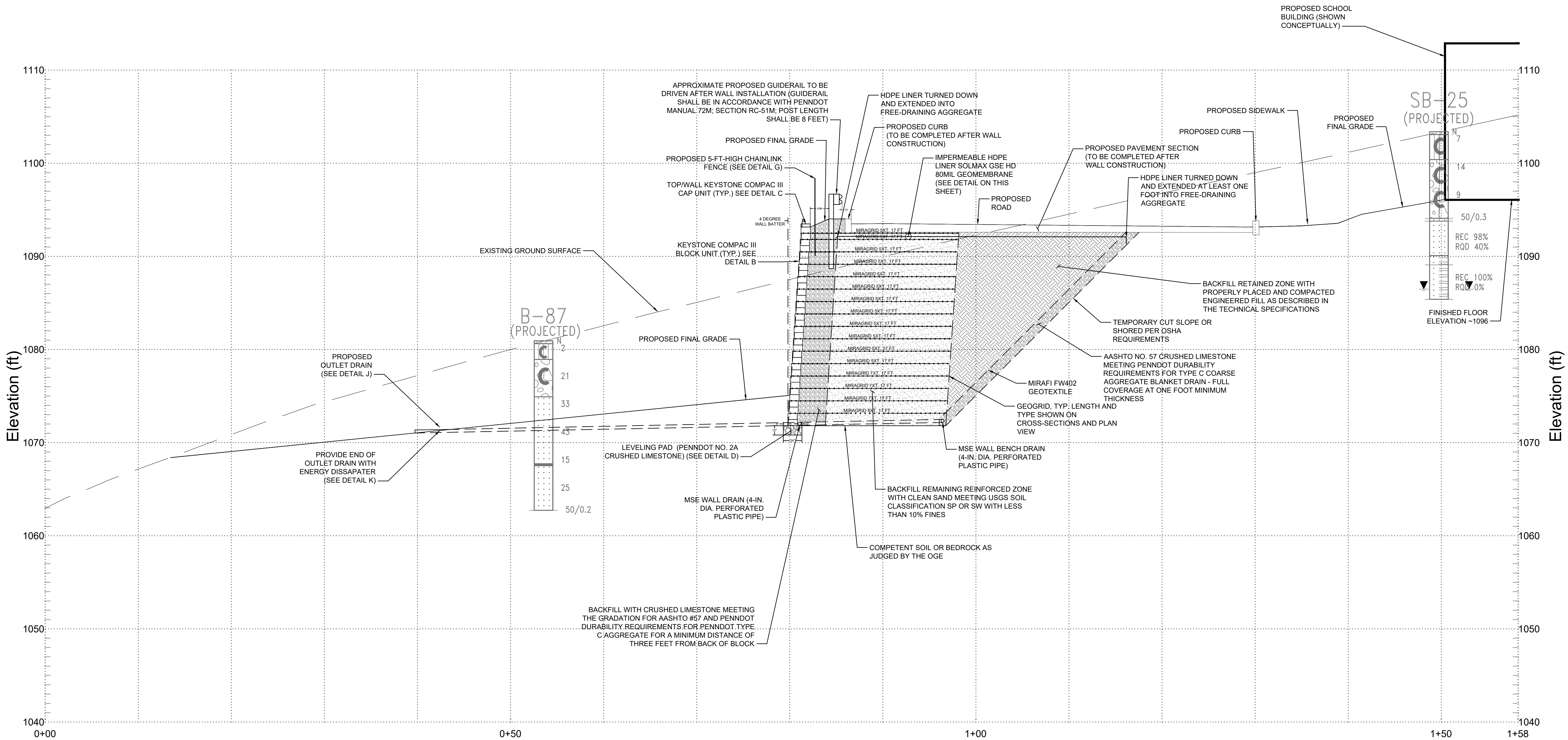


GARVIN

BOWARD BEITKO

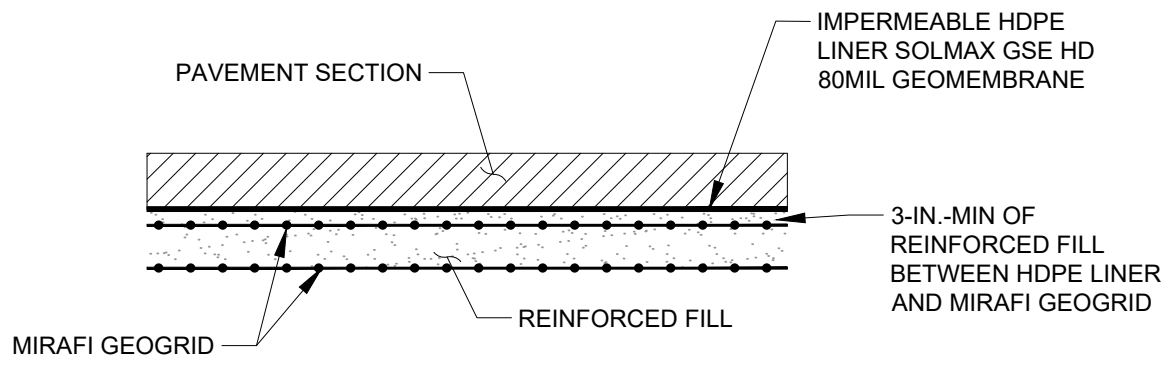
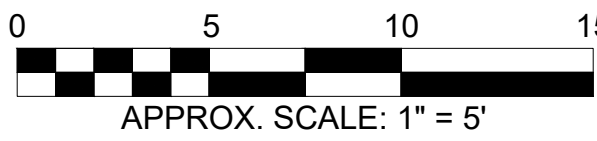
SCALE:	AS NOTED	REVISION DATE	REVISION DATE
DATE:	10/29/2025		
DRAWN BY:	MAW		
APPROVED BY:	DAB		

GARVIN BOWARD BEITKO ENGINEERING, INC.		180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440	
BUILT ON REPUTATION		PROPOSED MSE RETAINING WALL NO. 2 NEW QUAKER VALLEY HIGH SCHOOL CAMPUS	
FOR:	PHILLIPS AND ASSOCIATES, INC.	PROJECT NUMBER:	DRAWING NUMBER:
		16123A	G-MSE-2C



NOTES:

- SUBSURFACE CONDITIONS DEPICTED ON THIS DRAWING ARE REPRESENTATIVE ONLY AT BORING LOCATIONS. CONDITIONS BETWEEN BORINGS ARE ESTIMATED BASED ON INTERPOLATION BETWEEN THE BORINGS, EXTRAPOLATION BEYOND THE BORINGS AND PROJECTIONS ALONG CONTOUR LINES. ACTUAL SUBSURFACE CONDITIONS WILL VARY FROM THOSE HEREON SHOWN.
- LEVELING PAD MATERIAL SHALL CONSIST OF PROPERLY COMPACTED CRUSHED LIMESTONE MEETING GRADATION REQUIREMENTS FOR PENNDOT NO. 2A AND MEET DURABILITY REQUIREMENTS FOR PENNDOT TYPE C COARSE AGGREGATE. SEE DETAIL D.
- ALL BLOCK COURSES SHALL BE THOROUGHLY CLEANED/SWEPT PRIOR TO INSTALLATION OF NEXT COURSE TO ENSURE NO STONES/PARTICLES ARE TRAPPED BETWEEN COURSES.
- CONTRACTOR SHALL PROVIDE SHORING AND BRACING FOR TEMPORARY CUT SLOPES, AS NECESSARY, DURING CONSTRUCTION.
- STRUCTURES, FENCES, AND SITE APPURTENANCES ADJACENT TO THE CONSTRUCTION AREA MUST BE PROTECTED DURING CONSTRUCTION. IF STRUCTURES AND/OR SITE ELEMENTS BECOME DISTRESSED OR DAMAGED, THE CONTRACTOR MUST REPAIR ANY DAMAGED OR DISTRESSED STRUCTURES TO THE SATISFACTION OF THE OWNER AND AT NO COST TO THE OWNER.
- THESE DRAWINGS SHOULD ONLY BE USED IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS BY GARVIN BOWARD BEITKO ENGINEERING, INC. AS SHOWN ON DRAWINGS G-MSE-1 THROUGH G-MSE-3.
- SEE DRAWING G-MSE-3 FOR STICK LOG LEGEND/KEY.
- ALL DRAINS SHALL HAVE A MINIMUM 2% FALL.



HDPE LINER DETAIL
NOT TO SCALE

GARVIN BOWARD BEITKO	SCALE:	AS NOTED	REVISION DATE	REVISION DATE	GARVIN BOWARD BEITKO ENGINEERING, INC. <i>BUILT ON REPUTATION</i>	180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440			
	DATE:	10/29/2025							
	DRAWN BY:	MAW			PROPOSED MSE RETAINING WALL NO. 2 NEW QUAKER VALLEY HIGH SCHOOL CAMPUS				
	APPROVED BY:	DAB							
				FOR:	PHILLIPS AND ASSOCIATES, INC.	PROJECT NUMBER:	16123A	DRAWING NUMBER:	G-MSE-2D

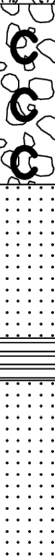
TEST BORING RECORDS



Test Boring Record

B-85

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1	
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/21/23		Water Level During Drilling:	
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/21/23		Water Level Before Coring:	
Drilling Rig: Diedrich D-50 Track Mount		Weather: Cloudy, 69 Degrees		Water Level Upon Completion:	
Drilling Method: 3 1/4-inch HSA		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:	

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1102'		TOPSOIL Brown randomly oriented SANDSTONE FRAGMENTS (GP), few silt, very loose to medium dense, moist	0.3	S-1	67	1-1-1 (2)				
1097'		(COLLUVIAL) Brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, dense, moist	5.0	S-2	100	20-16-17 (33)				
1092'		(RESIDUAL) Brown-gray DECOMPOSED SHALE sampled as shale fragments, few silt, trace clay, medium dense, dry	9.0	S-3	100	16-23-17 (40)				
1087'		(RESIDUAL) Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, dense to very dense, dry	10.1	S-4	100	20-12-27 (39)				
1082'		(RESIDUAL) Boring Terminated at 15.1 feet Boring collapsed at 13.2' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	15	S-6	100	500/1'				
1077'			20							
1072'			25							
1067'			30							
1062'			35							



Test Boring Record

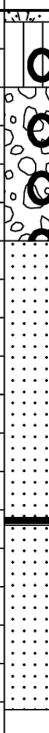
B-86

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1							
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/21/23		Water Level During Drilling:							
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/21/23		Water Level Before Coring:							
Drilling Rig: Diedrich D-50 Track Mount		Weather: Partly sunny, 69 Degrees		Water Level Upon Completion:							
Drilling Method: 3 1/4-inch HSA		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:							
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit	
1086'		TOPSOIL	0.4'	S-1	100	1-1-1 (2)					
		Brown sandy SILT (ML), few clay, very soft, moist									
		(COLLUVIAL)									
		Brown and gray randomly oriented SANDSTONE FRAGMENTS (GP), some sand, medium dense, moist	3.0	S-2	100	18-19-17 (36)					
1081'		(COLLUVIAL)									
		Brown DECOMPOSED SANDSTONE sampled as sandstone fragments (GP), few sand, medium dense, dry to moist	6.0	S-3	100	12-11-11 (22)					
		-moist from 6.0' to 7.5'									
		(COLLUVIAL)									
1076'		Brown DECOMPOSED SANDSTONE, few sand, very dense, dry to moist	9.0	S-4	100	41-50/0.4'					
		(RESIDUAL)									
	Boring Terminated at 9.9 feet Boring collapsed at 12.6' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.										
1071'			15								
1066'			20								
1061'			25								
1056'			30								
1051'			35								



Test Boring Record

B-87

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1							
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/21/23		Water Level During Drilling:							
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/21/23		Water Level Before Coring:							
Drilling Rig: Diedrich D-50 Track Mount		Weather: Cloudy, 68 Degrees		Water Level Upon Completion:							
Drilling Method: 3 1/4-inch HSA		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:							
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit	
1081'		TOPSOIL	0.3	S-1	67	1-1-1 (2)					
		Brown clayey SILT (ML), some sand, very soft, moist	2.0								
		Yellow-brown SANDSTONE FRAGMENTS (GP), some sand, trace silt, medium dense, moist		S-2	100	14-11-10 (21)					
		(COLLUVIAL)									
1076		Orange-brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium dense to dense, dry	6.0	S-3	100	9-14-19 (33)					
1071				10	S-4	100	24-20-23 (43)				
1066			(POSSIBLE COLLUVIAL)	13.2	S-5	100	6-3-12 (15)				
			Black DECOMPOSED carbonaceous SHALE sampled as carbonaceous shale fragments, loose, dry	13.4							
		(POSSIBLE COLLUVIAL)									
		Brown and orange-brown DECOMPOSED medium to coarse-grained SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry, some carbonaceous inclusions		S-6	100	36-16-9 (25)					
		(RESIDUAL)									
1061		Boring Terminated at 18.2 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	20	S-7	100	50/0.2'					
1056			25								
1051			30								
1046			35								



Test Boring Record

B-88

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1							
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/21/23		Water Level During Drilling:							
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/21/23		Water Level Before Coring:							
Drilling Rig: Diedrich D-50 Track Mount		Weather: Cloudy, 76 Degrees		Water Level Upon Completion:							
Drilling Method: 3 1/4-inch HSA		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:							
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit	
1089'		TOPSOIL	0.3'	S-1	67	1-1-1 (2)					
		Brown SANDSTONE FRAGMENTS (GP), few sand, trace clay, very loose, moist									
		(COLLUVIAL)	3.0	S-2	100	8-15-11 (26)					
1084'		Brown SANDSTONE FRAGMENTS (GP), few to little sand, medium dense, dry		5	S-3	100	6-6-9 (15)				
		(RESIDUAL)	9.0	S-4	100	50/0.3'					
1079'		Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry	10								
		(RESIDUAL)									
1074'		Boring Terminated at 9.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.									
1069'			15								
1064'			20								
1059'			25								
1054'			30								
			35								



Test Boring Record

SB-19

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 2							
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/13/23		Water Level During Drilling:							
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/13/23		Water Level Before Coring:							
Drilling Rig: Diedrich D-50 Track Mount		Weather: 70's Partly Sunny		Water Level Upon Completion: 25.8							
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:							
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit	
1122'		TOPSOIL	0.3'	S-1	73	2-5-4 (9)					
		FILL: sampled as orange-brown rock fragments (shale, sandstone), few gravel, trace clay, loose, moist (FILL)	3.0'	S-2	100	16-15-14 (29)			8.6		
1117'		Brown SAND (SM), little silt, little gravel (sandstone fragments), medium dense, moist -moist from 3.0' to 7.5'	5'	S-3	100	10-8-8 (16)			21.53		9.1
		(RESIDUAL)	9.0'	S-4	100	50/0.3'					
1112'		Brown micaceous DECOMPOSED SANDSTONE: sampled as sandstone fragments, few sand, trace silt, medium to very dense, dry (RESIDUAL)	12.4'	S-5	100	50/0.4'					
1107'		Brown fine- to medium-grained micaceous SANDSTONE, moderately weathered, thickly laminated to medium bedded, very broken to massive, medium hard to hard, few soft seams	15'	R-1	81 (0)						
		-MOHs 7.5 at 16.5'		R-2	100 (0)						
1102'		-very water stained, medium to coarse-grained, thinly bedded, massive, hard from 20.0' to 30.8'	20'	R-3	96 (54)						
1097'		-MOHs 7.5 at 25'	25'	R-4	92 (38)						
1092'		-MOHs 6.5 at 32'	30'								
1087'		Brown and gray fine- to medium-grained SANDSTONE and SHALE, moderately weathered, thinly laminated to thinly bedded, very broken to moderately broken, medium hard, some	32.7'	R-5	94 (12)						
			35'								

(Continued Next Page)



Test Boring Record

SB-19

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 2 of 2						
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/13/23		Water Level During Drilling:						
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/13/23		Water Level Before Coring:						
Drilling Rig: Diedrich D-50 Track Mount		Weather: 70% Partly Sunny		Water Level Upon Completion: 25.6						
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:						
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		carbonaceous laminations, possible pyrite -MOHs 5.5 at 36' Boring Terminated at 36.0 feet Boring Collapsed at 22.7' after 24 Hours		R-6	100 (0)					
1082			40							
1077			45							
1072			50							
1067			55							
1062			60							
1057			65							
1052			70							



Test Boring Record

SB-20

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 2						
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/13/23		Water Level During Drilling:						
Drilled By: W. Ewing (Test Boring Services, Inc.)		Completion Date: 7/13/23		Water Level Before Coring:						
Drilling Rig: Acker Rebel Track Mounted Rig		Weather: 80% Sunny		Water Level Upon Completion:						
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: C. Ledney		Water Level After 24 Hours:						
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1116.8'		TOPSOIL	0.4'	S-1	67	1-1-2 (3)				
		Yellow-brown SAND (SP), little angular sandstone fragments, very loose to firm, moist								
		(RESIDUAL)								
		Brown-orange-gray DECOMPOSED SANDSTONE (GP), sampled as sandstone fragments, little sand, loose to very dense, moist	7.0	S-3	100		8-5-6 (11)			
		(RESIDUAL)								
		Gray medium-grained SANDSTONE, moderately weathered, thinly bedded, moderately broken, medium hard to hard, iron stained	12.1	S-5	100		50/0.1'			
		-MOHs 7.5 at 13'								
		Light gray CLAYSTONE, slightly weathered, medium bedded, very soft	15.0	R-1			76 (0)			
		-MOHs <2 at 16'								
		-lost water return at 17.0'								
	Brown-gray SANDSTONE, medium-grained, micaceous, moderately broken, iron stained, carbonaceous streaks, hard	17.5	R-2			66 (0)				
	-MOHs 7.5 at 19'									
		Dark gray sandy CLAYSTONE, moderately weathered, thinly bedded, very soft	22.3	R-3		100 (26)				
		Gray medium-grained SANDSTONE, slightly weathered, iron stained, slightly broken, soft to hard	22.7							
		-MOHs 2.5 at 23'								
		-MOHs 7.5 at 24'								
		Gray sandy SHALE, slightly weathered, thinly bedded, iron stained, slightly broken, soft to medium hard	25.2	R-4		100 (8)				
		-MOHs <2 at 25.5'								
		Gray medium-grained SANDSTONE, slightly weathered, thinly bedded, slightly broken, soft to medium hard	26.4							
		-MOHs 5.5 at 27'								
		-iron stained vertical fracture from 28.3' to 28.5'								
		Medium gray SILTSTONE, slightly to moderately weathered, iron stained, vertically fractured, slightly broken, medium hard	28.4	R-5		(20)				
		-MOHs 4.5 at 29'								
		Gray medium-grained SANDSTONE, slightly weathered to fresh, micaceous, carbonaceous laminations, sub-vertical fracture, moderately broken, hard	30.0							
		-MOHs 8.5 at 31'								
			35							

TEST BORING RECORDS



Test Boring Record

SB-21

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1	
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/13/23		Water Level During Drilling:	
Drilled By: W. Ewing (Test Boring Services, Inc.)		Completion Date: 7/13/23		Water Level Before Coring:	
Drilling Rig: Acker Rebel Track Mounted Rig		Weather: 80's, Sunny		Water Level Upon Completion: 3.2'	
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: C. Ledney		Water Level After 24 Hours: 2.3'	

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1107.1'		TOPSOIL	0.4'	S-1	67	1-1-1 (2)				
		Brown-orange medium-grained SAND (SM), little silt, trace sandstone fragments, very loose, moist (COLLUVIAL)	3.0	S-2	100	4-3-5 (8)				
1102		Yellow-brown SAND (SP), some sandstone fragments, loose, moist (COLLUVIAL)	6.0	S-3	100	18-12-9 (21)				
		Gray DECOMPOSED SANDSTONE, sampled as sandstone fragments (GP), little sand, medium dense, moist (COLLUVIAL)	10.0	S-4	100	20-35-50/0.4'				
1097		Gray DECOMPOSED SANDSTONE, little sand, very dense, moist (RESIDUAL)	12.4	S-5	100	50/0.4'				
		Gray medium-grained SANDSTONE, moderately weathered, thinly to medium bedded, micaceous, moderately broken, medium hard	15	R-1	100 (0)					
1092		-MOHs 4.5 at 13.3'	16.4	R-2	100 (0)					
		Gray CLAYSTONE, slightly weathered to fresh, medium bedded, very soft	18.0							
		-MOHs <2 at 17.5'	18.8							
		Gray sandy SHALE, slightly weathered, iron stained, thinly bedded, slightly broken, very soft to soft	19.4							
1087	Gray with dark gray streaked shaley SANDSTONE, slightly weathered, microlaminated, thinly to medium bedded, moderately broken, medium hard		20	R-3	100 (25)					
	-MOHs 5.5 at 27'									
	Boring Terminated at 21.0 feet									
1082			25							
1077			30							
1072			35							



Test Boring Record

SB-23

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1						
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/19/23		Water Level During Drilling:						
Drilled By: W. Ewing (Test Boring Services, Inc.)		Completion Date: 7/19/23		Water Level Before Coring:						
Drilling Rig: Acker Rebel Track Mounted Rig		Weather: 70's, Cloudy		Water Level Upon Completion: 15.9						
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: L. Barnes, E.I.T.		Water Level After 24 Hours:						
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103.3'		Brown clayey SILT (ML), trace fine sand, medium, moist		S-1	67	1-1-4 (5)				
		(RESIDUAL)	3.0							
		Gray and brown SANDSTONE FRAGMENTS (GP), some sand, little silt, medium dense, moist, micaceous		S-2	80	5-7-8 (15)				
		(RESIDUAL)	6.5							
		Gray and brown DECOMPOSED SANDSTONE, sampled as sandstone fragments, some sand, little silt, dense to very dense, moist, micaceous		S-3	80	7-30-10 (40)				
		(RESIDUAL)	9.4							
		Brown medium- to coarse-grained micaceous SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard -vertical fracture from 10.6' to 11.6' -MOHs 6.5 at 11'		S-4	100	50/0.4'				
			14.2	R-1	60 (0)					
		Gray and orange-brown SHALE, highly weathered, very soft -MOHs <2 at 15.5'								
			17.7	R-2	100 (10)					
		Gray and brown shaley fine- to medium-grained SANDSTONE, highly weathered, very broken to massive (generally very broken to moderately broken), very soft to hard (generally medium hard) -MOHs 6.5 at 16'								
		Boring Terminated at 19.4 feet								
			20							
			25							
			30							
			35							



Test Boring Record

SB-25

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1	
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/19/23		Water Level During Drilling:	
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/19/23		Water Level Before Coring:	
Drilling Rig: Diedrich D-50 Track Mount		Weather: Partly cloudy, 71 Degrees		Water Level Upon Completion: 16.9	
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: K. Thiry, P.G.		Water Level After 24 Hours:	

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103'		TOPSOIL Tan sandy SILT (ML), medium, dry	0.3'	S-1	87	1-3-4 (7)				
		(COLLUVIAL) Brown SANDSTONE FRAGMENTS (GP), some sand, loose to firm, dry	3.0	S-2	100	9-9-5 (14)				
1098			5	S-3	100	6-5-4 (9)				
		(COLLUVIAL) Brown DECOMPOSED SANDSTONE, LITTLE sand, very dense, dry	9.0	S-4	100	500.3'				
1093		(RESIDUAL) Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, very broken to massive, hard, few carbonaceous laminations	13.3	R-1	98 (40)					
1088			15	R-2	100 (0)					
		Gray INTERBEDDED fine-grained micaceous SANDSTONE and SHALE, slightly weathered, moderately broken to hard, some carbonaceous laminations								
		-lost drill water at 14' -MOHs 8.5 at 17.5'								
1083		Boring Terminated at 18.0 feet Offset Approx. 9' NE. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.	20							
1078			25							
1073			30							
1068			35							



Test Boring Record

SB-26

Project Number: 16123A		Project Name: Proposed QVSD High School		Sheet: 1 of 1						
Project Location: Edgeworth, Leet Twp., Leetsdale, PA		Start Date: 7/18/23		Water Level During Drilling:						
Drilled By: J. Powell (Test Boring Services, Inc.)		Completion Date: 7/19/23		Water Level Before Coring:						
Drilling Rig: Diedrich D-50 Track Mount		Weather: Cloudy, 69 Degrees		Water Level Upon Completion: 19.2'						
Drilling Method: 3 1/4 HSA & NQ2 Core		Logged By: K. Thiry/L. Barnes		Water Level After 24 Hours:						
Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RCD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1110'		Light brown SILT (ML), little sand, few rock fragments, trace roots, stiff, dry		S-1	87	1-4-8 (12)		4.4		
		(POSSIBLE COLLUVIAL/RESIDUAL)	3.0	S-2	100	13-12-13 (25)		4.4		
1105		Gray and brown SAND (SM), little silt, little to some gravel (sandstone fragments), medium dense, dry	5	S-3	100	10-9-7 (16)		5.2		
		(RESIDUAL)	9.0	S-4	38	32-50/0.3'				
1100		Gray to gray and brown DECOMPOSED SANDSTONE, sampled as sandstone fragments, few sand, few silt, very dense, dry	10	R-1	94 (48)					
		(RESIDUAL)								
		Brown and gray medium to coarse-grained SANDSTONE, slightly to moderately weathered, medium bedded, very broken to massive, hard	15	R-2	96 (44)					
1095		-MOHs >9 at 15'	16.5							
		Brown and gray fine to medium-grained micaceous SANDSTONE, slightly weathered, thinly laminated to very thinly bedded, very broken to massive, hard	20	R-3	100 (60)					
1090		-MOHs >9 at 21'	22.0							
	Gray INTERBEDDED fine-grained SANDSTONE and SHALE, slightly weathered, thinly to thickly laminated, moderately broken to massive, hard, few carbonaceous laminations	25								
1085	-MOHs 8.5 at 24'									
	Boring Terminated at 24.8 feet									
	Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.									
1080			30							
1075			35							

NOTES:

- THE SUBSURFACE CONDITIONS ENCOUNTERED ARE SUMMARIZED ON THE TEST BORING RECORDS. THE TEST BORING RECORDS REPRESENT OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE TIME OF DRILLING BASED ON THE DRILLER'S FIELD LOGS AND VISUAL CLASSIFICATION OF THE FIELD SAMPLES BY AN ENGINEER OR GEOLOGIST IN GENERAL ACCORDANCE WITH ASTM D 2488. THE LINES DESIGNATING THE INTERFACES BETWEEN VARIOUS STRATA ON THE TEST BORING RECORDS REPRESENT THE APPROXIMATE INTERFACE LOCATIONS; THE ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL. GROUNDWATER LEVELS SHOWN ON THE TEST BORING RECORDS REPRESENT THE CONDITIONS ONLY AT THE TIME OF OUR EXPLORATION.
- THE GROUND SURFACE ELEVATIONS SHOWN ON THE TEST BORING RECORDS SHOULD BE CONSIDERED APPROXIMATE AS TEST BORINGS WERE SLIGHTLY SHIFTED IN THE FIELD TO AVOID EXISTING SITE FEATURES.

GARVIN

BOWARD BEITKO

SCALE: AS NOTED
DATE: 10/29/2025
DRAWN BY: MAW
APPROVED BY: DAB

REVISION DATE
REVISION DATE
REVISION DATE
REVISION DATE

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION

PROPOSED MSE RETAINING WALL NO. 2
NEW QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS AND ASSOCIATES, INC.

PROJECT NUMBER: 16123A

DRAWING NUMBER: G-MSE-2G

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

1140
1120
1100
1080
1060
1040

Support Name	Color	Type	Selected Manufacturer	Force Application	Material Dependent	Input Type	Adhesion (psf)	Friction Angle (°)	Shear Strength Model	Force Orientation	Anchorage	Strip Coverage (%)	Allowable Tensile Strength (lbs/ft)	Connection Strength Input	Connection Strength (lbs/ft)
Mirafi SXT	Blue	Geosynthetic	TenCate Miragrid SXT	Active (Method A)	No	Friction Angle & Adhesion	104	40	Linear	Parallel to Reinforcement	Slope Face	100	1884.16	Constant	40
Mirafi TXT	Purple	Geosynthetic	TenCate Miragrid TXT	Active (Method A)	No	Friction Angle & Adhesion	104	40	Linear	Parallel to Reinforcement	Slope Face	100	2364.81	Constant	40
Mirafi SXT	Green	Geosynthetic	TenCate Miragrid SXT	Active (Method A)	No	Friction Angle &	5	40	Linear	Parallel to Reinforcement	Slope Face	100	2966.31	Constant	40

16123A NEW QUAKER VALLEY HIGH SCHOOL CAMPUS
MSE WALL NO. 2
SLOPE STABILITY - CROSS-SECTION 2A-2A

Method Name	Min FS
Bishop simplified	1.8

Material Name	Color	Unit Weights (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)	Water Surface	Ru Value
Colluvium	Red	125	Mohr-Coulomb	0	28	None	0
Residual	Yellow	130	Mohr-Coulomb	100	30	None	0
Bedrock	Grey	145	Mohr-Coulomb	500	40	None	0
Block	Dark Blue	120	Mohr-Coulomb	200	34	None	0
2A	Light Blue	140	Mohr-Coulomb	0	34	None	0
Sand	Orange	135	Mohr-Coulomb	50	33	None	0
#57	Purple	100	Mohr-Coulomb	0	36	None	0
Clay Eng. Fill	Green	135	Mohr-Coulomb	0	20	None	0



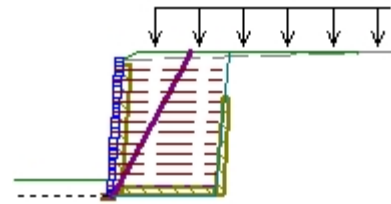
Project: 16123A - QVSD High School Campus

Site: Leet Township

Date: 10/8/2025

Section Summary Report

Section #1 at Station 0.00
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	17.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	17.31 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.79 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

7XT - Miragrid 7XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	12.31	Bearing Pressure	3506.45 lb/ft²
Overturning	3.10	Max Eccentricity	1.81 ft
Base Sliding	1.74		
Crest Toppling	0.00		
Internal Sliding	1.60		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
12	1,092.00	5XT	14.00	76	1,999	26.32	1,774	23.35	1,197	15.75
11	1,090.67	5XT	14.00	138	1,999	14.51	3,114	22.61	1,374	9.98
10	1,089.33	5XT	14.00	302	1,999	6.61	4,690	15.51	1,552	5.13
9	1,088.00	5XT	14.00	372	1,999	5.38	6,501	17.50	1,730	4.66

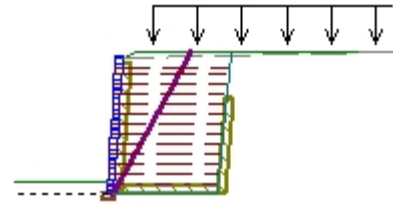


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
8	1,086.67	5XT	14.00	441	1,999	4.54	8,549	19.40	1,907	4.33
7	1,085.33	5XT	14.00	510	1,999	3.92	10,832	21.25	2,085	4.09
6	1,084.00	5XT	14.00	579	1,999	3.45	13,352	23.06	2,251	3.89
5	1,082.67	5XT	14.00	648	1,999	3.08	16,107	24.85	2,315	3.57
4	1,081.33	5XT	14.00	717	1,999	2.79	19,098	26.62	2,379	3.32
3	1,080.00	5XT	14.00	787	1,999	2.54	22,326	28.39	2,443	3.11
2	1,078.67	5XT	14.00	856	1,999	2.34	25,789	30.14	2,507	2.93
1	1,077.33	7XT	14.00	1,413	2,509	1.78	29,488	20.87	2,566	1.82

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	3	1.53	Pass
1	7	1	1.58	Pass
6	7	2	1.61	Pass
8	8	5	1.61	Pass
10	8	4	1.65	Pass
10	8	7	1.71	Pass
10	7	6	1.75	Pass
10	7	9	1.83	Pass
7	8	8	1.88	Pass
10	6	11	1.98	Pass

Section #2 at Station 9.75
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	18.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	18.00 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.67 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT				Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate			
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	13.10	Bearing Pressure	3534.50 lb/ft²
Overturning	3.33	Max Eccentricity	1.77 ft
Base Sliding	1.81		
Crest Toppling	0.00		
Internal Sliding	1.65		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
13	1,092.67	5XT	15.00	54	1,999	37.07	2,018	37.43	1,200	22.25
12	1,092.00	5XT	15.00	84	1,999	23.76	2,724	32.38	1,289	15.32
11	1,090.67	5XT	15.00	178	1,999	11.26	4,312	24.29	1,466	8.26
10	1,089.33	5XT	15.00	337	1,999	5.92	6,135	18.18	1,644	4.87

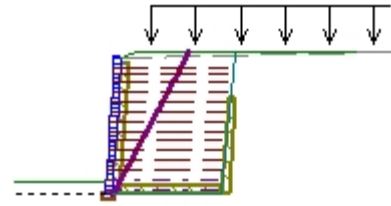


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
9	1,088.00	5XT	15.00	406	1,999	4.92	8,195	20.16	1,822	4.48
8	1,086.67	5XT	15.00	475	1,999	4.20	10,491	22.06	1,999	4.21
7	1,085.33	5XT	15.00	544	1,999	3.67	13,023	23.92	2,177	4.00
6	1,084.00	5XT	15.00	614	1,999	3.26	15,790	25.74	2,284	3.72
5	1,082.67	5XT	15.00	683	1,999	2.93	18,794	27.54	2,348	3.44
4	1,081.33	5XT	15.00	752	1,999	2.66	22,033	29.32	2,412	3.21
3	1,080.00	5XT	15.00	821	1,999	2.44	25,508	31.09	2,476	3.02
2	1,078.67	5XT	15.00	890	1,999	2.25	29,220	32.85	2,540	2.85
1	1,077.33	7XT	15.00	1,464	2,509	1.71	33,167	22.66	2,606	1.78

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	7	3	1.54	Pass
1	9	1	1.60	Pass
10	7	2	1.61	Pass
10	7	5	1.62	Pass
6	7	4	1.67	Pass
10	6	7	1.72	Pass
8	7	6	1.76	Pass
7	7	9	1.83	Pass
10	7	8	1.87	Pass
7	6	11	1.97	Pass

Section #3 at Station 15.00
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	19.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	18.66 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.73 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	14.05	Bearing Pressure	3571.33 lb/ft²
Overturning	3.56	Max Eccentricity	1.74 ft
Base Sliding	1.88		
Crest Toppling	0.00		
Internal Sliding	1.64		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
14	1,092.67	5XT	16.00	53	1,999	37.56	2,235	42.00	1,198	22.52
13	1,092.00	5XT	16.00	84	1,999	23.91	3,004	35.94	1,287	15.40
12	1,090.67	5XT	16.00	176	1,999	11.33	4,720	26.75	1,465	8.30
11	1,089.33	5XT	16.00	336	1,999	5.94	6,671	19.84	1,643	4.89

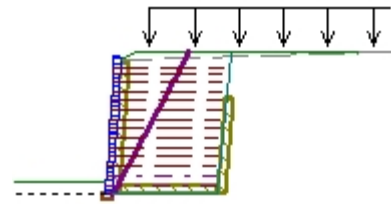


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
10	1,088.00	5XT	16.00	405	1,999	4.93	8,858	21.86	1,820	4.49
9	1,086.67	5XT	16.00	474	1,999	4.22	11,281	23.80	1,998	4.22
8	1,085.33	5XT	16.00	543	1,999	3.68	13,940	25.68	2,176	4.01
7	1,084.00	5XT	16.00	612	1,999	3.27	16,834	27.52	2,283	3.73
6	1,082.67	5XT	16.00	681	1,999	2.94	19,965	29.33	2,347	3.45
5	1,081.33	5XT	16.00	750	1,999	2.67	23,332	31.13	2,411	3.22
4	1,080.00	5XT	16.00	818	1,999	2.44	26,934	32.91	2,475	3.02
3	1,078.67	5XT	16.00	887	1,999	2.25	30,773	34.68	2,539	2.86
2	1,077.33	7XT	16.00	956	2,509	2.62	34,847	36.44	2,605	2.72
1	1,076.00	7XT	16.00	1,025	2,509	2.45	39,157	38.20	2,682	2.62

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	6	2	1.55	Pass
10	6	4	1.60	Pass
6	6	3	1.68	Pass
6	6	6	1.69	Pass
8	6	5	1.71	Pass
1	8	1	1.73	Pass
9	6	8	1.79	Pass
10	6	7	1.82	Pass
4	6	10	1.91	Pass
6	6	9	1.94	Pass

Section #4 at Station 42.75
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	19.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	19.20 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.80 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External	Value	Internal	Value	Facing	Value
FSSl Base Sliding	1.50	FSSl Internal Sliding	1.50	FSSc Connection Strength	1.50
FSbc Bearing Capacity	2.00	FSpO Pullout	1.50	FSsc Facing Shear	1.50
FSct Crest Toppling	1.50	FSto Tensile Overstress	1.50		
FSot Overturning	2.00				

Reinforcements

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	13.25	Bearing Pressure	3742.27 lb/ft²
Overturning	3.36	Max Eccentricity	1.87 ft
Base Sliding	1.82		
Crest Toppling	0.00		
Internal Sliding	1.65		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
14	1,092.67	5XT	16.00	45	1,999	44.15	2,016	44.53	1,182	26.10
13	1,092.00	5XT	16.00	79	1,999	25.46	2,750	35.03	1,270	16.18
12	1,090.67	5XT	16.00	169	1,999	11.86	4,395	26.07	1,448	8.59
11	1,089.33	5XT	16.00	329	1,999	6.07	6,276	19.07	1,626	4.94

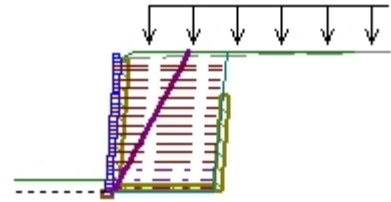


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
10	1,088.00	5XT	16.00	398	1,999	5.03	8,392	21.10	1,803	4.53
9	1,086.67	5XT	16.00	467	1,999	4.28	10,745	23.03	1,981	4.25
8	1,085.33	5XT	16.00	535	1,999	3.73	13,334	24.91	2,159	4.03
7	1,084.00	5XT	16.00	604	1,999	3.31	16,158	26.75	2,277	3.77
6	1,082.67	5XT	16.00	673	1,999	2.97	19,219	28.57	2,341	3.48
5	1,081.33	5XT	16.00	742	1,999	2.70	22,515	30.36	2,405	3.24
4	1,080.00	5XT	16.00	810	1,999	2.47	26,047	32.15	2,469	3.05
3	1,078.67	5XT	16.00	879	1,999	2.27	29,816	33.92	2,533	2.88
2	1,077.33	7XT	16.00	948	2,509	2.65	33,820	35.68	2,598	2.74
1	1,076.00	7XT	16.00	1,551	2,509	1.62	38,060	24.55	2,675	1.72

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
9	6	3	1.56	Pass
1	9	1	1.59	Pass
8	7	5	1.60	Pass
8	7	2	1.61	Pass
10	7	4	1.66	Pass
10	7	7	1.70	Pass
10	6	6	1.73	Pass
10	6	9	1.80	Pass
8	7	8	1.83	Pass
7	7	11	1.93	Pass

Section #5 at Station 70.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	20.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	19.74 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.86 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT				Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate			
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	12.47	Bearing Pressure	3923.45 lb/ft²
Overturning	3.18	Max Eccentricity	2.00 ft
Base Sliding	1.76		
Crest Toppling	0.00		
Internal Sliding	1.57		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
15	1,092.67	5XT	16.00	38	1,999	52.65	1,807	47.60	1,164	30.67
14	1,092.00	5XT	16.00	73	1,999	27.22	2,506	34.13	1,253	17.07
13	1,090.67	5XT	16.00	161	1,999	12.43	4,081	25.37	1,431	8.89
12	1,089.33	5XT	16.00	322	1,999	6.21	5,892	18.30	1,609	5.00

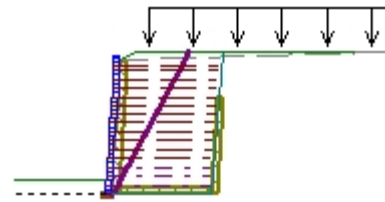


Internal Static		Rein	Length	Load	Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation									
11	1,088.00	5XT	16.00	391	1,999	5.12	7,938	20.33	1,786	4.57
10	1,086.67	5XT	16.00	459	1,999	4.35	10,220	22.26	1,964	4.28
9	1,085.33	5XT	16.00	528	1,999	3.79	12,739	24.14	2,142	4.06
8	1,084.00	5XT	16.00	596	1,999	3.35	15,493	25.98	2,271	3.81
7	1,082.67	5XT	16.00	665	1,999	3.01	18,483	27.79	2,335	3.51
6	1,081.33	5XT	16.00	734	1,999	2.72	21,709	29.59	2,399	3.27
5	1,080.00	5XT	16.00	802	1,999	2.49	25,171	31.38	2,463	3.07
4	1,078.67	5XT	16.00	871	1,999	2.30	28,869	33.15	2,527	2.90
3	1,077.33	7XT	16.00	940	2,509	2.67	32,803	34.92	2,591	2.76
2	1,076.00	7XT	16.00	1,008	2,509	2.49	36,973	36.68	2,667	2.65
1	1,074.67	7XT	16.00	1,077	2,509	2.33	41,379	38.43	2,744	2.55

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	6	2	1.52	Pass
7	7	4	1.57	Pass
10	7	3	1.61	Pass
9	7	6	1.62	Pass
1	7	1	1.65	Pass
8	6	5	1.67	Pass
8	6	8	1.71	Pass
10	6	7	1.74	Pass
7	5	10	1.82	Pass
9	7	9	1.84	Pass

Section #6 at Station 98.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	21.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	20.28 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.92 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	11.73	Bearing Pressure	4116.09 lb/ft²
Overturning	3.02	Max Eccentricity	2.14 ft
Base Sliding	1.70		
Crest Toppling	0.00		
Internal Sliding	1.58		

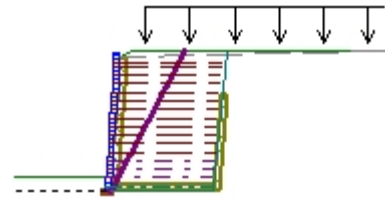
Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
15	1,092.67	5XT	16.00	31	1,999	63.80	1,610	51.40	1,148	36.62
14	1,092.00	5XT	16.00	68	1,999	29.22	2,274	33.24	1,236	18.07
13	1,090.67	5XT	16.00	153	1,999	13.04	3,779	24.65	1,414	9.23
12	1,089.33	5XT	16.00	315	1,999	6.35	5,519	17.53	1,592	5.06

Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
11	1,088.00	5XT	16.00	383	1,999	5.22	7,495	19.55	1,769	4.62
10	1,086.67	5XT	16.00	452	1,999	4.42	9,707	21.49	1,947	4.31
9	1,085.33	5XT	16.00	520	1,999	3.84	12,156	23.36	2,125	4.08
8	1,084.00	5XT	16.00	589	1,999	3.39	14,840	25.20	2,265	3.85
7	1,082.67	5XT	16.00	657	1,999	3.04	17,760	27.02	2,329	3.54
6	1,081.33	5XT	16.00	726	1,999	2.75	20,915	28.82	2,393	3.30
5	1,080.00	5XT	16.00	794	1,999	2.52	24,307	30.60	2,457	3.09
4	1,078.67	5XT	16.00	863	1,999	2.32	27,935	32.38	2,521	2.92
3	1,077.33	7XT	16.00	931	2,509	2.69	31,799	34.14	2,583	2.77
2	1,076.00	7XT	16.00	1,000	2,509	2.51	35,898	35.90	2,660	2.66
1	1,074.67	7XT	16.00	1,628	2,509	1.54	40,234	24.71	2,737	1.68

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
9	8	3	1.52	Pass
1	8	1	1.56	Pass
9	7	2	1.57	Pass
8	7	5	1.58	Pass
10	7	4	1.63	Pass
10	7	7	1.64	Pass
10	6	6	1.68	Pass
10	6	9	1.73	Pass
8	7	8	1.76	Pass
8	5	11	1.84	Pass

Section #7 at Station 126.00
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	21.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	20.81 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.98 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

8XT - Miragrid 8XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	acs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	12.70	Bearing Pressure	4109.77 lb/ft²
Overturning	3.22	Max Eccentricity	2.11 ft
Base Sliding	1.76		
Crest Toppling	0.00		

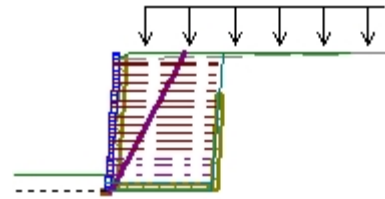
External Static		FS
Internal Sliding		1.59

Internal Static		Rein	Length	Load	Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation									
16	1,092.67	5XT	17.00	25	1,999	78.90	1,682	66.38	1,131	44.62
15	1,092.00	5XT	17.00	63	1,999	31.54	2,404	37.92	1,219	19.24
14	1,090.67	5XT	17.00	146	1,999	13.71	4,025	27.61	1,397	9.58
13	1,089.33	5XT	17.00	308	1,999	6.50	5,882	19.11	1,575	5.12
12	1,088.00	5XT	17.00	376	1,999	5.31	7,975	21.20	1,752	4.66
11	1,086.67	5XT	17.00	445	1,999	4.50	10,304	23.18	1,930	4.34
10	1,085.33	5XT	17.00	513	1,999	3.90	12,869	25.09	2,108	4.11
9	1,084.00	5XT	17.00	581	1,999	3.44	15,670	26.96	2,259	3.89
8	1,082.67	5XT	17.00	650	1,999	3.08	18,706	28.79	2,323	3.57
7	1,081.33	5XT	17.00	718	1,999	2.78	21,979	30.61	2,387	3.32
6	1,080.00	5XT	17.00	787	1,999	2.54	25,488	32.41	2,451	3.12
5	1,078.67	5XT	17.00	855	1,999	2.34	29,232	34.19	2,515	2.94
4	1,077.33	7XT	17.00	923	2,509	2.72	33,213	35.97	2,576	2.79
3	1,076.00	7XT	17.00	992	2,509	2.53	37,429	37.74	2,653	2.67
2	1,074.67	7XT	17.00	1,060	2,509	2.37	41,881	39.51	2,729	2.57
1	1,073.33	8XT	17.00	1,128	3,239	2.87	46,569	41.27	3,107	2.75

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	2	1.51	Pass
8	6	4	1.58	Pass
10	6	3	1.61	Pass
10	6	6	1.63	Pass
10	7	5	1.66	Pass
1	7	1	1.68	Pass
9	7	8	1.69	Pass
8	6	7	1.74	Pass
8	6	10	1.79	Pass
10	6	9	1.82	Pass

Section #8 at Station 153.75
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	22.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	21.35 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	2.55 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

8XT - Miragrid 8XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	acs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	12.52	Bearing Pressure	4299.24 lb/ft²
Overturning	3.06	Max Eccentricity	2.24 ft
Base Sliding	1.70		
Crest Toppling	0.00		



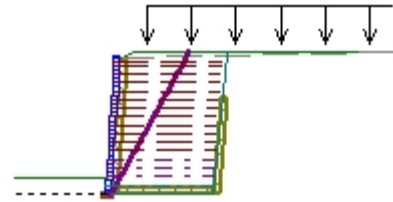
External Static	FS
Internal Sliding	1.60

Internal Static Layer	Elevation	Rein	Length	Load	Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
16	1,092.67	5XT	17.00	20	1,999	99.97	1,489	74.49	1,114	55.69
15	1,092.00	5XT	17.00	58	1,999	34.23	2,176	37.27	1,202	20.59
14	1,090.67	5XT	17.00	138	1,999	14.45	3,727	26.94	1,380	9.98
13	1,089.33	5XT	17.00	301	1,999	6.65	5,514	18.33	1,558	5.18
12	1,088.00	5XT	17.00	369	1,999	5.42	7,537	20.42	1,735	4.70
11	1,086.67	5XT	17.00	437	1,999	4.57	9,796	22.40	1,913	4.37
10	1,085.33	5XT	17.00	506	1,999	3.95	12,290	24.31	2,091	4.14
9	1,084.00	5XT	17.00	574	1,999	3.48	15,021	26.17	2,253	3.93
8	1,082.67	5XT	17.00	642	1,999	3.11	17,987	28.01	2,317	3.61
7	1,081.33	5XT	17.00	710	1,999	2.81	21,190	29.82	2,381	3.35
6	1,080.00	5XT	17.00	779	1,999	2.57	24,628	31.62	2,445	3.14
5	1,078.67	5XT	17.00	847	1,999	2.36	28,302	33.41	2,509	2.96
4	1,077.33	7XT	17.00	915	2,509	2.74	32,212	35.19	2,569	2.81
3	1,076.00	7XT	17.00	984	2,509	2.55	36,359	36.96	2,645	2.69
2	1,074.67	7XT	17.00	1,052	2,509	2.39	40,741	38.73	2,722	2.59
1	1,073.33	8XT	17.00	1,706	3,239	1.90	45,358	26.59	3,098	1.82

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	3	1.53	Pass
10	6	5	1.59	Pass
10	6	2	1.59	Pass
1	6	1	1.61	Pass
9	7	4	1.63	Pass
8	7	7	1.65	Pass
10	7	6	1.69	Pass
10	5	9	1.71	Pass
10	6	8	1.75	Pass
10	6	11	1.81	Pass

Section #9 at Station 158.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	21.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	21.33 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	2.50 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

8XT - Miragrid 8XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	acs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	13.04	Bearing Pressure	4190.79 lb/ft²
Overturning	3.22	Max Eccentricity	2.09 ft
Base Sliding	1.80		
Crest Toppling	0.00		



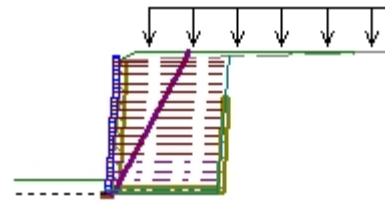
External Static		FS
Internal Sliding		1.60

Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
16	1,092.67	5XT	17.00	19	1,999	103.98	1,471	76.54	1,111	57.78
15	1,092.00	5XT	17.00	58	1,999	34.65	2,158	37.39	1,200	20.79
14	1,090.67	5XT	17.00	137	1,999	14.55	3,707	26.98	1,377	10.02
13	1,089.33	5XT	17.00	300	1,999	6.66	5,492	18.29	1,555	5.18
12	1,088.00	5XT	17.00	369	1,999	5.42	7,513	20.38	1,733	4.70
11	1,086.67	5XT	17.00	437	1,999	4.57	9,770	22.36	1,910	4.37
10	1,085.33	5XT	17.00	505	1,999	3.96	12,262	24.26	2,088	4.13
9	1,084.00	5XT	17.00	574	1,999	3.48	14,991	26.13	2,252	3.92
8	1,082.67	5XT	17.00	642	1,999	3.11	17,956	27.96	2,316	3.61
7	1,081.33	5XT	17.00	711	1,999	2.81	21,156	29.77	2,380	3.35
6	1,080.00	5XT	17.00	779	1,999	2.57	24,593	31.57	2,444	3.14
5	1,078.67	5XT	17.00	847	1,999	2.36	28,265	33.36	2,508	2.96
4	1,077.33	7XT	17.00	916	2,509	2.74	32,173	35.13	2,568	2.80
3	1,076.00	7XT	17.00	984	2,509	2.55	36,318	36.90	2,644	2.69
2	1,074.67	7XT	17.00	1,053	2,509	2.38	40,698	38.67	2,721	2.58
1	1,073.33	8XT	17.00	1,707	3,239	1.90	45,314	26.54	3,097	1.81

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	3	1.53	Pass
10	6	5	1.59	Pass
10	6	2	1.59	Pass
1	6	1	1.61	Pass
9	7	4	1.63	Pass
8	7	7	1.65	Pass
10	7	6	1.69	Pass
10	5	9	1.71	Pass
10	6	8	1.76	Pass
10	6	11	1.81	Pass

Section #10 at Station 171.00
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	21.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	20.18 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.91 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

8XT - Miragrid 8XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	acs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	13.47	Bearing Pressure	3916.03 lb/ft²
Overturning	3.39	Max Eccentricity	1.97 ft
Base Sliding	1.80		
Crest Toppling	0.00		



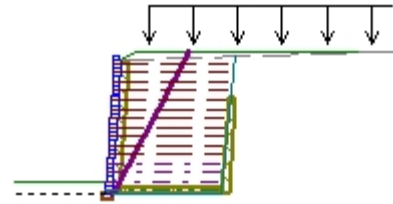
External Static		FS
Internal Sliding		1.63

Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
16	1,092.67	5XT	17.00	5	1,999	394.56	1,099	217.00	1,046	206.44
15	1,092.00	5XT	17.00	39	1,999	51.22	1,793	45.95	1,135	29.08
14	1,090.67	5XT	17.00	112	1,999	17.85	3,358	29.99	1,312	11.72
13	1,089.33	5XT	17.00	186	1,999	10.76	5,159	27.76	1,490	8.02
12	1,088.00	5XT	17.00	344	1,999	5.81	7,196	20.91	1,668	4.85
11	1,086.67	5XT	17.00	413	1,999	4.84	9,469	22.95	1,846	4.47
10	1,085.33	5XT	17.00	481	1,999	4.15	11,978	24.89	2,023	4.21
9	1,084.00	5XT	17.00	550	1,999	3.64	14,722	26.79	2,201	4.00
8	1,082.67	5XT	17.00	618	1,999	3.23	17,703	28.64	2,292	3.71
7	1,081.33	5XT	17.00	687	1,999	2.91	20,919	30.47	2,356	3.43
6	1,080.00	5XT	17.00	755	1,999	2.65	24,372	32.27	2,420	3.20
5	1,078.67	5XT	17.00	824	1,999	2.43	28,060	34.07	2,484	3.02
4	1,077.33	7XT	17.00	892	2,509	2.81	31,984	35.85	2,540	2.85
3	1,076.00	7XT	17.00	961	2,509	2.61	36,144	37.62	2,616	2.72
2	1,074.67	7XT	17.00	1,029	2,509	2.44	40,540	39.39	2,693	2.62
1	1,073.33	8XT	17.00	1,098	3,239	2.95	45,172	41.15	3,064	2.79

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	6	2	1.56	Pass
8	6	4	1.61	Pass
10	6	3	1.65	Pass
10	6	6	1.67	Pass
1	8	1	1.72	Pass
9	5	5	1.72	Pass
9	5	8	1.74	Pass
8	6	7	1.78	Pass
9	6	10	1.84	Pass
7	5	9	1.87	Pass

Section #11 at Station 175.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	20.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	20.00 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.94 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

8XT - Miragrid 8XT				Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate			
Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	acs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	14.17	Bearing Pressure	3801.42 lb/ft²
Overturning	3.58	Max Eccentricity	1.83 ft
Base Sliding	1.89		
Crest Toppling	0.00		



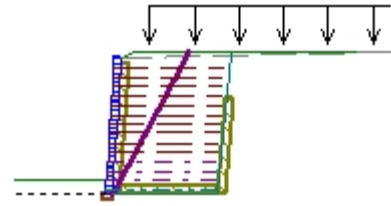
External Static	FS
Internal Sliding	1.64

Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
15	1,092.00	5XT	17.00	34	1,999	58.32	1,620	47.27	1,111	32.40
14	1,090.67	5XT	17.00	103	1,999	19.43	3,169	30.80	1,288	12.52
13	1,089.33	5XT	17.00	176	1,999	11.36	4,954	28.17	1,466	8.34
12	1,088.00	5XT	17.00	335	1,999	5.96	6,975	20.79	1,644	4.90
11	1,086.67	5XT	17.00	404	1,999	4.95	9,232	22.85	1,822	4.51
10	1,085.33	5XT	17.00	473	1,999	4.23	11,725	24.80	1,999	4.23
9	1,084.00	5XT	17.00	541	1,999	3.69	14,454	26.70	2,177	4.02
8	1,082.67	5XT	17.00	610	1,999	3.28	17,418	28.56	2,284	3.74
7	1,081.33	5XT	17.00	679	1,999	2.95	20,619	30.38	2,348	3.46
6	1,080.00	5XT	17.00	747	1,999	2.68	24,055	32.19	2,412	3.23
5	1,078.67	5XT	17.00	816	1,999	2.45	27,728	33.99	2,476	3.03
4	1,077.33	7XT	17.00	884	2,509	2.84	31,636	35.77	2,529	2.86
3	1,076.00	7XT	17.00	953	2,509	2.63	35,780	37.54	2,606	2.73
2	1,074.67	7XT	17.00	1,022	2,509	2.46	40,160	39.31	2,682	2.63
1	1,073.33	8XT	17.00	1,090	3,239	2.97	44,776	41.07	3,051	2.80

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	6	2	1.57	Pass
8	6	4	1.62	Pass
10	6	3	1.66	Pass
10	6	6	1.68	Pass
1	8	1	1.72	Pass
9	5	5	1.73	Pass
6	6	8	1.75	Pass
8	6	7	1.80	Pass
9	6	10	1.85	Pass
7	5	9	1.89	Pass

Section #12 at Station 193.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	19.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	19.33 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	2.08 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

8XT - Miragrid 8XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	acs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	13.52	Bearing Pressure	3763.34 lb/ft²
Overturning	3.37	Max Eccentricity	1.86 ft
Base Sliding	1.83		
Crest Toppling	0.00		



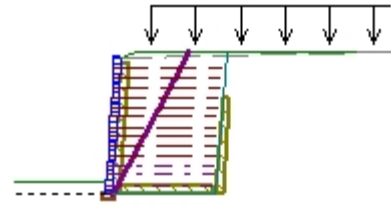
External Static		FS
Internal Sliding		1.60

Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
14	1,090.67	5XT	16.00	77	1,999	25.85	2,140	27.67	1,200	15.51
13	1,089.33	5XT	16.00	138	1,999	14.46	3,679	26.62	1,377	9.97
12	1,088.00	5XT	16.00	302	1,999	6.63	5,454	18.08	1,555	5.15
11	1,086.67	5XT	16.00	370	1,999	5.40	7,465	20.15	1,733	4.68
10	1,085.33	5XT	16.00	439	1,999	4.55	9,712	22.11	1,910	4.35
9	1,084.00	5XT	16.00	508	1,999	3.94	12,195	24.01	2,088	4.11
8	1,082.67	5XT	16.00	577	1,999	3.47	14,913	25.86	2,252	3.90
7	1,081.33	5XT	16.00	645	1,999	3.10	17,868	27.68	2,316	3.59
6	1,080.00	5XT	16.00	714	1,999	2.80	21,058	29.48	2,380	3.33
5	1,078.67	5XT	16.00	783	1,999	2.55	24,485	31.27	2,444	3.12
4	1,077.33	7XT	16.00	852	2,509	2.95	28,147	33.05	2,491	2.92
3	1,076.00	7XT	16.00	920	2,509	2.73	32,045	34.81	2,568	2.79
2	1,074.67	7XT	16.00	989	2,509	2.54	36,179	36.57	2,644	2.67
1	1,073.33	8XT	16.00	1,058	3,239	3.06	40,550	38.33	3,006	2.84

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	6	2	1.56	Pass
7	7	4	1.61	Pass
9	7	3	1.66	Pass
9	7	6	1.66	Pass
1	7	1	1.69	Pass
8	6	5	1.72	Pass
8	6	8	1.74	Pass
7	7	7	1.80	Pass
6	7	10	1.85	Pass
9	7	9	1.88	Pass

Section #13 at Station 235.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	19.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	18.67 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.73 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External	Value	Internal	Value	Facing	Value
FSSl Base Sliding	1.50	FSSl Internal Sliding	1.50	FSSc Connection Strength	1.50
FSbc Bearing Capacity	2.00	FSpO Pullout	1.50	FSsc Facing Shear	1.50
FSct Crest Toppling	1.50	FSto Tensile Overstress	1.50		
FSot Overturning	2.00				

Reinforcements

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	12.21	Bearing Pressure	3738.02 lb/ft²
Overturning	3.15	Max Eccentricity	1.90 ft
Base Sliding	1.76		
Crest Toppling	0.00		
Internal Sliding	1.59		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
13	1,090.67	5XT	15.00	77	1,999	25.80	1,914	24.70	1,200	15.48
12	1,089.33	5XT	15.00	138	1,999	14.43	3,325	24.01	1,377	9.95
11	1,088.00	5XT	15.00	302	1,999	6.61	4,972	16.45	1,555	5.14
10	1,086.67	5XT	15.00	371	1,999	5.39	6,855	18.47	1,733	4.67

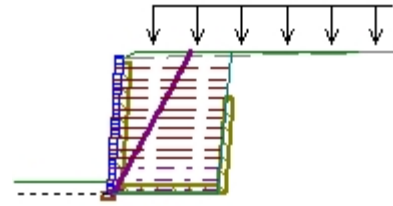


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
9	1,085.33	5XT	15.00	440	1,999	4.54	8,974	20.39	1,910	4.34
8	1,084.00	5XT	15.00	509	1,999	3.93	11,328	22.26	2,088	4.10
7	1,082.67	5XT	15.00	578	1,999	3.46	13,919	24.09	2,252	3.90
6	1,081.33	5XT	15.00	647	1,999	3.09	16,745	25.89	2,316	3.58
5	1,080.00	5XT	15.00	716	1,999	2.79	19,808	27.68	2,380	3.33
4	1,078.67	5XT	15.00	784	1,999	2.55	23,106	29.46	2,444	3.12
3	1,077.33	7XT	15.00	853	2,509	2.94	26,641	31.22	2,491	2.92
2	1,076.00	7XT	15.00	922	2,509	2.72	30,411	32.98	2,568	2.78
1	1,074.67	7XT	15.00	1,512	2,509	1.66	34,417	22.76	2,644	1.75

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	7	3	1.56	Pass
1	8	1	1.59	Pass
10	7	2	1.62	Pass
10	7	5	1.62	Pass
8	8	4	1.67	Pass
8	8	7	1.69	Pass
10	8	6	1.74	Pass
7	7	9	1.79	Pass
10	7	8	1.82	Pass
7	6	11	1.92	Pass

Section #14 at Station 316.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	18.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	18.00 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.67 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate					
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4"- gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	13.09	Bearing Pressure	3534.50 lb/ft²
Overturning	3.33	Max Eccentricity	1.77 ft
Base Sliding	1.81		
Crest Toppling	0.00		
Internal Sliding	1.59		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
13	1,090.67	5XT	15.00	78	1,999	25.74	2,018	25.99	1,200	15.45
12	1,089.33	5XT	15.00	139	1,999	14.40	3,488	25.13	1,377	9.92
11	1,088.00	5XT	15.00	303	1,999	6.60	5,194	17.15	1,555	5.13
10	1,086.67	5XT	15.00	372	1,999	5.37	7,136	19.19	1,733	4.66

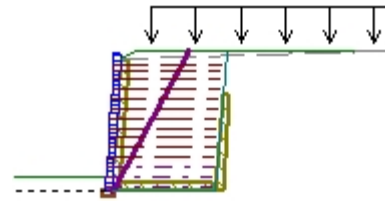


Internal Static		Rein	Length	Load	Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation									
9	1,085.33	5XT	15.00	441	1,999	4.53	9,314	21.12	1,910	4.33
8	1,084.00	5XT	15.00	510	1,999	3.92	11,727	23.00	2,088	4.09
7	1,082.67	5XT	15.00	579	1,999	3.45	14,377	24.83	2,252	3.89
6	1,081.33	5XT	15.00	648	1,999	3.08	17,262	26.64	2,316	3.57
5	1,080.00	5XT	15.00	717	1,999	2.79	20,384	28.43	2,380	3.32
4	1,078.67	5XT	15.00	786	1,999	2.54	23,741	30.20	2,444	3.11
3	1,077.33	7XT	15.00	855	2,509	2.93	27,334	31.97	2,491	2.91
2	1,076.00	7XT	15.00	924	2,509	2.72	31,164	33.72	2,568	2.78
1	1,074.67	7XT	15.00	993	2,509	2.53	35,229	35.47	2,644	2.66

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	7	2	1.55	Pass
9	7	4	1.60	Pass
8	6	6	1.68	Pass
10	7	3	1.69	Pass
1	7	1	1.70	Pass
7	7	5	1.74	Pass
6	7	8	1.77	Pass
9	7	7	1.81	Pass
9	7	10	1.90	Pass
8	6	9	1.94	Pass

Section #15 at Station 348.75
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	19.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	18.32 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.91 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	12.59	Bearing Pressure	3683.58 lb/ft²
Overturning	3.14	Max Eccentricity	1.91 ft
Base Sliding	1.73		
Crest Toppling	0.00		
Internal Sliding	1.57		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
14	1,091.33	5XT	15.00	34	1,999	59.12	1,633	48.30	1,154	34.12
13	1,090.67	5XT	15.00	71	1,999	28.33	2,294	32.51	1,243	17.61
12	1,089.33	5XT	15.00	157	1,999	12.73	3,792	24.15	1,420	9.04
11	1,088.00	5XT	15.00	319	1,999	6.27	5,526	17.33	1,598	5.01

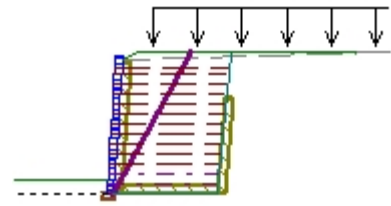


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
10	1,086.67	5XT	15.00	388	1,999	5.16	7,497	19.33	1,776	4.58
9	1,085.33	5XT	15.00	457	1,999	4.38	9,703	21.25	1,953	4.28
8	1,084.00	5XT	15.00	526	1,999	3.80	12,145	23.11	2,131	4.06
7	1,082.67	5XT	15.00	594	1,999	3.36	14,823	24.94	2,267	3.81
6	1,081.33	5XT	15.00	663	1,999	3.01	17,737	26.74	2,331	3.51
5	1,080.00	5XT	15.00	732	1,999	2.73	20,887	28.53	2,395	3.27
4	1,078.67	5XT	15.00	801	1,999	2.50	24,272	30.30	2,459	3.07
3	1,077.33	7XT	15.00	870	2,509	2.88	27,894	32.07	2,509	2.88
2	1,076.00	7XT	15.00	939	2,509	2.67	31,752	33.82	2,586	2.75
1	1,074.67	7XT	15.00	1,008	2,509	2.49	35,845	35.57	2,663	2.64

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	7	2	1.54	Pass
9	7	4	1.59	Pass
8	6	6	1.66	Pass
10	7	3	1.67	Pass
1	7	1	1.69	Pass
7	7	5	1.71	Pass
6	7	8	1.75	Pass
9	7	7	1.78	Pass
9	7	10	1.87	Pass
8	6	9	1.91	Pass

Section #16 at Station 364.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	18.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	17.78 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.69 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT				Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate			
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	13.23	Bearing Pressure	3500.72 lb/ft²
Overturning	3.33	Max Eccentricity	1.78 ft
Base Sliding	1.79		
Crest Toppling	0.00		
Internal Sliding	1.66		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
13	1,091.33	5XT	15.00	41	1,999	49.06	1,831	44.95	1,171	28.73
12	1,090.67	5XT	15.00	76	1,999	26.42	2,527	33.40	1,260	16.65
11	1,089.33	5XT	15.00	165	1,999	12.12	4,096	24.84	1,437	8.72
10	1,088.00	5XT	15.00	326	1,999	6.13	5,900	18.09	1,615	4.95

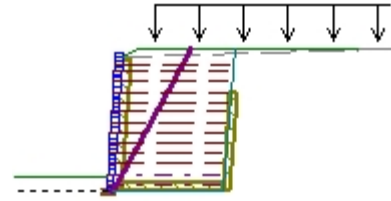


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
9	1,086.67	5XT	15.00	395	1,999	5.06	7,941	20.10	1,793	4.54
8	1,085.33	5XT	15.00	464	1,999	4.31	10,217	22.01	1,970	4.24
7	1,084.00	5XT	15.00	533	1,999	3.75	12,730	23.87	2,148	4.03
6	1,082.67	5XT	15.00	602	1,999	3.32	15,478	25.70	2,273	3.77
5	1,081.33	5XT	15.00	671	1,999	2.98	18,462	27.51	2,337	3.48
4	1,080.00	5XT	15.00	740	1,999	2.70	21,682	29.29	2,401	3.24
3	1,078.67	5XT	15.00	809	1,999	2.47	25,138	31.06	2,465	3.05
2	1,077.33	7XT	15.00	878	2,509	2.86	28,830	32.83	2,517	2.87
1	1,076.00	7XT	15.00	1,447	2,509	1.73	32,758	22.64	2,593	1.79

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
6	6	3	1.61	Pass
1	9	1	1.61	Pass
7	6	5	1.65	Pass
9	9	2	1.67	Pass
10	6	4	1.72	Pass
5	7	7	1.74	Pass
8	7	6	1.78	Pass
7	7	9	1.85	Pass
10	7	8	1.90	Pass
7	6	11	2.00	Pass

Section #17 at Station 370.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	17.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	17.24 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.63 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

7XT - Miragrid 7XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	14.11	Bearing Pressure	3329.00 lb/ft²
Overturning	3.54	Max Eccentricity	1.64 ft
Base Sliding	1.86		
Crest Toppling	0.00		
Internal Sliding	1.65		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
13	1,091.33	5XT	15.00	48	1,999	41.35	2,041	42.21	1,188	24.57
12	1,090.67	5XT	15.00	81	1,999	24.74	2,772	34.31	1,277	15.80
11	1,089.33	5XT	15.00	173	1,999	11.56	4,411	25.52	1,454	8.41
10	1,088.00	5XT	15.00	333	1,999	5.99	6,286	18.85	1,632	4.89

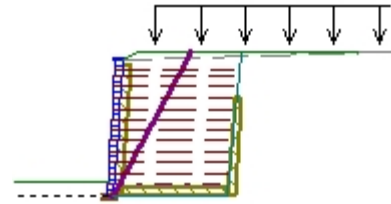


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
9	1,086.67	5XT	15.00	403	1,999	4.96	8,396	20.85	1,810	4.49
8	1,085.33	5XT	15.00	472	1,999	4.24	10,743	22.77	1,987	4.21
7	1,084.00	5XT	15.00	541	1,999	3.70	13,326	24.63	2,165	4.00
6	1,082.67	5XT	15.00	610	1,999	3.28	16,144	26.46	2,279	3.74
5	1,081.33	5XT	15.00	679	1,999	2.94	19,199	28.26	2,343	3.45
4	1,080.00	5XT	15.00	748	1,999	2.67	22,489	30.05	2,407	3.22
3	1,078.67	5XT	15.00	818	1,999	2.44	26,015	31.82	2,471	3.02
2	1,077.33	7XT	15.00	887	2,509	2.83	29,778	33.58	2,524	2.85
1	1,076.00	7XT	15.00	956	2,509	2.62	33,776	35.33	2,601	2.72

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	8	2	1.58	Pass
9	7	4	1.65	Pass
7	8	3	1.72	Pass
9	9	6	1.74	Pass
1	7	1	1.77	Pass
9	8	5	1.77	Pass
4	6	8	1.85	Pass
6	6	7	1.88	Pass
6	6	10	1.97	Pass
9	6	9	2.02	Pass

Section #18 at Station 376.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	17.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	16.66 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.58 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT				Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate			
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	15.06	Bearing Pressure	3160.07 lb/ft²
Overturning	3.77	Max Eccentricity	1.52 ft
Base Sliding	1.92		
Crest Toppling	0.00		
Internal Sliding	1.76		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
12	1,091.33	5XT	15.00	53	1,999	37.38	2,216	41.44	1,198	22.40
11	1,090.67	5XT	15.00	84	1,999	23.77	2,980	35.44	1,287	15.31
10	1,089.33	5XT	15.00	178	1,999	11.22	4,685	26.30	1,465	8.22
9	1,088.00	5XT	15.00	338	1,999	5.91	6,626	19.58	1,643	4.85

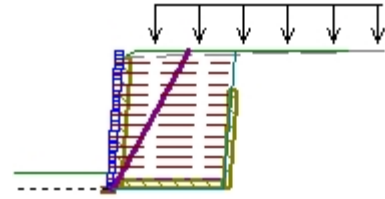


Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
8	1,086.67	5XT	15.00	408	1,999	4.90	8,803	21.59	1,820	4.46
7	1,085.33	5XT	15.00	477	1,999	4.19	11,216	23.51	1,998	4.19
6	1,084.00	5XT	15.00	546	1,999	3.66	13,864	25.37	2,176	3.98
5	1,082.67	5XT	15.00	616	1,999	3.25	16,749	27.20	2,283	3.71
4	1,081.33	5XT	15.00	685	1,999	2.92	19,870	29.00	2,347	3.43
3	1,080.00	5XT	15.00	754	1,999	2.65	23,226	30.79	2,411	3.20
2	1,078.67	5XT	15.00	824	1,999	2.43	26,818	32.56	2,475	3.00
1	1,077.33	7XT	15.00	1,366	2,509	1.84	30,647	22.44	2,529	1.85

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	8	3	1.64	Pass
1	10	1	1.67	Pass
6	8	2	1.72	Pass
5	8	5	1.74	Pass
8	8	4	1.78	Pass
7	8	7	1.84	Pass
10	8	6	1.88	Pass
10	8	9	1.99	Pass
4	8	8	2.04	Pass
3	8	11	2.16	Pass

Section #19 at Station 380.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	17.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	16.71 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.96 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced

External		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

7XT - Miragrid 7XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate						
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft	
RFid	1.41	Cds	0.80	Ci	0.80			

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static	FS		
Bearing Capacity	14.88	Bearing Pressure	3248.01 lb/ft²
Overturning	3.53	Max Eccentricity	1.66 ft
Base Sliding	1.80		
Crest Toppling	0.00		
Internal Sliding	1.76		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
12	1,092.00	5XT	15.00	37	1,999	53.84	1,564	42.13	1,117	30.09
11	1,090.67	5XT	15.00	106	1,999	18.82	3,039	28.60	1,295	12.19
10	1,089.33	5XT	15.00	181	1,999	11.03	4,749	26.21	1,473	8.13
9	1,088.00	5XT	15.00	341	1,999	5.87	6,695	19.65	1,650	4.85

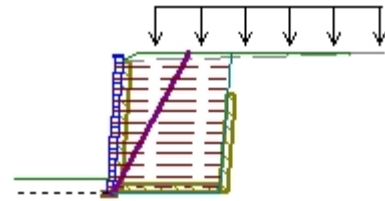


Internal Static		Rein	Length	Load	Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation				Resist.	FS	Resist.	FS	Resist.	FS
8	1,086.67	5XT	15.00	410	1,999	4.88	8,877	21.66	1,828	4.46
7	1,085.33	5XT	15.00	479	1,999	4.17	11,295	23.58	2,006	4.19
6	1,084.00	5XT	15.00	548	1,999	3.65	13,949	25.45	2,183	3.98
5	1,082.67	5XT	15.00	617	1,999	3.24	16,838	27.28	2,286	3.70
4	1,081.33	5XT	15.00	686	1,999	2.91	19,964	29.08	2,350	3.42
3	1,080.00	5XT	15.00	756	1,999	2.65	23,326	30.87	2,414	3.19
2	1,078.67	5XT	15.00	825	1,999	2.42	26,923	32.64	2,478	3.00
1	1,077.33	7XT	15.00	1,367	2,509	1.84	30,757	22.50	2,532	1.85

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	8	3	1.63	Pass
1	10	1	1.67	Pass
10	7	2	1.71	Pass
5	8	5	1.74	Pass
8	8	4	1.77	Pass
7	8	7	1.84	Pass
10	8	6	1.88	Pass
10	8	9	1.98	Pass
4	8	8	2.03	Pass
3	8	11	2.15	Pass

Section #20 at Station 383.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	17.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	16.16 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.60 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

7XT - Miragrid 7XT				Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate			
Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
acs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	13.37	Bearing Pressure	3225.79 lb/ft²
Overturning	3.29	Max Eccentricity	1.69 ft
Base Sliding	1.74		
Crest Toppling	0.00		
Internal Sliding	1.64		

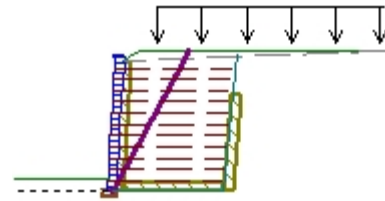
Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
12	1,092.00	5XT	14.00	44	1,999	45.79	1,490	34.14	1,133	25.94
11	1,090.67	5XT	14.00	112	1,999	17.78	2,847	25.31	1,310	11.65
10	1,089.33	5XT	14.00	189	1,999	10.59	4,439	23.52	1,488	7.89
9	1,088.00	5XT	14.00	347	1,999	5.75	6,267	18.04	1,666	4.79

Internal Static					Tensile	Tensile	Pullout	Pullout	Conn.	Conn.
Layer	Elevation	Rein	Length	Load	Resist.	FS	Resist.	FS	Resist.	FS
8	1,086.67	5XT	14.00	417	1,999	4.80	8,331	19.99	1,843	4.42
7	1,085.33	5XT	14.00	486	1,999	4.11	10,631	21.87	2,021	4.16
6	1,084.00	5XT	14.00	555	1,999	3.60	13,167	23.71	2,199	3.96
5	1,082.67	5XT	14.00	625	1,999	3.20	15,939	25.52	2,291	3.67
4	1,081.33	5XT	14.00	694	1,999	2.88	18,947	27.30	2,355	3.39
3	1,080.00	5XT	14.00	763	1,999	2.62	22,191	29.07	2,419	3.17
2	1,078.67	5XT	14.00	833	1,999	2.40	25,670	30.83	2,483	2.98
1	1,077.33	7XT	14.00	902	2,509	2.78	29,386	32.58	2,539	2.81

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
6	6	2	1.57	Pass
8	6	4	1.64	Pass
9	8	3	1.71	Pass
4	6	6	1.76	Pass
1	6	1	1.77	Pass
6	6	5	1.80	Pass
6	6	8	1.87	Pass
8	6	7	1.92	Pass
9	6	10	2.02	Pass
3	6	9	2.08	Pass

Section #21 at Station 389.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	16.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	15.61 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.54 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced				Facing			
External		Value	Internal	Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Cl	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	14.34	Bearing Pressure	3051.73 lb/ft²
Overturning	3.51	Max Eccentricity	1.56 ft
Base Sliding	1.81		
Crest Toppling	0.00		
Internal Sliding	1.75		

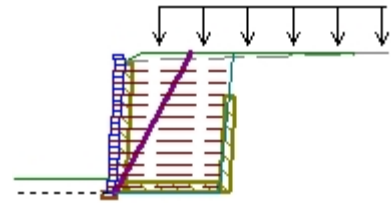
Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
11	1,092.00	5XT	14.00	51	1,999	39.40	1,670	32.91	1,148	22.62
10	1,090.67	5XT	14.00	119	1,999	16.84	3,095	26.07	1,326	11.17
9	1,089.33	5XT	14.00	196	1,999	10.18	4,757	24.22	1,503	7.65
8	1,088.00	5XT	14.00	354	1,999	5.64	6,654	18.78	1,681	4.75
7	1,086.67	5XT	14.00	424	1,999	4.72	8,787	20.74	1,859	4.39
6	1,085.33	5XT	14.00	493	1,999	4.05	11,156	22.62	2,036	4.13
5	1,084.00	5XT	14.00	563	1,999	3.55	13,762	24.46	2,214	3.93
4	1,082.67	5XT	14.00	632	1,999	3.16	16,603	26.26	2,297	3.63
3	1,081.33	5XT	14.00	702	1,999	2.85	19,680	28.05	2,361	3.36
2	1,080.00	5XT	14.00	771	1,999	2.59	22,992	29.81	2,425	3.14
1	1,078.67	5XT	14.00	1,287	1,999	1.55	26,541	20.62	2,489	1.93

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
1	8	1	1.63	Pass
5	8	3	1.65	Pass
8	8	2	1.71	Pass
7	8	5	1.74	Pass
10	8	4	1.80	Pass
10	8	7	1.87	Pass
4	8	6	1.93	Pass
3	8	9	2.02	Pass
6	8	8	2.07	Pass
6	8	11	2.20	Pass



Section #22 at Station 395.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	15.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	15.06 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.49 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced				Facing			
External		Value	Internal	Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Cl	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	13.18	Bearing Pressure	3029.80 lb/ft²
Overturning	3.25	Max Eccentricity	1.59 ft
Base Sliding	1.74		
Crest Toppling	0.00		
Internal Sliding	1.62		

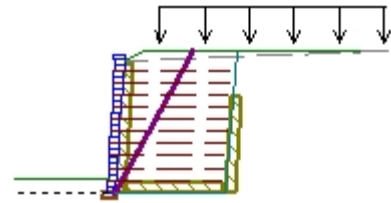
Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
11	1,092.00	5XT	13.00	58	1,999	34.24	1,568	26.85	1,163	19.92
10	1,090.67	5XT	13.00	125	1,999	15.99	2,875	23.00	1,341	10.72
9	1,089.33	5XT	13.00	204	1,999	9.78	4,419	21.63	1,519	7.43
8	1,088.00	5XT	13.00	361	1,999	5.53	6,198	17.16	1,696	4.70
7	1,086.67	5XT	13.00	431	1,999	4.64	8,214	19.06	1,874	4.35
6	1,085.33	5XT	13.00	501	1,999	3.99	10,465	20.91	2,052	4.10
5	1,084.00	5XT	13.00	570	1,999	3.51	12,952	22.71	2,229	3.91
4	1,082.67	5XT	13.00	640	1,999	3.12	15,675	24.50	2,303	3.60
3	1,081.33	5XT	13.00	710	1,999	2.82	18,634	26.26	2,367	3.34
2	1,080.00	5XT	13.00	779	1,999	2.57	21,829	28.01	2,431	3.12
1	1,078.67	5XT	13.00	849	1,999	2.35	25,260	29.76	2,495	2.94

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	9	2	1.56	Pass
4	6	4	1.67	Pass
1	10	1	1.73	Pass
5	9	3	1.74	Pass
6	6	6	1.77	Pass
8	6	5	1.82	Pass
8	6	8	1.90	Pass
3	6	7	1.97	Pass
2	6	10	2.05	Pass
5	6	9	2.12	Pass



Section #23 at Station 401.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	15.00	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	14.51 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.43 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Cl	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

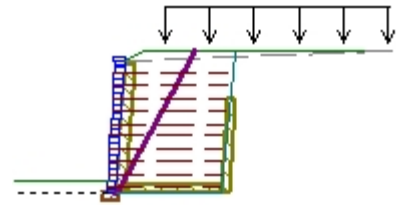
External Static		FS	
Bearing Capacity	14.22	Bearing Pressure	2853.87 lb/ft²
Overturning	3.49	Max Eccentricity	1.45 ft
Base Sliding	1.82		
Crest Toppling	0.00		
Internal Sliding	1.74		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
10	1,092.00	5XT	13.00	67	1,999	30.01	1,751	26.30	1,178	17.69
9	1,090.67	5XT	13.00	131	1,999	15.21	3,128	23.80	1,356	10.32
8	1,089.33	5XT	13.00	212	1,999	9.41	4,741	22.32	1,534	7.22
7	1,088.00	5XT	13.00	368	1,999	5.43	6,589	17.90	1,712	4.65
6	1,086.67	5XT	13.00	438	1,999	4.56	8,674	19.80	1,889	4.31
5	1,085.33	5XT	13.00	508	1,999	3.94	10,994	21.64	2,067	4.07
4	1,084.00	5XT	13.00	578	1,999	3.46	13,551	23.45	2,244	3.88
3	1,082.67	5XT	13.00	648	1,999	3.09	16,343	25.23	2,308	3.56
2	1,081.33	5XT	13.00	718	1,999	2.79	19,371	26.99	2,372	3.31
1	1,080.00	5XT	13.00	1,207	1,999	1.66	22,635	18.75	2,436	2.02

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
1	8	1	1.61	Pass
7	8	3	1.65	Pass
10	8	2	1.72	Pass
10	8	5	1.76	Pass
8	10	4	1.84	Pass
3	8	7	1.90	Pass
6	8	6	1.95	Pass
5	8	9	2.06	Pass
10	8	8	2.13	Pass
1	5	11	2.23	Pass

Section #24 at Station 407.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	14.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	13.94 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.38 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Cl	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	12.98	Bearing Pressure	2829.84 lb/ft²
Overturning	3.21	Max Eccentricity	1.49 ft
Base Sliding	1.74		
Crest Toppling	0.00		
Internal Sliding	1.60		

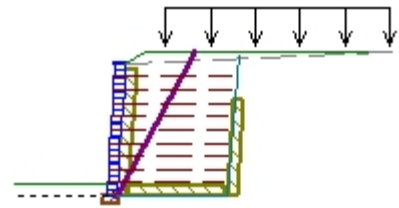
Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
10	1,092.00	5XT	12.00	74	1,999	26.91	1,611	21.69	1,192	16.04
9	1,090.67	5XT	12.00	138	1,999	14.52	2,869	20.84	1,370	9.95
8	1,089.33	5XT	12.00	305	1,999	6.56	4,362	14.32	1,547	5.08
7	1,088.00	5XT	12.00	375	1,999	5.34	6,092	16.26	1,725	4.60
6	1,086.67	5XT	12.00	445	1,999	4.49	8,057	18.12	1,903	4.28
5	1,085.33	5XT	12.00	515	1,999	3.88	10,258	19.93	2,080	4.04
4	1,084.00	5XT	12.00	585	1,999	3.42	12,696	21.71	2,249	3.84
3	1,082.67	5XT	12.00	655	1,999	3.05	15,369	23.46	2,313	3.53
2	1,081.33	5XT	12.00	725	1,999	2.76	18,278	25.21	2,377	3.28
1	1,080.00	5XT	12.00	795	1,999	2.51	21,423	26.94	2,441	3.07

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	9	2	1.58	Pass
4	9	4	1.68	Pass
1	9	1	1.71	Pass
7	9	3	1.75	Pass
3	7	6	1.77	Pass
10	9	5	1.86	Pass
4	7	8	1.91	Pass
8	7	7	2.00	Pass
7	7	10	2.10	Pass
1	7	9	2.18	Pass



Section #25 at Station 412.50
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	13.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	13.32 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.25 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSsc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Cl	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	14.03	Bearing Pressure	2640.69 lb/ft²
Overturning	3.46	Max Eccentricity	1.35 ft
Base Sliding	1.81		
Crest Toppling	0.00		
Internal Sliding	1.74		

Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
9	1,092.00	5XT	12.00	78	1,999	25.67	1,745	22.41	1,198	15.38
8	1,090.67	5XT	12.00	141	1,999	14.20	3,065	21.77	1,375	9.77
7	1,089.33	5XT	12.00	308	1,999	6.49	4,622	15.01	1,553	5.05
6	1,088.00	5XT	12.00	378	1,999	5.29	6,414	16.96	1,731	4.58
5	1,086.67	5XT	12.00	448	1,999	4.46	8,442	18.83	1,908	4.26
4	1,085.33	5XT	12.00	519	1,999	3.85	10,706	20.64	2,086	4.02
3	1,084.00	5XT	12.00	589	1,999	3.39	13,206	22.42	2,251	3.82
2	1,082.67	5XT	12.00	659	1,999	3.03	15,942	24.18	2,315	3.51
1	1,081.33	5XT	12.00	1,121	1,999	1.78	18,914	16.87	2,379	2.12

Internal Compound Stability

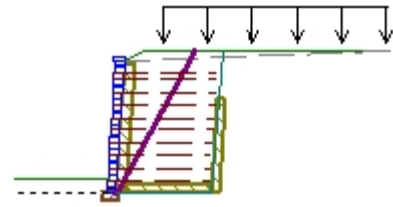


10 Lowest Static

Radius Point	Entry Point	Exit Point	Result	Status
1	7	1	1.63	Pass
9	8	3	1.67	Pass
8	10	2	1.76	Pass
3	8	5	1.78	Pass
6	8	4	1.86	Pass
5	8	7	1.92	Pass
1	8	6	2.00	Pass
2	5	9	2.11	Pass
2	8	8	2.19	Pass
4	5	11	2.33	Pass



Section #26 at Station 414.75
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Parameters	Phi Angle	Cohesion	Unit Weight	
Soil Zone	[degrees]	[lb/ft²]	[lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	14.33	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	13.90 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.48 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced							
External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate					
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	10.70	Bearing Pressure	3038.25 lb/ft²
Overturning	2.71	Max Eccentricity	1.68 ft
Base Sliding	1.59		
Crest Toppling	0.00		
Internal Sliding	1.54		

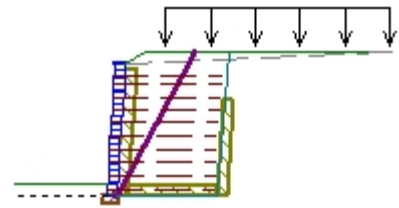
Internal Static					Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation	Rein	Length	Load						
10	1,092.67	5XT	11.00	49	1,999	41.15	1,268	26.10	1,187	24.43
9	1,092.00	5XT	11.00	82	1,999	24.50	1,772	21.72	1,276	15.63
8	1,090.67	5XT	11.00	176	1,999	11.35	2,957	16.79	1,453	8.25
7	1,089.33	5XT	11.00	338	1,999	5.92	4,379	12.97	1,631	4.83
6	1,088.00	5XT	11.00	408	1,999	4.90	6,036	14.81	1,809	4.44
5	1,086.67	5XT	11.00	478	1,999	4.18	7,928	16.60	1,986	4.16
4	1,085.33	5XT	11.00	548	1,999	3.65	10,057	18.36	2,164	3.95
3	1,084.00	5XT	11.00	618	1,999	3.23	12,422	20.10	2,279	3.69
2	1,082.67	5XT	11.00	688	1,999	2.91	15,023	21.83	2,343	3.41
1	1,081.33	5XT	11.00	1,163	1,999	1.72	17,859	15.35	2,407	2.07

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
4	8	3	1.54	Pass
1	5	1	1.56	Pass
7	8	2	1.62	Pass
5	8	5	1.64	Pass
9	8	4	1.72	Pass
2	5	7	1.76	Pass
3	8	6	1.85	Pass
5	6	9	1.89	Pass
4	8	8	2.01	Pass
6	5	11	2.09	Pass



Section #27 at Station 419.25
Report Date October 08, 2025
Designer MAW
Design Standard Rankine Theory Analysis
Design Static
Unit of Measure U.S./Imperial
Selected Facing Unit
Product Line: Keystone Pinned Systems
Name: Compac III
Seismic As N/A



Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft²]	Unit Weight [lb/ft³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Section Details

Section Height	13.67	Back Slope	27.00°	LL Surcharge	250	DL Surcharge	0
Design Height	13.33 ft	Crest Offset	2.00 ft	LL Offset	4.00 ft	DL Offset	0.00 ft
Embedment	1.27 ft	Wall Batter	4.00°	Toe Slope	0.00°	Toe Offset	0.00 ft

Minimum Factors of Safety

Reinforced		Value	Internal		Value	Facing		Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FSSc	Connection Strength	1.50
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear	1.50
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50			
FSot	Overturning	2.00						

Reinforcements

5XT - Miragrid 5XT		Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate						
Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft	
RFid	1.41	Cds	0.80	Ci	0.80			

Connection/Shear Properties

acs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	acs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
acs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

Analysis Results

* Embedment is included in Bearing Capacity

External Static		FS	
Bearing Capacity	11.56	Bearing Pressure	2818.31 lb/ft²
Overturning	2.92	Max Eccentricity	1.53 ft
Base Sliding	1.66		
Crest Toppling	0.00		
Internal Sliding	1.54		

Internal Static		Rein		Length		Load		Tensile Resist.	Tensile FS	Pullout Resist.	Pullout FS	Conn. Resist.	Conn. FS
Layer	Elevation												
10	1,092.67	5XT		11.00		55		1,999	36.39	1,427	25.97	1,200	21.84
9	1,092.00	5XT		11.00		86		1,999	23.32	1,965	22.92	1,289	15.03
8	1,090.67	5XT		11.00		183		1,999	10.92	3,217	17.57	1,466	8.01
7	1,089.33	5XT		11.00		344		1,999	5.81	4,706	13.69	1,644	4.78
6	1,088.00	5XT		11.00		414		1,999	4.83	6,430	15.53	1,822	4.40
5	1,086.67	5XT		11.00		484		1,999	4.13	8,391	17.32	1,999	4.13
4	1,085.33	5XT		11.00		555		1,999	3.60	10,587	19.08	2,177	3.92
3	1,084.00	5XT		11.00		625		1,999	3.20	13,020	20.83	2,284	3.65
2	1,082.67	5XT		11.00		695		1,999	2.87	15,688	22.56	2,348	3.38
1	1,081.33	5XT		11.00		766		1,999	2.61	18,592	24.28	2,412	3.15



Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
6	10	2	1.54	Pass
4	8	4	1.62	Pass
1	8	1	1.71	Pass
10	9	3	1.73	Pass
6	8	6	1.74	Pass
2	8	5	1.81	Pass
7	7	8	1.89	Pass
3	8	7	1.96	Pass
1	8	10	2.04	Pass
5	8	9	2.17	Pass



Project: 16123A - QVSD High School Campus

Site: Leet Township

Date: 10/8/2025

Wall: MSE Wall 2

Project Information

Client	Phillips and Associates, Inc.					
Name	QVSD High School Campus				Number	16123A
Site	Leet Township				Designer	MAW
Revision	1	Created	9/24/2025		Modified	10/8/2025
Standard	Rankine Theory Analysis					
Seismic As Comments	N/A					

Selected Facing Unit

Product Line:

Name:Keystone Pinned Systems
Compac III

Project Summary

Quantities

Wall Length	420.75 ft
Pins	15,368
Steps in Top of Wall	7
Steps in Bottom of Wall	19
Total Wall Area	8,109 ft ²
Cap Area	145 ft ²
Exposed Area (includes cap)	7,341 ft ²
Embedded Area	769 ft ²
Tallest Panel Height	22.33 ft
Longest reinforcement length	17.00 ft
Base soil volume	31 yd ³
Infill soil volume ‡	3,973 yd ³
Gravity Face Drain	289 yd ³
Face Drain	289 yd ³
Blanket Drain	194 yd ³
Chimney Drain	210 yd ³
Drainage stone within block	123 yd ³

Reinforcement

5XT - Miragrid 5XT	7,960 yd ²
7XT - Miragrid 7XT	1,829 yd ²
8XT - Miragrid 8XT	202 yd ²
10XT - Miragrid 10XT	0 yd ²

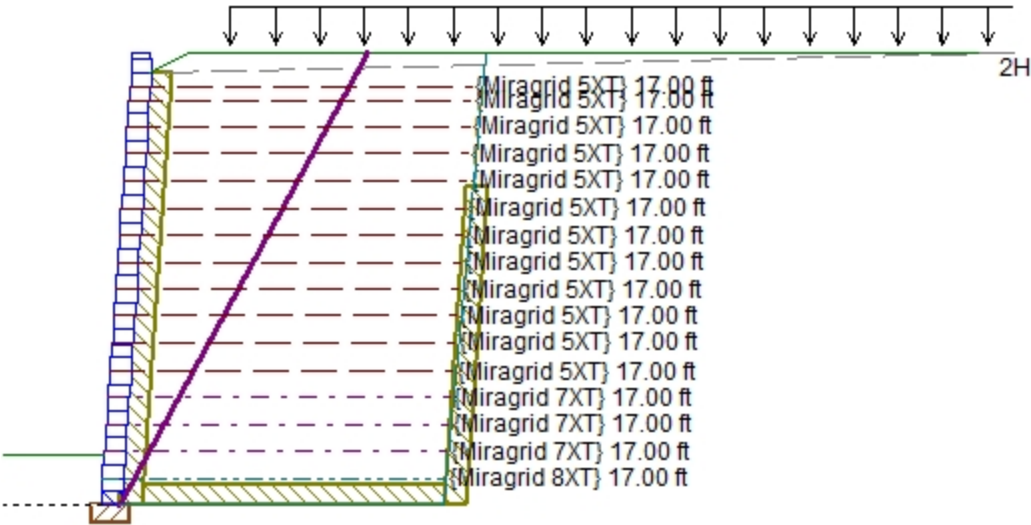
Note †: Total Facing Unit quantity is based on using full-sized units only on bottom course and an even mix of defined facing sizes, as identified elsewhere in this report, on remaining courses of each Section. The use of corners, tapered or cut units is not reflected in this quantity.

Note ‡: Reinforced fill values are calculated based on the average geogrid length in each Section. They do not account for anything beyond the reinforced zone (end of the geogrids). Actual infill values may be significantly higher.

Note Δ: Drainage fill does not include the drainage stone within block. Core fill are calculated based on the percentage hollow core of the wall unit selected. If the percentage hollow core is not defined then the Core fill value within block will not be calculated.

Tallest Section

Section Height 22.33 ft



Project Design Inputs

Design Standard Rankine Theory Analysis

Minimum Factors of Safety

Conventional

External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50		
FSbc	Bearing Capacity	2.00	FSSc	Shear Capacity	1.50		
FSot	Overturning	1.50					

Reinforced

External		Value	Internal		Value	Facing	Value
FSSl	Base Sliding	1.50	FSSl	Internal Sliding	1.50	FScs	Connection Strength
FSbc	Bearing Capacity	2.00	FSpO	Pullout	1.50	FSSc	Facing Shear
FSct	Crest Toppling	1.50	FSto	Tensile Overstress	1.50		
FSot	Overturning	2.00					

Design Factors

Term	Description	Minimum (as appl.)	Maximum (as appl.)
RC	Reinforced coverage ratio	1.00	0.00

Selected Facing Unit

Product Line: Keystone Pinned Systems

Name: Compac III

Facing Height	Hu	0.67 ft
Facing Width	Lu	1.50 ft
Facing Depth	Wu	1.00 ft
Facing Weight	Xu	120 lb/ft ³
Center of Gravity	Gu	0.50 ft
Setback	Δu	0.05 ft
Batter	ω	4.00 °
Cap Height	Hcu	0.33 ft
Initial Shear Capacity	au	1393.00 lb/ft
Apparent Shear Angle	λu	34.00 °
Maximum Shear Capacity	Vu(max)	3245.00 lb/ft

Selected Reinforcement Types

Reinforcements

5XT - Miragrid 5XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	4,700.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	1,999.00 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

αcs1	1,022.00 lb/ft	IP-1	1,100.00 lb/ft	αcs2	2,243.67 lb/ft	IP-2	2,802.00 lb/ft
αcs max	2,924.43 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

7XT - Miragrid 7XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	5,900.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	2,509.38 lb/ft
RFid	1.41	Cds	0.80	Ci	0.80		

Connection/Shear Properties

αcs1	970.00 lb/ft	IP-1	1,100.00 lb/ft	αcs2	2,174.65 lb/ft	IP-2	3,380.00 lb/ft
αcs max	3,267.05 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

8XT - Miragrid 8XT

Supplier: TenCate Geosynthetics - Mirafi IDEA, Fill Type: 3/4" - gravels or aggregate

Tult	7,400.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	3,239.26 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

αcs1	1,150.00 lb/ft	IP-1	1,680.00 lb/ft	αcs2	2,689.44 lb/ft	IP-2	3,380.00 lb/ft
αcs max	3,651.25 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft



Tult	9,500.00 lb/ft	RFcr	1.45	RFd	1.15	LTDS	4,158.50 lb/ft
RFid	1.37	Cds	0.80	Ci	0.80		

Connection/Shear Properties

acs1	850.00 lb/ft	IP-1	1,150.00 lb/ft	acs2	2,376.10 lb/ft	IP-2	3,373.00 lb/ft
acs max	3,836.34 lb/ft	au	900.00 lb/ft	λu	34.00 lb/ft	Vu(max)	2,762.00 lb/ft

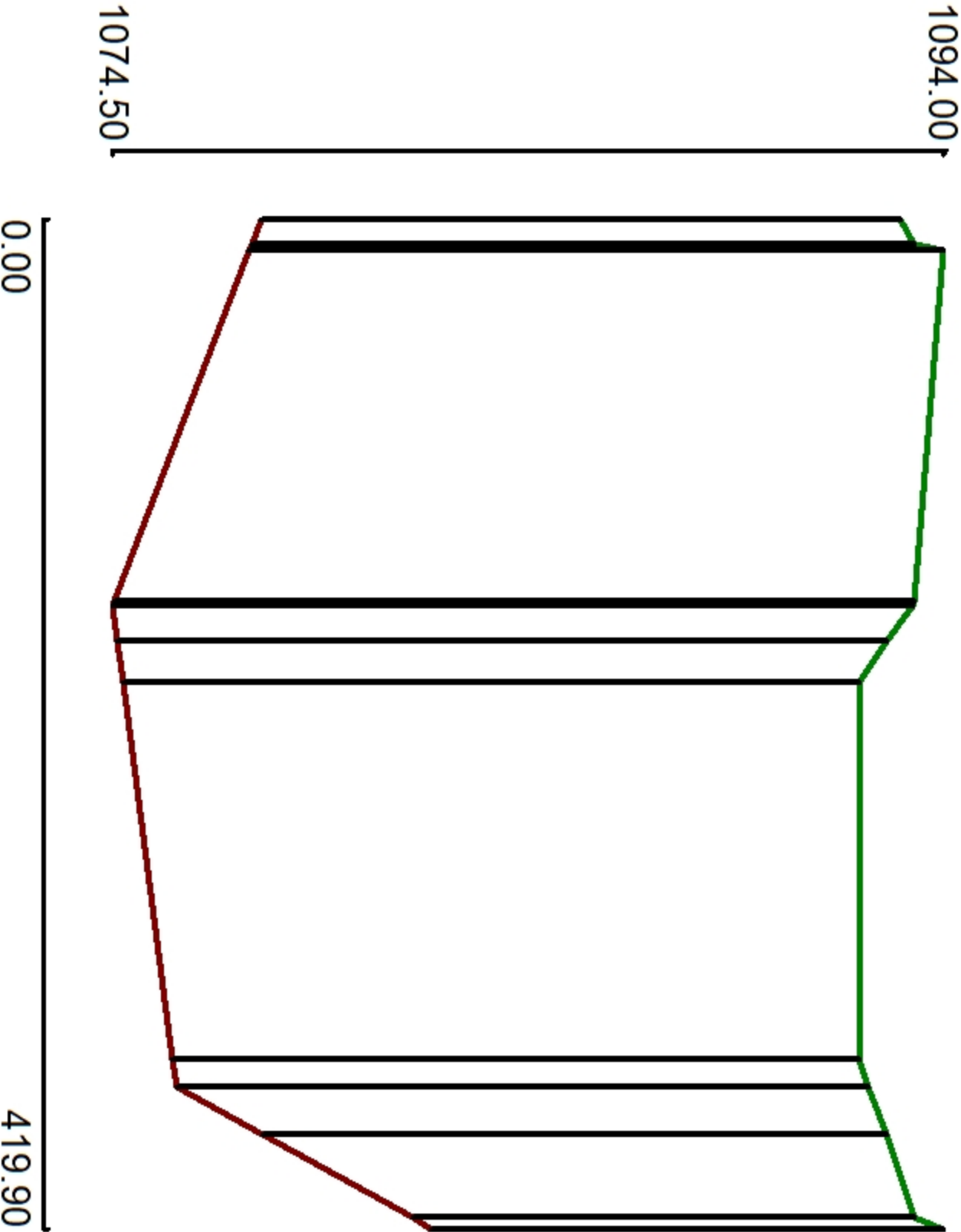
Selected Soil Types

Soil Zone	Phi Angle [degrees]	Cohesion [lb/ft ²]	Unit Weight [lb/ft ³]	Description
Reinforced	33	n/a	135.00	sand
Retained	20	0.00	135.00	clay
Foundation	36	0.00	120.00	residual
Leveling Pad	34	n/a	n/a	
Drainage	n/a	n/a	0.70	

Soil Glossary

CH:	Inorganic clays, high plasticity
CL:	Inorganic clays, low to medium plasticity, gravelly, sandy, silty, lean clays
GC:	Clayey gravels, poorly graded gravel-sand-clay mixtures
GM:	Silty gravels, poorly graded gravel-sand-silt mixtures
GP:	1/2"-3/4" clean crushed stone or crushed gravel
GW:	Well-graded gravels, gravel-sand. Little or no fines.
MH:	Inorganic clayey silts, elastic silts
ML:	Inorganic silts, very fine sands, silty or clayey, slight plasticity
SC:	Clayey sands, poorly graded sand-clay mixtures
SM:	Silty sands, poorly graded sand-silt mixtures
SP:	Poorly-graded sands, gravelly sands. Little or no fines.
SW:	Well-graded sands, gravelly sands. Little or no fines.

Station Detail



Note: Station Layout is the face view of the wall, looking at it from left to right

Station Layout

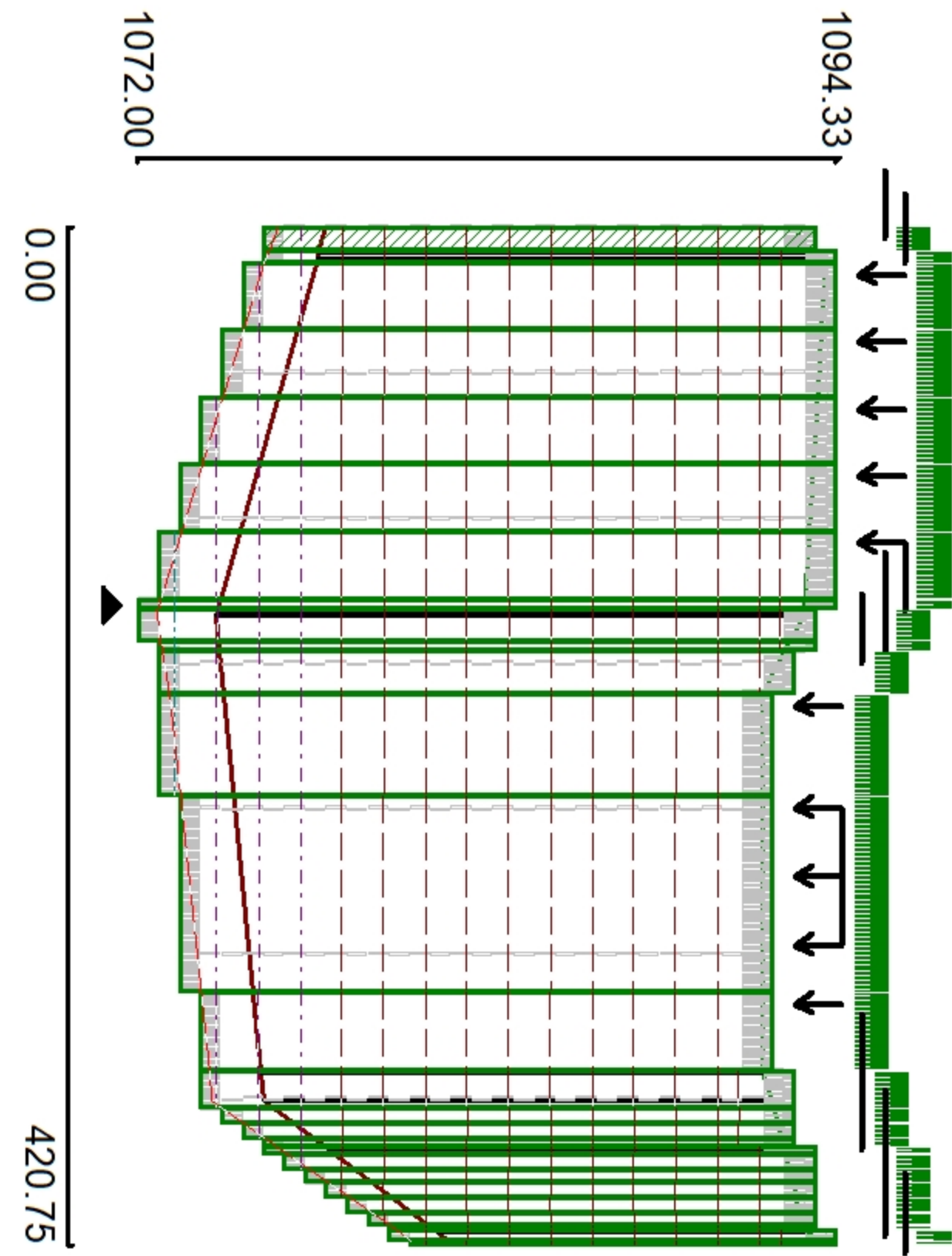
No.	Station [ft]	Top [ft]	Bottom [ft]	Height [ft]
1	0.00	1,093.00	1,078.00	15.00
2	10.40	1,093.33	1,077.77	15.56
3	13.00	1,094.00	1,077.72	16.28
4	158.90	1,093.33	1,074.54	18.79
5	160.60	1,093.26	1,074.50	18.76
6	175.40	1,092.67	1,074.61	18.06
7	192.90	1,092.00	1,074.74	17.26
8	349.40	1,092.00	1,075.91	16.09
9	361.00	1,092.25	1,076.00	16.25
10	380.90	1,092.67	1,078.03	14.64
11	415.40	1,093.33	1,081.54	11.79
12	419.90	1,094.00	1,082.00	12.00

Station Wall Length	419.90 ft
Minimum Height	11.79 ft
Maximum Height	18.79 ft



Section Geometry

Section Drawing



Section Extents

Section	Top Elevation [ft]	Base Elevation [ft]	Left Side [ft]	Right Side [ft]	Bottom Grade Elevation [ft]
1	1,093.67	1,076.00	0.00	9.75	1,077.79
2	1,094.33	1,076.00	9.75	15.00	1,077.67
3	1,094.33	1,075.33	15.00	42.75	1,077.07
4	1,094.33	1,074.67	42.75	70.50	1,076.46
5	1,094.33	1,074.00	70.50	98.25	1,075.86
6	1,094.33	1,073.33	98.25	126.00	1,075.25
7	1,094.33	1,072.67	126.00	153.75	1,074.65
8	1,094.33	1,072.00	153.75	158.25	1,074.55
9	1,093.67	1,072.00	158.25	171.00	1,074.50
10	1,093.67	1,072.67	171.00	175.50	1,074.58
11	1,093.00	1,072.67	175.50	193.50	1,074.61
12	1,092.33	1,072.67	193.50	235.50	1,074.75
13	1,092.33	1,073.33	235.50	316.50	1,075.06
14	1,092.33	1,074.00	316.50	348.75	1,075.67
15	1,093.00	1,074.00	348.75	364.50	1,075.91
16	1,093.00	1,074.67	364.50	370.50	1,076.36
17	1,093.00	1,075.33	370.50	376.50	1,076.97
18	1,093.00	1,076.00	376.50	380.25	1,077.58
19	1,093.67	1,076.00	380.25	383.25	1,077.96
20	1,093.67	1,076.67	383.25	389.25	1,078.27
21	1,093.67	1,077.33	389.25	395.25	1,078.88
22	1,093.67	1,078.00	395.25	401.25	1,079.49
23	1,093.67	1,078.67	401.25	407.25	1,080.10
24	1,093.67	1,079.33	407.25	412.50	1,080.71
25	1,093.67	1,080.00	412.50	414.75	1,081.25
26	1,094.33	1,080.00	414.75	419.25	1,081.48
27	1,094.33	1,080.67	419.25	420.75	1,081.93

Section Measurements

Section	Height [ft]	Design Height [ft]	Width [ft]	Face Area [ft ²]	Embedment [ft]	Infill Volume [yd ³]
1	17.67	17.31	9.75	172	1.79	75
2	18.33	18.00	5.25	96	1.67	46
3	19.00	18.66	27.75	527	1.73	269
4	19.67	19.20	27.75	546	1.80	277
5	20.33	19.74	27.75	564	1.86	285
6	21.00	20.28	27.75	583	1.92	292
7	21.67	20.81	27.75	601	1.98	322
8	22.33	21.35	4.50	100	2.55	53
9	21.67	21.33	12.75	276	2.50	151
10	21.00	20.18	4.50	94	1.91	51
11	20.33	20.00	18.00	366	1.94	200
12	19.67	19.33	42.00	826	2.08	422
13	19.00	18.67	81.00	1,539	1.73	730
14	18.33	18.00	32.25	591	1.67	280
15	19.00	18.32	15.75	299	1.91	139
16	18.33	17.78	6.00	110	1.69	52
17	17.67	17.24	6.00	106	1.63	50
18	17.00	16.66	3.75	64	1.58	30
19	17.67	16.71	3.00	53	1.96	24
20	17.00	16.16	6.00	102	1.60	43
21	16.33	15.61	6.00	98	1.54	42
22	15.67	15.06	6.00	94	1.49	37
23	15.00	14.51	6.00	90	1.43	36
24	14.33	13.94	5.25	75	1.38	27
25	13.67	13.32	2.25	31	1.25	11
26	14.33	13.90	4.50	64	1.48	21
27	13.67	13.33	1.50	20	1.27	7

Section Slopes

Section	Crest Slope [°]	Crest Offset [ft]	Toe Slope [°]	Toe Offset [ft]
1	27.00	2.00	0.00	0.00
2	27.00	2.00	0.00	0.00
3	27.00	2.00	0.00	0.00
4	27.00	2.00	0.00	0.00
5	27.00	2.00	0.00	0.00
6	27.00	2.00	0.00	0.00
7	27.00	2.00	0.00	0.00
8	27.00	2.00	0.00	0.00
9	27.00	2.00	0.00	0.00
10	27.00	2.00	0.00	0.00
11	27.00	2.00	0.00	0.00
12	27.00	2.00	0.00	0.00
13	27.00	2.00	0.00	0.00
14	27.00	2.00	0.00	0.00
15	27.00	2.00	0.00	0.00
16	27.00	2.00	0.00	0.00
17	27.00	2.00	0.00	0.00
18	27.00	2.00	0.00	0.00
19	27.00	2.00	0.00	0.00
20	27.00	2.00	0.00	0.00
21	27.00	2.00	0.00	0.00
22	27.00	2.00	0.00	0.00
23	27.00	2.00	0.00	0.00
24	27.00	2.00	0.00	0.00
25	27.00	2.00	0.00	0.00
26	27.00	2.00	0.00	0.00
27	27.00	2.00	0.00	0.00

Section Loads

Section	Live Load [lb/ft²]	Live Offset [ft]	Dead Load [lb/ft²]	Dead Offset [ft]
1	250	4.00	0	0.00
2	250	4.00	0	0.00
3	250	4.00	0	0.00
4	250	4.00	0	0.00
5	250	4.00	0	0.00
6	250	4.00	0	0.00
7	250	4.00	0	0.00
8	250	4.00	0	0.00
9	250	4.00	0	0.00
10	250	4.00	0	0.00
11	250	4.00	0	0.00
12	250	4.00	0	0.00
13	250	4.00	0	0.00
14	250	4.00	0	0.00
15	250	4.00	0	0.00
16	250	4.00	0	0.00
17	250	4.00	0	0.00
18	250	4.00	0	0.00
19	250	4.00	0	0.00
20	250	4.00	0	0.00
21	250	4.00	0	0.00
22	250	4.00	0	0.00
23	250	4.00	0	0.00
24	250	4.00	0	0.00
25	250	4.00	0	0.00
26	250	4.00	0	0.00
27	250	4.00	0	0.00

Reinforcement Details



Section	Course	Length [ft]	Area [ft²]	Reinforcement
1	24	14.00	136.50	5XT - Miragrid 5XT
	22	14.00	136.50	5XT - Miragrid 5XT
	20	14.00	136.50	5XT - Miragrid 5XT
	18	14.00	136.50	5XT - Miragrid 5XT
	16	14.00	136.50	5XT - Miragrid 5XT
	14	14.00	136.50	5XT - Miragrid 5XT
	12	14.00	136.50	5XT - Miragrid 5XT
	10	14.00	136.50	5XT - Miragrid 5XT
	8	14.00	136.50	5XT - Miragrid 5XT
	6	14.00	136.50	5XT - Miragrid 5XT
	4	14.00	136.50	5XT - Miragrid 5XT
2	2	14.00	136.50	7XT - Miragrid 7XT
	25	15.00	78.75	5XT - Miragrid 5XT
	24	15.00	78.75	5XT - Miragrid 5XT
	22	15.00	78.75	5XT - Miragrid 5XT
	20	15.00	78.75	5XT - Miragrid 5XT
	18	15.00	78.75	5XT - Miragrid 5XT
	16	15.00	78.75	5XT - Miragrid 5XT
	14	15.00	78.75	5XT - Miragrid 5XT
	12	15.00	78.75	5XT - Miragrid 5XT
	10	15.00	78.75	5XT - Miragrid 5XT
	8	15.00	78.75	5XT - Miragrid 5XT
3	6	15.00	78.75	5XT - Miragrid 5XT
	4	15.00	78.75	5XT - Miragrid 5XT
	2	15.00	78.75	7XT - Miragrid 7XT
	26	16.00	444.00	5XT - Miragrid 5XT
	25	16.00	444.00	5XT - Miragrid 5XT
	23	16.00	444.00	5XT - Miragrid 5XT
	21	16.00	444.00	5XT - Miragrid 5XT
	19	16.00	444.00	5XT - Miragrid 5XT
	17	16.00	444.00	5XT - Miragrid 5XT
	15	16.00	444.00	5XT - Miragrid 5XT
	13	16.00	444.00	5XT - Miragrid 5XT
4	11	16.00	444.00	5XT - Miragrid 5XT
	9	16.00	444.00	5XT - Miragrid 5XT
	7	16.00	444.00	5XT - Miragrid 5XT
	5	16.00	444.00	5XT - Miragrid 5XT
	3	16.00	444.00	7XT - Miragrid 7XT
	1	16.00	444.00	7XT - Miragrid 7XT
	27	16.00	444.00	5XT - Miragrid 5XT
	26	16.00	444.00	5XT - Miragrid 5XT
	24	16.00	444.00	5XT - Miragrid 5XT
	22	16.00	444.00	5XT - Miragrid 5XT
	20	16.00	444.00	5XT - Miragrid 5XT
5	18	16.00	444.00	5XT - Miragrid 5XT
	16	16.00	444.00	5XT - Miragrid 5XT
	14	16.00	444.00	5XT - Miragrid 5XT
	12	16.00	444.00	5XT - Miragrid 5XT
	10	16.00	444.00	5XT - Miragrid 5XT
	8	16.00	444.00	5XT - Miragrid 5XT
	6	16.00	444.00	5XT - Miragrid 5XT
	4	16.00	444.00	7XT - Miragrid 7XT
	2	16.00	444.00	7XT - Miragrid 7XT
	28	16.00	444.00	5XT - Miragrid 5XT
	27	16.00	444.00	5XT - Miragrid 5XT
	25	16.00	444.00	5XT - Miragrid 5XT
	23	16.00	444.00	5XT - Miragrid 5XT
	21	16.00	444.00	5XT - Miragrid 5XT
	19	16.00	444.00	5XT - Miragrid 5XT
	17	16.00	444.00	5XT - Miragrid 5XT
	15	16.00	444.00	5XT - Miragrid 5XT
	13	16.00	444.00	5XT - Miragrid 5XT
	11	16.00	444.00	5XT - Miragrid 5XT
	9	16.00	444.00	5XT - Miragrid 5XT

Section	Course	Length [ft]	Area [ft²]	Reinforcement
6	7	16.00	444.00	5XT - Miragrid 5XT
	5	16.00	444.00	7XT - Miragrid 7XT
	3	16.00	444.00	7XT - Miragrid 7XT
	1	16.00	444.00	7XT - Miragrid 7XT
	29	16.00	444.00	5XT - Miragrid 5XT
	28	16.00	444.00	5XT - Miragrid 5XT
	26	16.00	444.00	5XT - Miragrid 5XT
	24	16.00	444.00	5XT - Miragrid 5XT
	22	16.00	444.00	5XT - Miragrid 5XT
	20	16.00	444.00	5XT - Miragrid 5XT
	18	16.00	444.00	5XT - Miragrid 5XT
	16	16.00	444.00	5XT - Miragrid 5XT
	14	16.00	444.00	5XT - Miragrid 5XT
	12	16.00	444.00	5XT - Miragrid 5XT
	10	16.00	444.00	5XT - Miragrid 5XT
	8	16.00	444.00	5XT - Miragrid 5XT
	6	16.00	444.00	7XT - Miragrid 7XT
	4	16.00	444.00	7XT - Miragrid 7XT
	2	16.00	444.00	7XT - Miragrid 7XT
7	30	17.00	471.75	5XT - Miragrid 5XT
	29	17.00	471.75	5XT - Miragrid 5XT
	27	17.00	471.75	5XT - Miragrid 5XT
	25	17.00	471.75	5XT - Miragrid 5XT
	23	17.00	471.75	5XT - Miragrid 5XT
	21	17.00	471.75	5XT - Miragrid 5XT
	19	17.00	471.75	5XT - Miragrid 5XT
	17	17.00	471.75	5XT - Miragrid 5XT
	15	17.00	471.75	5XT - Miragrid 5XT
	13	17.00	471.75	5XT - Miragrid 5XT
	11	17.00	471.75	5XT - Miragrid 5XT
	9	17.00	471.75	5XT - Miragrid 5XT
	7	17.00	471.75	7XT - Miragrid 7XT
	5	17.00	471.75	7XT - Miragrid 7XT
	3	17.00	471.75	7XT - Miragrid 7XT
	1	17.00	471.75	8XT - Miragrid 8XT
8	31	17.00	76.50	5XT - Miragrid 5XT
	30	17.00	76.50	5XT - Miragrid 5XT
	28	17.00	76.50	5XT - Miragrid 5XT
	26	17.00	76.50	5XT - Miragrid 5XT
	24	17.00	76.50	5XT - Miragrid 5XT
	22	17.00	76.50	5XT - Miragrid 5XT
	20	17.00	76.50	5XT - Miragrid 5XT
	18	17.00	76.50	5XT - Miragrid 5XT
	16	17.00	76.50	5XT - Miragrid 5XT
	14	17.00	76.50	5XT - Miragrid 5XT
	12	17.00	76.50	5XT - Miragrid 5XT
	10	17.00	76.50	5XT - Miragrid 5XT
	8	17.00	76.50	7XT - Miragrid 7XT
	6	17.00	76.50	7XT - Miragrid 7XT
	4	17.00	76.50	7XT - Miragrid 7XT
	2	17.00	76.50	8XT - Miragrid 8XT
9	31	17.00	216.75	5XT - Miragrid 5XT
	30	17.00	216.75	5XT - Miragrid 5XT
	28	17.00	216.75	5XT - Miragrid 5XT
	26	17.00	216.75	5XT - Miragrid 5XT
	24	17.00	216.75	5XT - Miragrid 5XT
	22	17.00	216.75	5XT - Miragrid 5XT
	20	17.00	216.75	5XT - Miragrid 5XT
	18	17.00	216.75	5XT - Miragrid 5XT
	16	17.00	216.75	5XT - Miragrid 5XT
	14	17.00	216.75	5XT - Miragrid 5XT
	12	17.00	216.75	5XT - Miragrid 5XT
	10	17.00	216.75	5XT - Miragrid 5XT
	8	17.00	216.75	7XT - Miragrid 7XT

Section	Course	Length [ft]	Area [ft²]	Reinforcement
10	6	17.00	216.75	7XT - Miragrid 7XT
	4	17.00	216.75	7XT - Miragrid 7XT
	2	17.00	216.75	8XT - Miragrid 8XT
	30	17.00	76.50	5XT - Miragrid 5XT
	29	17.00	76.50	5XT - Miragrid 5XT
	27	17.00	76.50	5XT - Miragrid 5XT
	25	17.00	76.50	5XT - Miragrid 5XT
	23	17.00	76.50	5XT - Miragrid 5XT
	21	17.00	76.50	5XT - Miragrid 5XT
	19	17.00	76.50	5XT - Miragrid 5XT
11	17	17.00	76.50	5XT - Miragrid 5XT
	15	17.00	76.50	5XT - Miragrid 5XT
	13	17.00	76.50	5XT - Miragrid 5XT
	11	17.00	76.50	5XT - Miragrid 5XT
	9	17.00	76.50	5XT - Miragrid 5XT
	7	17.00	76.50	7XT - Miragrid 7XT
	5	17.00	76.50	7XT - Miragrid 7XT
	3	17.00	76.50	7XT - Miragrid 7XT
	1	17.00	76.50	8XT - Miragrid 8XT
	29	17.00	306.00	5XT - Miragrid 5XT
12	27	17.00	306.00	5XT - Miragrid 5XT
	25	17.00	306.00	5XT - Miragrid 5XT
	23	17.00	306.00	5XT - Miragrid 5XT
	21	17.00	306.00	5XT - Miragrid 5XT
	19	17.00	306.00	5XT - Miragrid 5XT
	17	17.00	306.00	5XT - Miragrid 5XT
	15	17.00	306.00	5XT - Miragrid 5XT
	13	17.00	306.00	5XT - Miragrid 5XT
	11	17.00	306.00	5XT - Miragrid 5XT
	9	17.00	306.00	5XT - Miragrid 5XT
13	7	17.00	306.00	7XT - Miragrid 7XT
	5	17.00	306.00	7XT - Miragrid 7XT
	3	17.00	306.00	7XT - Miragrid 7XT
	1	17.00	306.00	8XT - Miragrid 8XT
	27	16.00	672.00	5XT - Miragrid 5XT
	25	16.00	672.00	5XT - Miragrid 5XT
	23	16.00	672.00	5XT - Miragrid 5XT
	21	16.00	672.00	5XT - Miragrid 5XT
	19	16.00	672.00	5XT - Miragrid 5XT
	17	16.00	672.00	5XT - Miragrid 5XT
14	15	16.00	672.00	5XT - Miragrid 5XT
	13	16.00	672.00	5XT - Miragrid 5XT
	11	16.00	672.00	5XT - Miragrid 5XT
	9	16.00	672.00	5XT - Miragrid 5XT
	7	16.00	672.00	7XT - Miragrid 7XT
	5	16.00	672.00	7XT - Miragrid 7XT
	3	16.00	672.00	7XT - Miragrid 7XT
	1	16.00	672.00	8XT - Miragrid 8XT
	26	15.00	1,215.00	5XT - Miragrid 5XT
	24	15.00	1,215.00	5XT - Miragrid 5XT
15	22	15.00	1,215.00	5XT - Miragrid 5XT
	20	15.00	1,215.00	5XT - Miragrid 5XT
	18	15.00	1,215.00	5XT - Miragrid 5XT
	16	15.00	1,215.00	5XT - Miragrid 5XT
	14	15.00	1,215.00	5XT - Miragrid 5XT
	12	15.00	1,215.00	5XT - Miragrid 5XT
	10	15.00	1,215.00	5XT - Miragrid 5XT
	8	15.00	1,215.00	5XT - Miragrid 5XT
	6	15.00	1,215.00	7XT - Miragrid 7XT
	4	15.00	1,215.00	7XT - Miragrid 7XT
16	2	15.00	1,215.00	7XT - Miragrid 7XT
	25	15.00	483.75	5XT - Miragrid 5XT
	23	15.00	483.75	5XT - Miragrid 5XT
17	21	15.00	483.75	5XT - Miragrid 5XT

Section	Course	Length [ft]	Area [ft²]	Reinforcement
15	19	15.00	483.75	5XT - Miragrid 5XT
	17	15.00	483.75	5XT - Miragrid 5XT
	15	15.00	483.75	5XT - Miragrid 5XT
	13	15.00	483.75	5XT - Miragrid 5XT
	11	15.00	483.75	5XT - Miragrid 5XT
	9	15.00	483.75	5XT - Miragrid 5XT
	7	15.00	483.75	5XT - Miragrid 5XT
	5	15.00	483.75	7XT - Miragrid 7XT
	3	15.00	483.75	7XT - Miragrid 7XT
	1	15.00	483.75	7XT - Miragrid 7XT
	26	15.00	236.25	5XT - Miragrid 5XT
	25	15.00	236.25	5XT - Miragrid 5XT
	23	15.00	236.25	5XT - Miragrid 5XT
	21	15.00	236.25	5XT - Miragrid 5XT
	19	15.00	236.25	5XT - Miragrid 5XT
16	17	15.00	236.25	5XT - Miragrid 5XT
	15	15.00	236.25	5XT - Miragrid 5XT
	13	15.00	236.25	5XT - Miragrid 5XT
	11	15.00	236.25	5XT - Miragrid 5XT
	9	15.00	236.25	5XT - Miragrid 5XT
	7	15.00	236.25	5XT - Miragrid 5XT
	5	15.00	236.25	7XT - Miragrid 7XT
	3	15.00	236.25	7XT - Miragrid 7XT
	1	15.00	236.25	7XT - Miragrid 7XT
	25	15.00	90.00	5XT - Miragrid 5XT
	24	15.00	90.00	5XT - Miragrid 5XT
	22	15.00	90.00	5XT - Miragrid 5XT
	20	15.00	90.00	5XT - Miragrid 5XT
	18	15.00	90.00	5XT - Miragrid 5XT
17	16	15.00	90.00	5XT - Miragrid 5XT
	14	15.00	90.00	5XT - Miragrid 5XT
	12	15.00	90.00	5XT - Miragrid 5XT
	10	15.00	90.00	5XT - Miragrid 5XT
	8	15.00	90.00	5XT - Miragrid 5XT
	6	15.00	90.00	5XT - Miragrid 5XT
	4	15.00	90.00	7XT - Miragrid 7XT
	2	15.00	90.00	7XT - Miragrid 7XT
	24	15.00	90.00	5XT - Miragrid 5XT
	23	15.00	90.00	5XT - Miragrid 5XT
	21	15.00	90.00	5XT - Miragrid 5XT
	19	15.00	90.00	5XT - Miragrid 5XT
	17	15.00	90.00	5XT - Miragrid 5XT
	15	15.00	90.00	5XT - Miragrid 5XT
18	13	15.00	90.00	5XT - Miragrid 5XT
	11	15.00	90.00	5XT - Miragrid 5XT
	9	15.00	90.00	5XT - Miragrid 5XT
	7	15.00	90.00	5XT - Miragrid 5XT
	5	15.00	90.00	5XT - Miragrid 5XT
	3	15.00	90.00	7XT - Miragrid 7XT
	1	15.00	90.00	7XT - Miragrid 7XT
	23	15.00	56.25	5XT - Miragrid 5XT
	22	15.00	56.25	5XT - Miragrid 5XT
	20	15.00	56.25	5XT - Miragrid 5XT
	18	15.00	56.25	5XT - Miragrid 5XT
	16	15.00	56.25	5XT - Miragrid 5XT
	14	15.00	56.25	5XT - Miragrid 5XT
	12	15.00	56.25	5XT - Miragrid 5XT
19	10	15.00	56.25	5XT - Miragrid 5XT
	8	15.00	56.25	5XT - Miragrid 5XT
	6	15.00	56.25	5XT - Miragrid 5XT
	4	15.00	56.25	5XT - Miragrid 5XT
	2	15.00	56.25	7XT - Miragrid 7XT
	24	15.00	45.00	5XT - Miragrid 5XT
	22	15.00	45.00	5XT - Miragrid 5XT

Section	Course	Length [ft]	Area [ft²]	Reinforcement
20	20	15.00	45.00	5XT - Miragrid 5XT
	18	15.00	45.00	5XT - Miragrid 5XT
	16	15.00	45.00	5XT - Miragrid 5XT
	14	15.00	45.00	5XT - Miragrid 5XT
	12	15.00	45.00	5XT - Miragrid 5XT
	10	15.00	45.00	5XT - Miragrid 5XT
	8	15.00	45.00	5XT - Miragrid 5XT
	6	15.00	45.00	5XT - Miragrid 5XT
	4	15.00	45.00	5XT - Miragrid 5XT
	2	15.00	45.00	7XT - Miragrid 7XT
	23	14.00	84.00	5XT - Miragrid 5XT
	21	14.00	84.00	5XT - Miragrid 5XT
	19	14.00	84.00	5XT - Miragrid 5XT
	17	14.00	84.00	5XT - Miragrid 5XT
	15	14.00	84.00	5XT - Miragrid 5XT
	13	14.00	84.00	5XT - Miragrid 5XT
	11	14.00	84.00	5XT - Miragrid 5XT
	9	14.00	84.00	5XT - Miragrid 5XT
	7	14.00	84.00	5XT - Miragrid 5XT
	5	14.00	84.00	5XT - Miragrid 5XT
21	3	14.00	84.00	5XT - Miragrid 5XT
	1	14.00	84.00	7XT - Miragrid 7XT
	22	14.00	84.00	5XT - Miragrid 5XT
	20	14.00	84.00	5XT - Miragrid 5XT
	18	14.00	84.00	5XT - Miragrid 5XT
	16	14.00	84.00	5XT - Miragrid 5XT
	14	14.00	84.00	5XT - Miragrid 5XT
	12	14.00	84.00	5XT - Miragrid 5XT
	10	14.00	84.00	5XT - Miragrid 5XT
	8	14.00	84.00	5XT - Miragrid 5XT
	6	14.00	84.00	5XT - Miragrid 5XT
	4	14.00	84.00	5XT - Miragrid 5XT
	2	14.00	84.00	5XT - Miragrid 5XT
	21	13.00	78.00	5XT - Miragrid 5XT
	19	13.00	78.00	5XT - Miragrid 5XT
	17	13.00	78.00	5XT - Miragrid 5XT
	15	13.00	78.00	5XT - Miragrid 5XT
	13	13.00	78.00	5XT - Miragrid 5XT
	11	13.00	78.00	5XT - Miragrid 5XT
22	9	13.00	78.00	5XT - Miragrid 5XT
	7	13.00	78.00	5XT - Miragrid 5XT
	5	13.00	78.00	5XT - Miragrid 5XT
	3	13.00	78.00	5XT - Miragrid 5XT
	1	13.00	78.00	5XT - Miragrid 5XT
	20	13.00	78.00	5XT - Miragrid 5XT
	18	13.00	78.00	5XT - Miragrid 5XT
	16	13.00	78.00	5XT - Miragrid 5XT
	14	13.00	78.00	5XT - Miragrid 5XT
	12	13.00	78.00	5XT - Miragrid 5XT
	10	13.00	78.00	5XT - Miragrid 5XT
	8	13.00	78.00	5XT - Miragrid 5XT
	6	13.00	78.00	5XT - Miragrid 5XT
	4	13.00	78.00	5XT - Miragrid 5XT
	2	13.00	78.00	5XT - Miragrid 5XT
	19	12.00	63.00	5XT - Miragrid 5XT
	17	12.00	63.00	5XT - Miragrid 5XT
	15	12.00	63.00	5XT - Miragrid 5XT
	13	12.00	63.00	5XT - Miragrid 5XT
23	11	12.00	63.00	5XT - Miragrid 5XT
	9	12.00	63.00	5XT - Miragrid 5XT
	7	12.00	63.00	5XT - Miragrid 5XT
	5	12.00	63.00	5XT - Miragrid 5XT
	3	12.00	63.00	5XT - Miragrid 5XT
	1	12.00	63.00	5XT - Miragrid 5XT
	19	12.00	63.00	5XT - Miragrid 5XT
	17	12.00	63.00	5XT - Miragrid 5XT
	15	12.00	63.00	5XT - Miragrid 5XT
	13	12.00	63.00	5XT - Miragrid 5XT
	11	12.00	63.00	5XT - Miragrid 5XT
	9	12.00	63.00	5XT - Miragrid 5XT
	7	12.00	63.00	5XT - Miragrid 5XT
	5	12.00	63.00	5XT - Miragrid 5XT
	3	12.00	63.00	5XT - Miragrid 5XT
	1	12.00	63.00	5XT - Miragrid 5XT
	19	12.00	63.00	5XT - Miragrid 5XT
	17	12.00	63.00	5XT - Miragrid 5XT
	15	12.00	63.00	5XT - Miragrid 5XT
	13	12.00	63.00	5XT - Miragrid 5XT

Section	Course	Length [ft]	Area [ft²]	Reinforcement
25	18	12.00	27.00	5XT - Miragrid 5XT
	16	12.00	27.00	5XT - Miragrid 5XT
	14	12.00	27.00	5XT - Miragrid 5XT
	12	12.00	27.00	5XT - Miragrid 5XT
	10	12.00	27.00	5XT - Miragrid 5XT
	8	12.00	27.00	5XT - Miragrid 5XT
	6	12.00	27.00	5XT - Miragrid 5XT
	4	12.00	27.00	5XT - Miragrid 5XT
	2	12.00	27.00	5XT - Miragrid 5XT
26	19	11.00	49.50	5XT - Miragrid 5XT
	18	11.00	49.50	5XT - Miragrid 5XT
	16	11.00	49.50	5XT - Miragrid 5XT
	14	11.00	49.50	5XT - Miragrid 5XT
	12	11.00	49.50	5XT - Miragrid 5XT
	10	11.00	49.50	5XT - Miragrid 5XT
	8	11.00	49.50	5XT - Miragrid 5XT
	6	11.00	49.50	5XT - Miragrid 5XT
	4	11.00	49.50	5XT - Miragrid 5XT
27	2	11.00	49.50	5XT - Miragrid 5XT
	18	11.00	16.50	5XT - Miragrid 5XT
	17	11.00	16.50	5XT - Miragrid 5XT
	15	11.00	16.50	5XT - Miragrid 5XT
	13	11.00	16.50	5XT - Miragrid 5XT
	11	11.00	16.50	5XT - Miragrid 5XT
	9	11.00	16.50	5XT - Miragrid 5XT
	7	11.00	16.50	5XT - Miragrid 5XT
	5	11.00	16.50	5XT - Miragrid 5XT
	3	11.00	16.50	5XT - Miragrid 5XT
	1	11.00	16.50	5XT - Miragrid 5XT

Analysis Summary

Lowest Values - Reinforced

Static Analysis

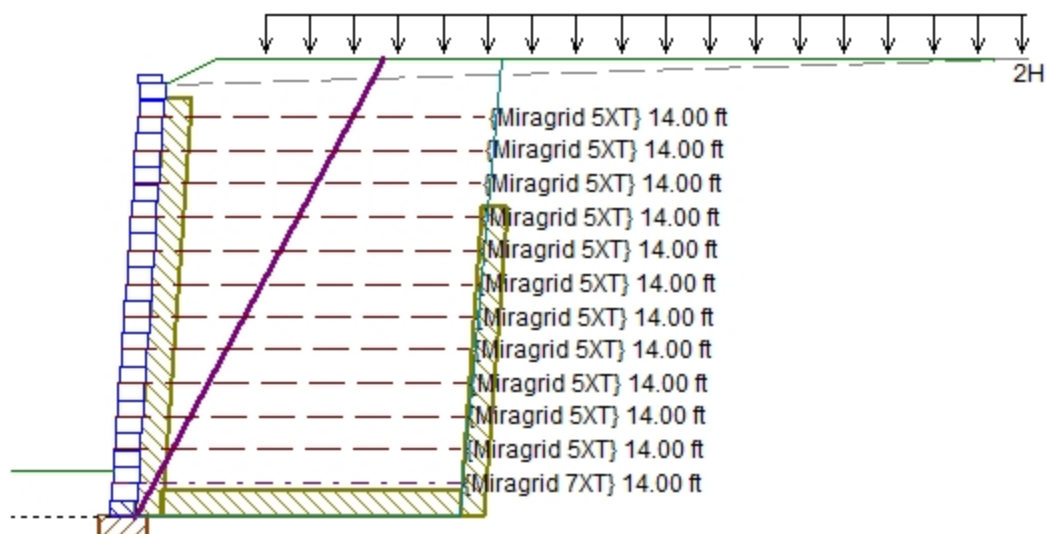
Test	Description	Section	Layer/ Course	Minimum Requirement	Result	Status
FSSl	Base Sliding	26		1.50	1.59	Pass
FSbc	Bearing Capacity	26		2.00	10.70	Pass
FSct	Crest Toppling	11	29	1.50	-0.01	Fail
FSot	Overturning	26		2.00	2.71	Pass
FSSl	Internal Sliding	27	1	1.50	1.54	Pass
FSpo	Pullout	26	7	1.50	12.97	Pass
FSto	Tensile Overstress	6	1	1.50	1.54	Pass
FScs	Connection Strength	6	1	1.50	1.68	Pass
Rs	Max. Reinforcement Separation	14		0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	5		0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	10		0.0000	1.0000	Pass
La	Min. Anchorage Length	26		1.0000	4.0082	Pass
L/H Ratio	Min. L/H Ratio	6		0.7000	0.7891	Pass
L	Min. Reinforcement Length	26		4.0000	11.0000	Pass

Below Standard Values

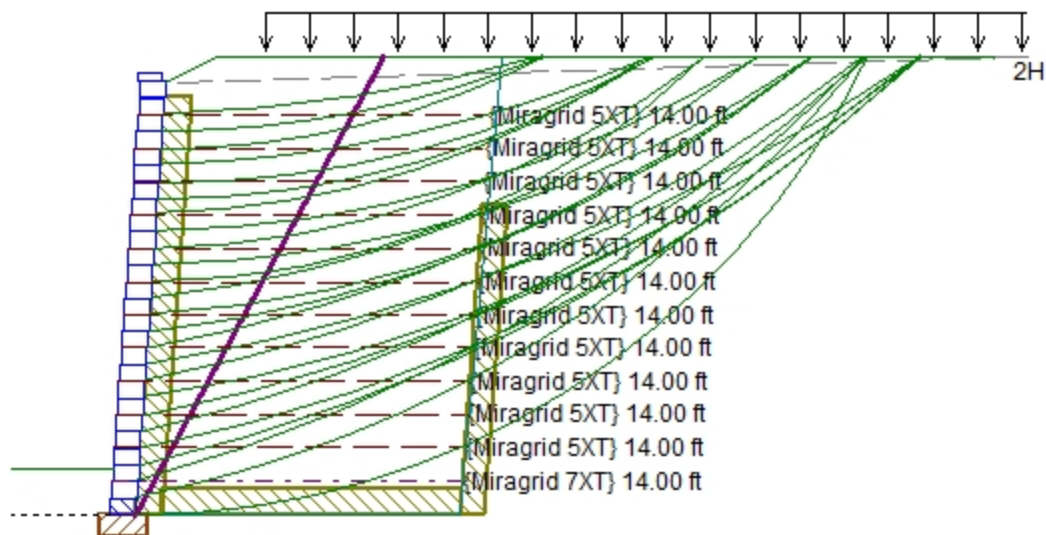
Test	Description	Section	Layer/ Course	Minimum Requirement	Result
FSct	Crest Toppling	11	29	1.50	-0.01
FSct	Crest Toppling	10	30	1.50	-0.01
FSct	Crest Toppling	9	31	1.50	-0.01
FSct	Crest Toppling	14	25	1.50	-0.01
FSct	Crest Toppling	13	26	1.50	-0.01
FSct	Crest Toppling	12	27	1.50	-0.01
FSct	Crest Toppling	8	31	1.50	-0.01
FSct	Crest Toppling	4	27	1.50	-0.01
FSct	Crest Toppling	3	26	1.50	-0.01
FSct	Crest Toppling	2	25	1.50	-0.01
FSct	Crest Toppling	7	30	1.50	-0.01
FSct	Crest Toppling	6	29	1.50	-0.01
FSct	Crest Toppling	5	28	1.50	-0.01
FSct	Crest Toppling	24	19	1.50	-0.01
FSct	Crest Toppling	23	20	1.50	-0.01
FSct	Crest Toppling	22	21	1.50	-0.01
FSct	Crest Toppling	27	18	1.50	-0.01
FSct	Crest Toppling	26	19	1.50	-0.01
FSct	Crest Toppling	25	18	1.50	-0.01
FSct	Crest Toppling	21	22	1.50	-0.01
FSct	Crest Toppling	17	24	1.50	-0.01
FSct	Crest Toppling	16	25	1.50	-0.01
FSct	Crest Toppling	15	26	1.50	-0.01
FSct	Crest Toppling	20	23	1.50	-0.01
FSct	Crest Toppling	19	24	1.50	-0.01
FSct	Crest Toppling	18	23	1.50	-0.01
FSct	Crest Toppling	1	24	1.50	-0.01

Section 1 Details

Section 1 Cross-section



Section 1 Static ICS Cross-section



Section 1 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1077.79 ft
Base of Section		1076.00 ft
Design Height	H	17.31 ft
Embedment Depth	Hemb	1.79 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	11.5200	Pass
L	Min. Reinforcement Length	4.0000	14.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8088	Pass
La	Min. Anchorage Length	1.0000	5.4314	Pass
MinHemb	Minimum Embedment	12.0000	21.4488	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.31	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.10	Pass
FSsl	Base Sliding	1.50	1.74	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,077.33	1.82	20.87	1.60	1.78
2	1,078.67	2.93	30.14	1.71	2.34
3	1,080.00	3.11	28.39	1.85	2.54
4	1,081.33	3.32	26.62	2.00	2.79
5	1,082.67	3.57	24.85	2.19	3.08
6	1,084.00	3.89	23.06	2.42	3.45
7	1,085.33	4.09	21.25	2.70	3.92
8	1,086.67	4.33	19.40	3.06	4.54
9	1,088.00	4.66	17.50	3.53	5.38
10	1,089.33	5.13	15.51	4.19	6.61
11	1,090.67	9.98	22.61	5.18	14.51
12	1,092.00	15.75	23.35	6.94	26.32

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	3	1.53	Pass
1	7	1	1.58	Pass
6	7	2	1.61	Pass
8	8	5	1.61	Pass
10	8	4	1.65	Pass
10	8	7	1.71	Pass
10	7	6	1.75	Pass
10	7	9	1.83	Pass
7	8	8	1.88	Pass
10	6	11	1.98	Pass



Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	18.33 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	13.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.37 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	10.38 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	17.31 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.37 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	13.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.48 ft	Eq. 7-4
Increase in height due to backslope	h	6.89 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	19.23 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	17.31 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.289	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.77 ft	Eq. 7-26
Horz. influence distance	dint	8.74 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	13.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	10599.08 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2138.99 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	10599.08 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2138.99 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	12738.08 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.11 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.16 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	14.43 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	14.64 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1519.70 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	32455.08 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1662.18 lb/ft	Eq. 7-31
Base sliding resistance	Rs	22156.01 lb/ft	Eq. 7-32
Base sliding	FSsl	1.739	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1519.70 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	32455.08 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1662.18 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	7.58 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	8.72 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.54 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	9.73 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	15.28 ft	Eq. 7-36A3
Resisting moment	Mr	261425.51 lb	Eq. 7-34
Driving moment	Mo	84357.07 lb	Eq. 7-38
Overturning	FSot	3.099	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	10.38 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.81 ft	Eq. 7-41
Applied bearing pressure	Qa	3506.45 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	43167.96 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	12.311	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,077.33	2509.38	2.00	16.31	1413.22
2/4	1,078.67	1999.00	1.33	14.64	855.69
3/6	1,080.00	1999.00	1.33	13.31	786.52
4/8	1,081.33	1999.00	1.33	11.98	717.35
5/10	1,082.67	1999.00	1.33	10.64	648.18
6/12	1,084.00	1999.00	1.33	9.31	579.01
7/14	1,085.33	1999.00	1.33	7.98	509.84
8/16	1,086.67	1999.00	1.33	6.64	440.67
9/18	1,088.00	1999.00	1.33	5.31	371.50
10/20	1,089.33	1999.00	1.33	3.98	302.33
11/22	1,090.67	1999.00	1.33	2.64	137.75
12/24	1,092.00	1999.00	1.98	0.99	75.96

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,077.33	1.776	1.000	1.000
2/4	1,078.67	2.336	1.000	1.000
3/6	1,080.00	2.542	1.000	1.000
4/8	1,081.33	2.787	1.000	1.000
5/10	1,082.67	3.084	1.000	1.000
6/12	1,084.00	3.452	1.000	1.000
7/14	1,085.33	3.921	1.000	1.000
8/16	1,086.67	4.536	1.000	1.000
9/18	1,088.00	5.381	1.000	1.000
10/20	1,089.33	6.612	1.000	1.000
11/22	1,090.67	14.512	1.000	0.007
12/24	1,092.00	26.316	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,077.33	1413.22	29487.63	12.37	17.00
2/4	1,078.67	855.69	25788.60	11.74	15.66
3/6	1,080.00	786.52	22325.50	11.11	14.33
4/8	1,081.33	717.35	19098.32	10.48	13.00
5/10	1,082.67	648.18	16107.06	9.85	11.66
6/12	1,084.00	579.01	13351.72	9.22	10.33
7/14	1,085.33	509.84	10832.30	8.59	9.00
8/16	1,086.67	440.67	8548.80	7.95	7.66
9/18	1,088.00	371.50	6501.22	7.32	6.33
10/20	1,089.33	302.33	4689.57	6.69	5.00
11/22	1,090.67	137.75	3113.83	6.06	3.66
12/24	1,092.00	75.96	1774.02	5.43	2.33

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,077.33	20.866
2/4	1,078.67	30.138
3/6	1,080.00	28.385
4/8	1,081.33	26.624
5/10	1,082.67	24.850
6/12	1,084.00	23.060
7/14	1,085.33	21.246
8/16	1,086.67	19.400

Layer/ Course	Elevation (ft)	FSpo [7-66]
9/18	1,088.00	17.500
10/20	1,089.33	15.511
11/22	1,090.67	22.605
12/24	1,092.00	23.354

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,077.33	9089.31	0.00	1980.80	0.00
2/4	1,078.67	7719.07	0.00	1825.40	0.00
3/6	1,080.00	6460.72	0.00	1670.00	0.00
4/8	1,081.33	5314.26	0.00	1514.60	0.00
5/10	1,082.67	4279.69	0.00	1359.19	0.00
6/12	1,084.00	3357.01	0.00	1203.79	0.00
7/14	1,085.33	2546.22	0.00	1048.39	0.00
8/16	1,086.67	1847.32	0.00	892.99	0.00
9/18	1,088.00	1260.31	0.00	737.59	0.00
10/20	1,089.33	785.18	0.00	582.19	0.00
11/22	1,090.67	421.95	0.00	426.78	0.00
12/24	1,092.00	170.61	0.00	271.38	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,077.33	0.00	0.00	11070.11	0.00
2/4	1,078.67	0.00	0.00	9544.47	0.00
3/6	1,080.00	0.00	0.00	8130.72	0.00
4/8	1,081.33	0.00	0.00	6828.85	0.00
5/10	1,082.67	0.00	0.00	5638.88	0.00
6/12	1,084.00	0.00	0.00	4560.80	0.00
7/14	1,085.33	0.00	0.00	3594.61	0.00
8/16	1,086.67	0.00	0.00	2740.31	0.00
9/18	1,088.00	0.00	0.00	1997.89	0.00
10/20	1,089.33	0.00	0.00	1367.37	0.00
11/22	1,090.67	0.00	0.00	848.74	0.00
12/24	1,092.00	0.00	0.00	441.99	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,077.33	15482.24	28138.51	2193.11	1.597
2/4	1,078.67	14262.19	25790.12	2085.19	1.713
3/6	1,080.00	13042.13	23441.73	1977.27	1.847
4/8	1,081.33	11822.08	21093.34	1869.35	2.005
5/10	1,082.67	10602.03	18744.95	1761.43	2.193
6/12	1,084.00	9381.98	16396.56	1653.51	2.420
7/14	1,085.33	8161.93	14048.16	1545.59	2.701
8/16	1,086.67	6941.88	11699.77	1437.67	3.058
9/18	1,088.00	5721.83	9351.38	1329.74	3.530
10/20	1,089.33	4501.78	7002.99	1221.82	4.186
11/22	1,090.67	3281.73	4654.60	1113.90	5.179
12/24	1,092.00	2061.68	2306.21	1005.98	6.940

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,077.33	1413.22	2566.15	1.816	5.09
2/4	1,078.67	855.69	2506.50	2.929	5.09
3/6	1,080.00	786.52	2442.51	3.105	5.09



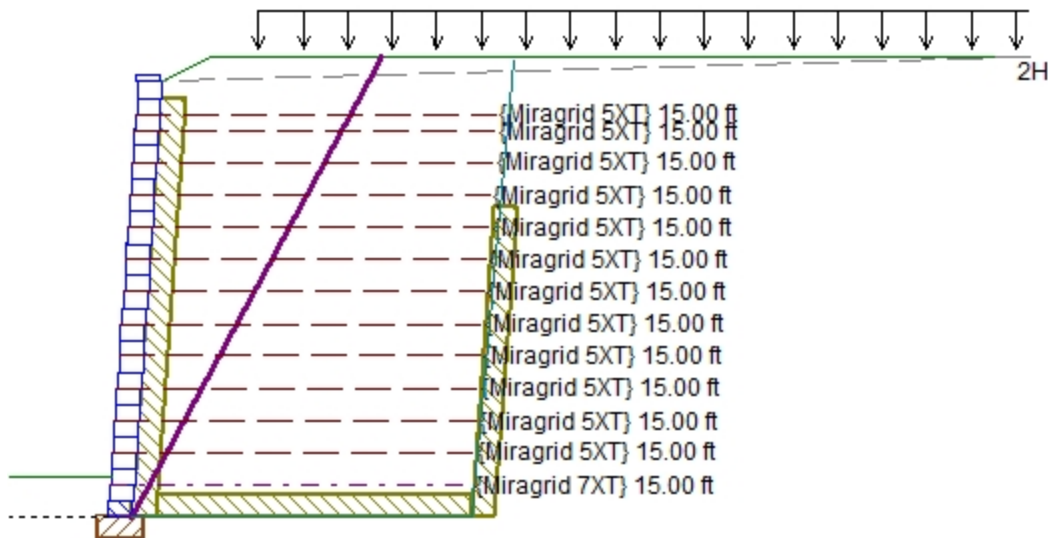
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinflmax (ft) [7-92]
4/8	1,081.33	717.35	2378.51	3.316	5.09
5/10	1,082.67	648.18	2314.51	3.571	5.09
6/12	1,084.00	579.01	2250.52	3.887	5.09
7/14	1,085.33	509.84	2084.99	4.089	5.09
8/16	1,086.67	440.67	1907.29	4.328	5.09
9/18	1,088.00	371.50	1729.59	4.656	5.09
10/20	1,089.33	302.33	1551.90	5.133	5.09
11/22	1,090.67	137.75	1374.20	9.976	5.09
12/24	1,092.00	75.96	1196.50	15.751	5.09

Crest Toppling

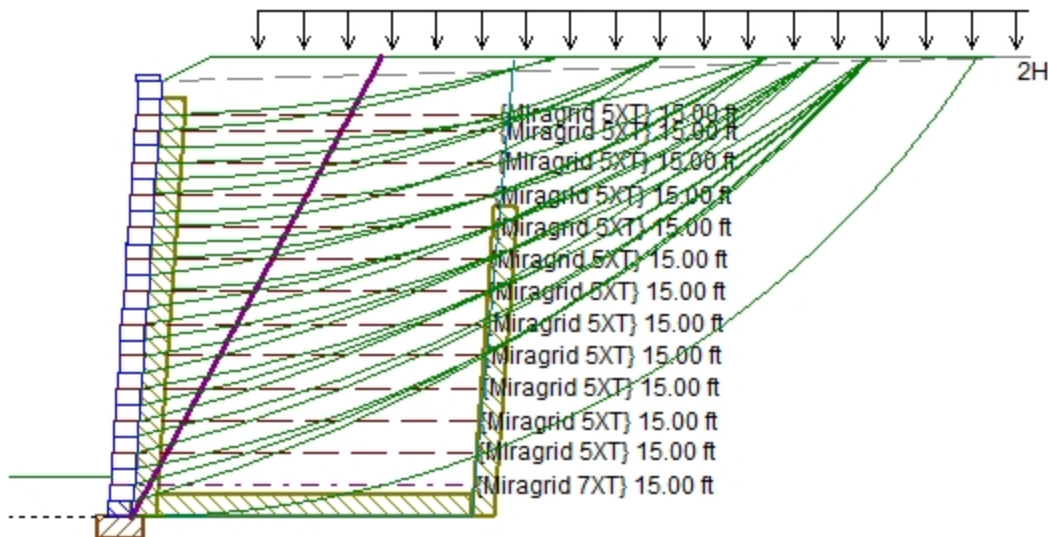
Height from top layer to grade	Hz	1.31 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2138.99 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 2 Details

Section 2 Cross-section



Section 2 Static ICS Cross-section



Section 2 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1077.67 ft
Base of Section		1076.00 ft
Design Height	H	18.00 ft
Embedment Depth	Hemb	1.67 ft
* Embedment is included in Bearing Capacity		

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.2500	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8333	Pass
La	Min. Anchorage Length	1.0000	6.1161	Pass
MinHemb	Minimum Embedment	12.0000	20.0748	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.10	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.33	Pass
FSsl	Base Sliding	1.50	1.81	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,077.33	1.78	22.66	1.65	1.71
2	1,078.67	1.82	20.87	1.60	1.78
3	1,080.00	2.93	32.85	1.71	2.25
4	1,081.33	2.85	30.14	1.76	2.34
5	1,082.67	3.02	28.39	1.85	2.44
6	1,084.00	3.11	31.09	1.89	2.54
7	1,085.33	3.32	26.62	2.00	2.79
8	1,086.67	3.21	29.32	2.05	2.66
9	1,088.00	3.57	27.54	2.19	3.08
10	1,089.33	3.44	24.85	2.23	2.93
11	1,090.67	3.89	23.06	2.45	3.45
12	1,092.00	3.72	25.74	2.42	3.26
13	1,092.67	4.09	23.92	2.71	3.92

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	7	3	1.54	Pass
1	9	1	1.60	Pass
10	7	2	1.61	Pass
10	7	5	1.62	Pass
6	7	4	1.67	Pass
10	6	7	1.72	Pass
8	7	6	1.76	Pass
7	7	9	1.83	Pass
10	7	8	1.87	Pass
7	6	11	1.97	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	19.02 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.24 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	11.07 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	18.00 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.24 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	20.37 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	18.00 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.288	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.00 ft	Eq. 7-26
Horz. influence distance	dint	9.07 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	11383.11 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2216.70 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	11383.11 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2216.70 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	13599.81 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.34 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.51 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.44 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.66 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	36179.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	24664.33 lb/ft	Eq. 7-32
Base sliding	FSsl	1.814	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	36179.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.11 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.27 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.59 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.28 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.33 ft	Eq. 7-36A3
Resisting moment	Mr	310890.47 lb	Eq. 7-34
Driving moment	Mo	93245.05 lb	Eq. 7-38
Overturning	FSot	3.334	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.46 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.77 ft	Eq. 7-41
Applied bearing pressure	Qa	3534.50 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	46302.04 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.100	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,077.33	2509.38	2.00	17.00	1463.78
2/4	1,078.67	1999.00	1.33	15.33	889.58
3/6	1,080.00	1999.00	1.33	14.00	820.56
4/8	1,081.33	1999.00	1.33	12.67	751.54
5/10	1,082.67	1999.00	1.33	11.33	682.52
6/12	1,084.00	1999.00	1.33	10.00	613.50
7/14	1,085.33	1999.00	1.33	8.67	544.48
8/16	1,086.67	1999.00	1.33	7.33	475.46
9/18	1,088.00	1999.00	1.33	6.00	406.45
10/20	1,089.33	1999.00	1.33	4.67	337.43
11/22	1,090.67	1999.00	1.33	3.33	177.52
12/24	1,092.00	1999.00	1.00	2.17	84.12
13/25	1,092.67	1999.00	1.67	0.83	53.92

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,077.33	1.714	1.000	1.000
2/4	1,078.67	2.247	1.000	1.000
3/6	1,080.00	2.436	1.000	1.000
4/8	1,081.33	2.660	1.000	1.000
5/10	1,082.67	2.929	1.000	1.000
6/12	1,084.00	3.258	1.000	1.000
7/14	1,085.33	3.671	1.000	1.000
8/16	1,086.67	4.204	1.000	1.000
9/18	1,088.00	4.918	1.000	1.000
10/20	1,089.33	5.924	1.000	1.000
11/22	1,090.67	11.261	1.000	0.052
12/24	1,092.00	23.765	1.000	0.000
13/25	1,092.67	37.073	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,077.33	1463.78	33166.70	13.37	17.69
2/4	1,078.67	889.58	29219.55	12.74	16.35
3/6	1,080.00	820.56	25508.32	12.11	15.02
4/8	1,081.33	751.54	22033.01	11.48	13.69
5/10	1,082.67	682.52	18793.62	10.85	12.35
6/12	1,084.00	613.50	15790.15	10.22	11.02
7/14	1,085.33	544.48	13022.61	9.59	9.69
8/16	1,086.67	475.46	10490.98	8.95	8.35
9/18	1,088.00	406.45	8195.27	8.32	7.02
10/20	1,089.33	337.43	6135.49	7.69	5.69
11/22	1,090.67	177.52	4311.63	7.06	4.35
12/24	1,092.00	84.12	2723.68	6.43	3.02
13/25	1,092.67	53.92	2018.18	6.12	2.35

Layer/ Course	Elevation (ft)	FSpo [7-66]
1/2	1,077.33	22.658
2/4	1,078.67	32.847
3/6	1,080.00	31.086
4/8	1,081.33	29.317
5/10	1,082.67	27.536

Layer/ Course	Elevation (ft)	FSpo [7-66]
6/12	1,084.00	25.738
7/14	1,085.33	23.917
8/16	1,086.67	22.065
9/18	1,088.00	20.163
10/20	1,089.33	18.183
11/22	1,090.67	24.288
12/24	1,092.00	32.380
13/25	1,092.67	37.428

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,077.33	9843.03	0.00	2061.29	0.00
2/4	1,078.67	8414.83	0.00	1905.89	0.00
3/6	1,080.00	7098.53	0.00	1750.49	0.00
4/8	1,081.33	5894.11	0.00	1595.09	0.00
5/10	1,082.67	4801.59	0.00	1439.69	0.00
6/12	1,084.00	3820.95	0.00	1284.28	0.00
7/14	1,085.33	2952.21	0.00	1128.88	0.00
8/16	1,086.67	2195.35	0.00	973.48	0.00
9/18	1,088.00	1550.39	0.00	818.08	0.00
10/20	1,089.33	1017.31	0.00	662.68	0.00
11/22	1,090.67	596.13	0.00	507.28	0.00
12/24	1,092.00	286.83	0.00	351.87	0.00
13/25	1,092.67	174.14	0.00	274.17	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,077.33	0.00	0.00	11904.32	0.00
2/4	1,078.67	0.00	0.00	10320.72	0.00
3/6	1,080.00	0.00	0.00	8849.02	0.00
4/8	1,081.33	0.00	0.00	7489.20	0.00
5/10	1,082.67	0.00	0.00	6241.27	0.00
6/12	1,084.00	0.00	0.00	5105.24	0.00
7/14	1,085.33	0.00	0.00	4081.09	0.00
8/16	1,086.67	0.00	0.00	3168.83	0.00
9/18	1,088.00	0.00	0.00	2368.47	0.00
10/20	1,089.33	0.00	0.00	1679.99	0.00
11/22	1,090.67	0.00	0.00	1103.40	0.00
12/24	1,092.00	0.00	0.00	638.70	0.00
13/25	1,092.67	0.00	0.00	448.31	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,077.33	17354.58	31604.89	2249.01	1.647
2/4	1,078.67	16041.02	29076.50	2141.09	1.762
3/6	1,080.00	14727.45	26548.11	2033.17	1.894
4/8	1,081.33	13413.89	24019.72	1925.25	2.048
5/10	1,082.67	12100.32	21491.33	1817.33	2.230
6/12	1,084.00	10786.76	18962.94	1709.41	2.448
7/14	1,085.33	9473.19	16434.54	1601.49	2.714
8/16	1,086.67	8159.63	13906.15	1493.56	3.046
9/18	1,088.00	6846.06	11377.76	1385.64	3.476
10/20	1,089.33	5532.50	8849.37	1277.72	4.054
11/22	1,090.67	4218.93	6320.98	1169.80	4.884
12/24	1,092.00	2905.36	3792.59	1061.88	6.211
13/25	1,092.67	2248.58	2528.39	1007.92	7.264

Connection Strength

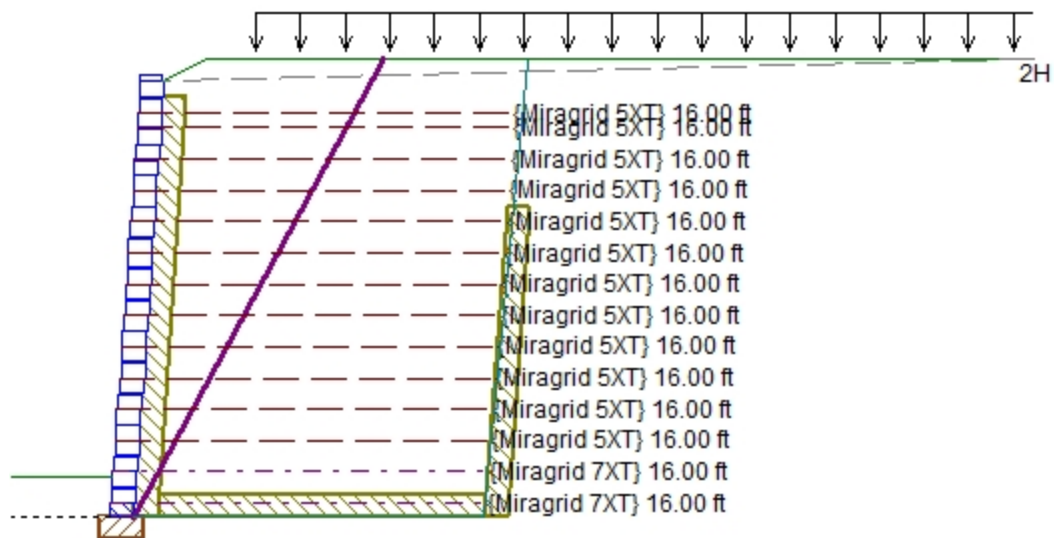
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,077.33	1463.78	2605.86	1.780	5.29
2/4	1,078.67	889.58	2539.65	2.855	5.29
3/6	1,080.00	820.56	2475.65	3.017	5.29
4/8	1,081.33	751.54	2411.66	3.209	5.29
5/10	1,082.67	682.52	2347.66	3.440	5.29
6/12	1,084.00	613.50	2283.67	3.722	5.29
7/14	1,085.33	544.48	2177.03	3.998	5.29
8/16	1,086.67	475.46	1999.33	4.205	5.29
9/18	1,088.00	406.45	1821.63	4.482	5.29
10/20	1,089.33	337.43	1643.94	4.872	5.29
11/22	1,090.67	177.52	1466.24	8.260	5.29
12/24	1,092.00	84.12	1288.54	15.318	5.29
13/25	1,092.67	53.92	1199.70	22.249	5.29

Crest Toppling

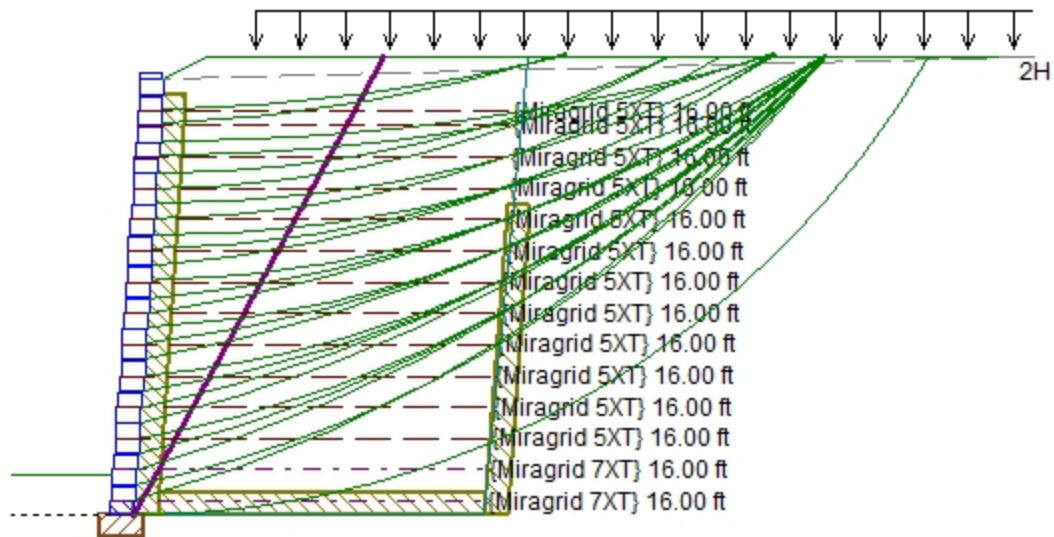
Height from top layer to grade	Hz	1.33 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2216.70 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 3 Details

Section 3 Cross-section



Section 3 Static ICS Cross-section



Section 3 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1077.07 ft
Base of Section		1075.33 ft
Design Height	H	18.66 ft
Embedment Depth	Hemb	1.73 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.2500	Pass
L	Min. Reinforcement Length	4.0000	16.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8576	Pass
La	Min. Anchorage Length	1.0000	6.8009	Pass
MinHemb	Minimum Embedment	12.0000	20.8189	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.05	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.56	Pass
FSsl	Base Sliding	1.50	1.88	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,076.00	2.62	38.20	1.64	2.45
2	1,077.33	1.78	22.66	1.65	1.78
3	1,078.67	1.82	20.87	1.60	1.71
4	1,080.00	2.72	36.44	1.75	2.62
5	1,081.33	2.93	30.14	1.76	2.34
6	1,082.67	2.85	32.85	1.71	2.25
7	1,084.00	2.86	34.68	1.87	2.25
8	1,085.33	3.11	31.09	1.89	2.44
9	1,086.67	3.02	28.39	1.85	2.54
10	1,088.00	3.02	32.91	2.01	2.44
11	1,089.33	3.21	29.32	2.00	2.66
12	1,090.67	3.32	26.62	2.05	2.79
13	1,092.00	3.22	31.13	2.18	2.67
14	1,092.67	3.44	24.85	2.23	2.93

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	6	2	1.55	Pass
10	6	4	1.60	Pass
6	6	3	1.68	Pass
6	6	6	1.69	Pass
8	6	5	1.71	Pass
1	8	1	1.73	Pass
9	6	8	1.79	Pass
10	6	7	1.82	Pass
4	6	10	1.91	Pass
6	6	9	1.94	Pass



Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	19.68 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	15.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.13 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	11.73 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	18.66 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.13 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	15.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.56 ft	Eq. 7-4
Increase in height due to backslope	h	7.95 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	21.51 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	18.66 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.287	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.22 ft	Eq. 7-26
Horz. influence distance	dint	9.38 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	15.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	12195.11 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2294.40 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	12195.11 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2294.40 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	14489.51 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.56 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.84 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	16.46 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	16.69 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	40020.29 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1937.32 lb/ft	Eq. 7-31
Base sliding resistance	Rs	27247.59 lb/ft	Eq. 7-32
Base sliding	FSsl	1.881	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	40020.29 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1937.32 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.63 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.82 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.64 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.83 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	17.38 ft	Eq. 7-36A3
Resisting moment	Mr	365356.05 lb	Eq. 7-34
Driving moment	Mo	102558.72 lb	Eq. 7-38
Overturning	FSot	3.562	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	12.53 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.74 ft	Eq. 7-41
Applied bearing pressure	Qa	3571.33 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	50183.49 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	14.052	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,076.00	2509.38	1.33	17.99	1025.05
2/3	1,077.33	2509.38	1.33	16.66	956.17
3/5	1,078.67	1999.00	1.33	15.32	887.30
4/7	1,080.00	1999.00	1.33	13.99	818.42
5/9	1,081.33	1999.00	1.33	12.66	749.54
6/11	1,082.67	1999.00	1.33	11.32	680.66
7/13	1,084.00	1999.00	1.33	9.99	611.78
8/15	1,085.33	1999.00	1.33	8.66	542.90
9/17	1,086.67	1999.00	1.33	7.32	474.02
10/19	1,088.00	1999.00	1.33	5.99	405.14
11/21	1,089.33	1999.00	1.33	4.66	336.27
12/23	1,090.67	1999.00	1.33	3.32	176.42
13/25	1,092.00	1999.00	1.00	2.16	83.59
14/26	1,092.67	1999.00	1.66	0.83	53.22

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,076.00	2.448	1.000	1.000
2/3	1,077.33	2.624	1.000	1.000
3/5	1,078.67	2.253	1.000	1.000
4/7	1,080.00	2.443	1.000	1.000
5/9	1,081.33	2.667	1.000	1.000
6/11	1,082.67	2.937	1.000	1.000
7/13	1,084.00	3.268	1.000	1.000
8/15	1,085.33	3.682	1.000	1.000
9/17	1,086.67	4.217	1.000	1.000
10/19	1,088.00	4.934	1.000	1.000
11/21	1,089.33	5.945	1.000	1.000
12/23	1,090.67	11.331	1.000	0.049
13/25	1,092.00	23.914	1.000	0.000
14/26	1,092.67	37.561	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,076.00	1025.05	39157.39	14.68	19.01
2/3	1,077.33	956.17	34847.08	14.05	17.68
3/5	1,078.67	887.30	30772.69	13.42	16.34
4/7	1,080.00	818.42	26934.22	12.79	15.01
5/9	1,081.33	749.54	23331.67	12.16	13.68
6/11	1,082.67	680.66	19965.05	11.53	12.34
7/13	1,084.00	611.78	16834.34	10.90	11.01
8/15	1,085.33	542.90	13939.56	10.27	9.68
9/17	1,086.67	474.02	11280.70	9.64	8.34
10/19	1,088.00	405.14	8857.75	9.01	7.01
11/21	1,089.33	336.27	6670.73	8.38	5.68
12/23	1,090.67	176.42	4719.63	7.75	4.34
13/25	1,092.00	83.59	3004.45	7.12	3.01
14/26	1,092.67	53.22	2235.33	6.80	2.34

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,076.00	38.200
2/3	1,077.33	36.444

Layer/ Course	Elevation (ft)	FSpo [7-66]
3/5	1,078.67	34.681
4/7	1,080.00	32.910
5/9	1,081.33	31.128
6/11	1,082.67	29.332
7/13	1,084.00	27.517
8/15	1,085.33	25.676
9/17	1,086.67	23.798
10/19	1,088.00	21.863
11/21	1,089.33	19.838
12/23	1,090.67	26.752
13/25	1,092.00	35.943
14/26	1,092.67	42.002

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,076.00	11372.12	0.00	2215.62	0.00
2/3	1,077.33	9832.80	0.00	2060.22	0.00
3/5	1,078.67	8405.38	0.00	1904.82	0.00
4/7	1,080.00	7089.85	0.00	1749.42	0.00
5/9	1,081.33	5886.20	0.00	1594.02	0.00
6/11	1,082.67	4794.45	0.00	1438.62	0.00
7/13	1,084.00	3814.58	0.00	1283.21	0.00
8/15	1,085.33	2946.61	0.00	1127.81	0.00
9/17	1,086.67	2190.53	0.00	972.41	0.00
10/19	1,088.00	1546.33	0.00	817.01	0.00
11/21	1,089.33	1014.03	0.00	661.61	0.00
12/23	1,090.67	593.61	0.00	506.21	0.00
13/25	1,092.00	285.09	0.00	350.80	0.00
14/26	1,092.67	172.78	0.00	273.10	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,076.00	0.00	0.00	13587.74	0.00
2/3	1,077.33	0.00	0.00	11893.03	0.00
3/5	1,078.67	0.00	0.00	10310.20	0.00
4/7	1,080.00	0.00	0.00	8839.27	0.00
5/9	1,081.33	0.00	0.00	7480.22	0.00
6/11	1,082.67	0.00	0.00	6233.06	0.00
7/13	1,084.00	0.00	0.00	5097.80	0.00
8/15	1,085.33	0.00	0.00	4074.42	0.00
9/17	1,086.67	0.00	0.00	3162.94	0.00
10/19	1,088.00	0.00	0.00	2363.34	0.00
11/21	1,089.33	0.00	0.00	1675.63	0.00
12/23	1,090.67	0.00	0.00	1099.82	0.00
13/25	1,092.00	0.00	0.00	635.89	0.00
14/26	1,092.67	0.00	0.00	445.89	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,076.00	19992.37	36544.62	2356.19	1.645
2/3	1,077.33	18585.29	33836.23	2248.27	1.752
3/5	1,078.67	17178.21	31127.84	2140.35	1.874
4/7	1,080.00	15771.13	28419.45	2032.42	2.014
5/9	1,081.33	14364.05	25711.06	1924.50	2.178
6/11	1,082.67	12956.97	23002.67	1816.58	2.370
7/13	1,084.00	11549.89	20294.28	1708.66	2.601
8/15	1,085.33	10142.81	17585.88	1600.74	2.882

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
9/17	1,086.67	8735.73	14877.49	1492.82	3.234
10/19	1,088.00	7328.65	12169.10	1384.90	3.687
11/21	1,089.33	5921.57	9460.71	1276.98	4.296
12/23	1,090.67	4514.49	6752.32	1169.06	5.168
13/25	1,092.00	3107.41	4043.93	1061.14	6.555
14/26	1,092.67	2403.87	2689.73	1007.18	7.650

Connection Strength

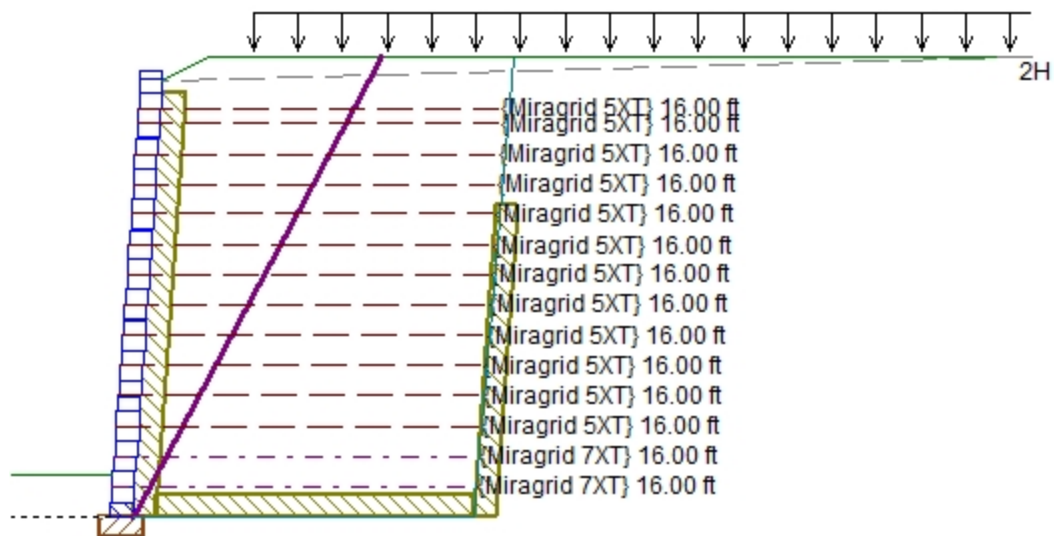
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,076.00	1025.05	2681.99	2.616	5.49
2/3	1,077.33	956.17	2605.33	2.725	5.49
3/5	1,078.67	887.30	2539.21	2.862	5.49
4/7	1,080.00	818.42	2475.21	3.024	5.49
5/9	1,081.33	749.54	2411.22	3.217	5.49
6/11	1,082.67	680.66	2347.22	3.448	5.49
7/13	1,084.00	611.78	2283.22	3.732	5.49
8/15	1,085.33	542.90	2175.80	4.008	5.49
9/17	1,086.67	474.02	1998.11	4.215	5.49
10/19	1,088.00	405.14	1820.41	4.493	5.49
11/21	1,089.33	336.27	1642.71	4.885	5.49
12/23	1,090.67	176.42	1465.02	8.304	5.49
13/25	1,092.00	83.59	1287.32	15.400	5.49
14/26	1,092.67	53.22	1198.47	22.519	5.49

Crest Toppling

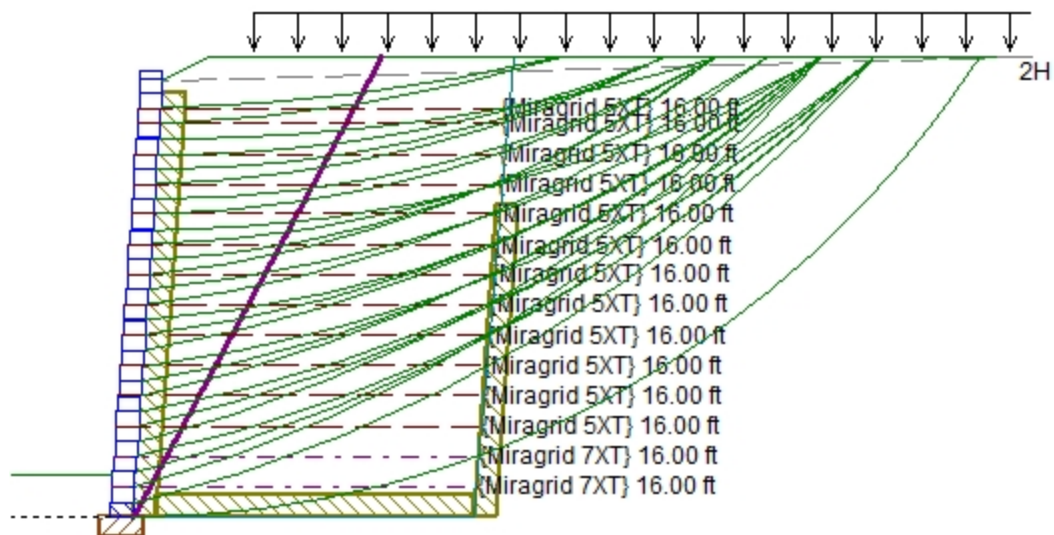
Height from top layer to grade	Hz	1.32 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2294.40 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 4 Details

Section 4 Cross-section



Section 4 Static ICS Cross-section



Section 4 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1076.46 ft
Base of Section		1074.67 ft
Design Height	H	19.20 ft
Embedment Depth	Hemb	1.80 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.3300	Pass
L	Min. Reinforcement Length	4.0000	16.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8335	Pass
La	Min. Anchorage Length	1.0000	6.4856	Pass
MinHemb	Minimum Embedment	12.0000	21.5630	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.25	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.36	Pass
FSsl	Base Sliding	1.50	1.82	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,076.00	2.62	38.20	1.64	2.45
2	1,077.33	1.73	24.55	1.65	1.62
3	1,078.67	1.82	20.87	1.65	1.78
4	1,080.00	1.78	22.66	1.60	1.71
5	1,081.33	2.72	36.44	1.75	2.62
6	1,082.67	2.93	35.68	1.71	2.65
7	1,084.00	2.85	32.85	1.76	2.25
8	1,085.33	2.74	30.14	1.76	2.34
9	1,086.67	2.86	34.68	1.87	2.25
10	1,088.00	2.88	28.39	1.85	2.44
11	1,089.33	3.02	31.09	1.89	2.27
12	1,090.67	3.11	33.92	1.89	2.54
13	1,092.00	3.02	32.91	2.01	2.44
14	1,092.67	3.21	32.15	2.03	2.79

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
9	6	3	1.56	Pass
1	9	1	1.59	Pass
8	7	5	1.60	Pass
8	7	2	1.61	Pass
10	7	4	1.66	Pass
10	7	7	1.70	Pass
10	6	6	1.73	Pass
10	6	9	1.80	Pass
8	7	8	1.83	Pass
7	7	11	1.93	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	20.22 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	15.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.04 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	12.27 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	19.20 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.04 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	15.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.56 ft	Eq. 7-4
Increase in height due to backslope	h	7.95 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	21.78 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	19.20 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.287	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.40 ft	Eq. 7-26
Horz. influence distance	dint	9.63 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	15.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	13035.09 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2372.10 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	13035.09 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2372.10 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	15407.18 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.74 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	10.11 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	16.47 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	16.71 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	41177.23 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1937.32 lb/ft	Eq. 7-31
Base sliding resistance	Rs	27998.92 lb/ft	Eq. 7-32
Base sliding	FSsl	1.817	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	41177.23 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1937.32 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.65 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.85 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.68 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.87 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	17.41 ft	Eq. 7-36A3
Resisting moment	Mr	376188.98 lb	Eq. 7-34
Driving moment	Mo	111815.71 lb	Eq. 7-38
Overturning	FSot	3.364	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	12.26 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.87 ft	Eq. 7-41
Applied bearing pressure	Qa	3742.27 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	49575.67 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.247	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,076.00	2509.38	2.00	18.20	1550.57
2/4	1,077.33	2509.38	1.33	16.53	947.78
3/6	1,078.67	1999.00	1.33	15.20	879.03
4/8	1,080.00	1999.00	1.33	13.86	810.29
5/10	1,081.33	1999.00	1.33	12.53	741.54
6/12	1,082.67	1999.00	1.33	11.20	672.79
7/14	1,084.00	1999.00	1.33	9.86	604.05
8/16	1,085.33	1999.00	1.33	8.53	535.30
9/18	1,086.67	1999.00	1.33	7.20	466.55
10/20	1,088.00	1999.00	1.33	5.86	397.81
11/22	1,089.33	1999.00	1.33	4.53	329.06
12/24	1,090.67	1999.00	1.33	3.20	168.60
13/26	1,092.00	1999.00	1.00	2.03	78.51
14/27	1,092.67	1999.00	1.53	0.77	45.27

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,076.00	1.618	1.000	1.000
2/4	1,077.33	2.648	1.000	1.000
3/6	1,078.67	2.274	1.000	1.000
4/8	1,080.00	2.467	1.000	1.000
5/10	1,081.33	2.696	1.000	1.000
6/12	1,082.67	2.971	1.000	1.000
7/14	1,084.00	3.309	1.000	1.000
8/16	1,085.33	3.734	1.000	1.000
9/18	1,086.67	4.285	1.000	1.000
10/20	1,088.00	5.025	1.000	1.000
11/22	1,089.33	6.075	1.000	1.000
12/24	1,090.67	11.856	1.000	0.040
13/26	1,092.00	25.463	1.000	0.000
14/27	1,092.67	44.155	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,076.00	1550.57	38059.90	14.37	18.88
2/4	1,077.33	947.78	33819.83	13.74	17.55
3/6	1,078.67	879.03	29815.69	13.11	16.22
4/8	1,080.00	810.29	26047.46	12.48	14.88
5/10	1,081.33	741.54	22515.16	11.85	13.55
6/12	1,082.67	672.79	19218.78	11.22	12.22
7/14	1,084.00	604.05	16158.31	10.59	10.88
8/16	1,085.33	535.30	13333.77	9.95	9.55
9/18	1,086.67	466.55	10745.15	9.32	8.22
10/20	1,088.00	397.81	8392.45	8.69	6.88
11/22	1,089.33	329.06	6275.67	8.06	5.55
12/24	1,090.67	168.60	4394.81	7.43	4.22
13/26	1,092.00	78.51	2749.87	6.80	2.88
14/27	1,092.67	45.27	2015.88	6.49	2.22

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,076.00	24.546
2/4	1,077.33	35.683



Layer/ Course	Elevation (ft)	FSpo [7-66]
3/6	1,078.67	33.919
4/8	1,080.00	32.146
5/10	1,081.33	30.363
6/12	1,082.67	28.566
7/14	1,084.00	26.750
8/16	1,085.33	24.909
9/18	1,086.67	23.031
10/20	1,088.00	21.097
11/22	1,089.33	19.072
12/24	1,090.67	26.066
13/26	1,092.00	35.027
14/27	1,092.67	44.528

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,076.00	11220.32	0.00	2200.79	0.00
2/4	1,077.33	9691.69	0.00	2045.39	0.00
3/6	1,078.67	8274.95	0.00	1889.98	0.00
4/8	1,080.00	6970.10	0.00	1734.58	0.00
5/10	1,081.33	5777.14	0.00	1579.18	0.00
6/12	1,082.67	4696.07	0.00	1423.78	0.00
7/14	1,084.00	3726.89	0.00	1268.38	0.00
8/16	1,085.33	2869.59	0.00	1112.98	0.00
9/18	1,086.67	2124.19	0.00	957.57	0.00
10/20	1,088.00	1490.68	0.00	802.17	0.00
11/22	1,089.33	969.06	0.00	646.77	0.00
12/24	1,090.67	559.32	0.00	491.37	0.00
13/26	1,092.00	261.48	0.00	335.97	0.00
14/27	1,092.67	154.52	0.00	258.27	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,076.00	0.00	0.00	13421.11	0.00
2/4	1,077.33	0.00	0.00	11737.08	0.00
3/6	1,078.67	0.00	0.00	10164.94	0.00
4/8	1,080.00	0.00	0.00	8704.68	0.00
5/10	1,081.33	0.00	0.00	7356.32	0.00
6/12	1,082.67	0.00	0.00	6119.85	0.00
7/14	1,084.00	0.00	0.00	4995.26	0.00
8/16	1,085.33	0.00	0.00	3982.57	0.00
9/18	1,086.67	0.00	0.00	3081.77	0.00
10/20	1,088.00	0.00	0.00	2292.85	0.00
11/22	1,089.33	0.00	0.00	1615.83	0.00
12/24	1,090.67	0.00	0.00	1050.69	0.00
13/26	1,092.00	0.00	0.00	597.45	0.00
14/27	1,092.67	0.00	0.00	412.79	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,076.00	19858.04	36286.05	2345.88	1.654
2/4	1,077.33	18450.96	33577.66	2237.96	1.763
3/6	1,078.67	17043.88	30869.26	2130.04	1.886
4/8	1,080.00	15636.80	28160.87	2022.12	2.029
5/10	1,081.33	14229.72	25452.48	1914.20	2.195
6/12	1,082.67	12822.64	22744.09	1806.28	2.390
7/14	1,084.00	11415.56	20035.70	1698.36	2.625
8/16	1,085.33	10008.48	17327.31	1590.44	2.912

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
9/18	1,086.67	8601.40	14618.92	1482.52	3.272
10/20	1,088.00	7194.32	11910.52	1374.60	3.737
11/22	1,089.33	5787.24	9202.13	1266.68	4.366
12/24	1,090.67	4380.16	6493.74	1158.75	5.272
13/26	1,092.00	2973.08	3785.35	1050.83	6.735
14/27	1,092.67	2269.54	2431.15	996.87	7.913

Connection Strength

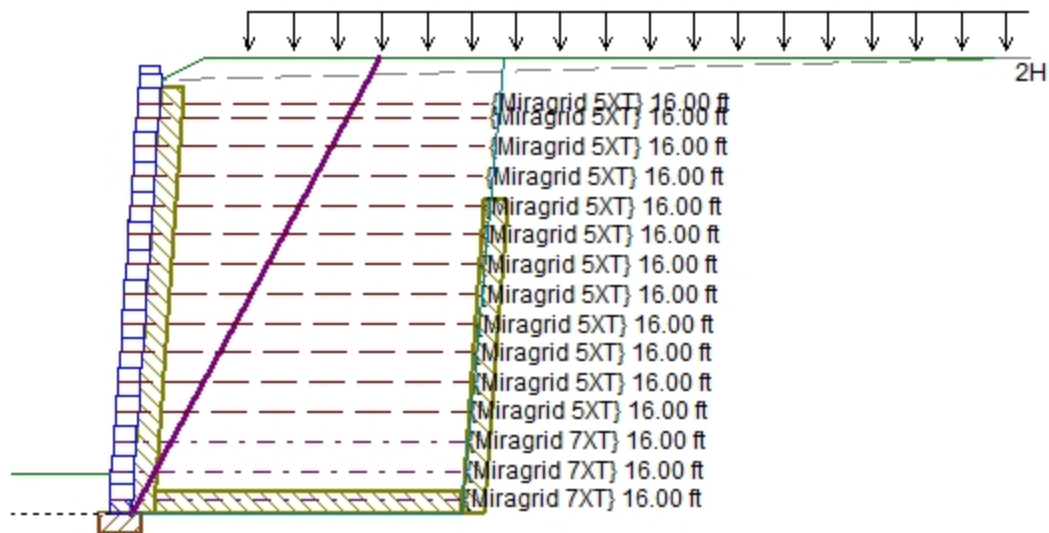
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,076.00	1550.57	2674.67	1.725	5.64
2/4	1,077.33	947.78	2598.01	2.741	5.64
3/6	1,078.67	879.03	2533.10	2.882	5.64
4/8	1,080.00	810.29	2469.10	3.047	5.64
5/10	1,081.33	741.54	2405.11	3.243	5.64
6/12	1,082.67	672.79	2341.11	3.480	5.64
7/14	1,084.00	604.05	2277.11	3.770	5.64
8/16	1,085.33	535.30	2158.84	4.033	5.64
9/18	1,086.67	466.55	1981.14	4.246	5.64
10/20	1,088.00	397.81	1803.44	4.533	5.64
11/22	1,089.33	329.06	1625.75	4.941	5.64
12/24	1,090.67	168.60	1448.05	8.589	5.64
13/26	1,092.00	78.51	1270.36	16.181	5.64
14/27	1,092.67	45.27	1181.51	26.098	5.64

Crest Toppling

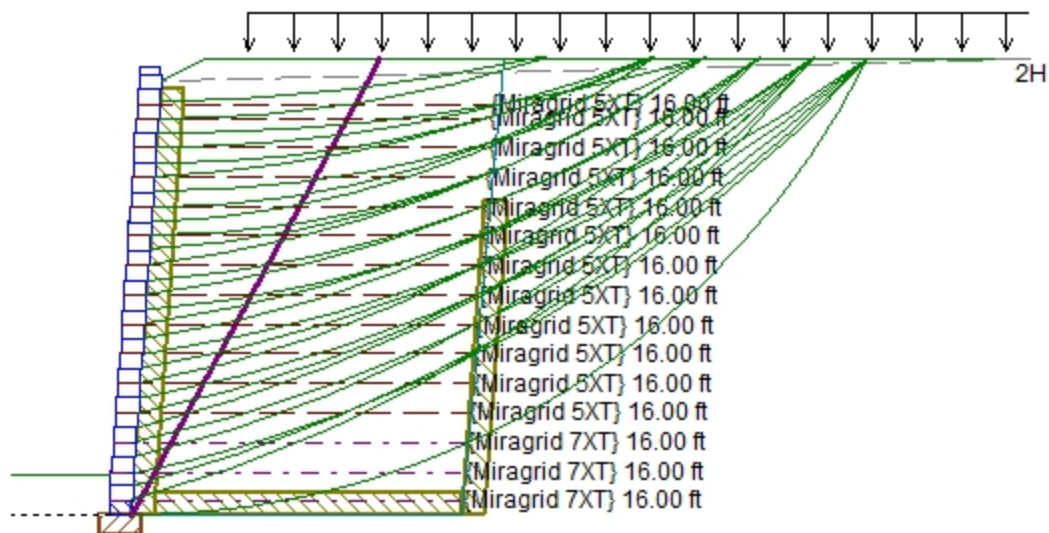
Height from top layer to grade	Hz	1.20 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2372.10 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 5 Details

Section 5 Cross-section



Section 5 Static ICS Cross-section



Section 5 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1075.86 ft
Base of Section		1074.00 ft
Design Height	H	19.74 ft
Embedment Depth	Hemb	1.86 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.4000	Pass
L	Min. Reinforcement Length	4.0000	16.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8107	Pass
La	Min. Anchorage Length	1.0000	6.1703	Pass
MinHemb	Minimum Embedment	12.0000	22.3071	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.47	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.18	Pass
FSsl	Base Sliding	1.50	1.76	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,074.67	2.55	38.43	1.57	2.33
2	1,076.00	2.62	38.20	1.64	2.45
3	1,077.33	1.73	22.66	1.65	1.62
4	1,078.67	1.82	20.87	1.60	1.71
5	1,080.00	1.78	24.55	1.65	1.78
6	1,081.33	2.72	36.44	1.66	2.62
7	1,082.67	2.65	36.68	1.75	2.49
8	1,084.00	2.74	30.14	1.71	2.25
9	1,085.33	2.85	32.85	1.76	2.65
10	1,086.67	2.93	35.68	1.76	2.34
11	1,088.00	2.76	34.92	1.77	2.67
12	1,089.33	2.86	34.68	1.87	2.25
13	1,090.67	3.11	33.92	1.89	2.54
14	1,092.00	2.88	31.09	1.89	2.27
15	1,092.67	3.02	28.39	1.85	2.44

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	6	2	1.52	Pass
7	7	4	1.57	Pass
10	7	3	1.61	Pass
9	7	6	1.62	Pass
1	7	1	1.65	Pass
8	6	5	1.67	Pass
8	6	8	1.71	Pass
10	6	7	1.74	Pass
7	5	10	1.82	Pass

Radius Point	Entry Point	Exit Point	Result	Status
9	7	9	1.84	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	20.75 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	15.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.96 °	Eq. 7-46
Elevation of influence of live load	Eq _{linfl}	12.80 ft	Eq. 7-93
Elevation of influence of dead load	Eq _{dinfl}	19.74 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.96 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	15.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.56 ft	Eq. 7-4
Increase in height due to backslope	h	7.95 ft	Eq. 7-5
Increase in height due to backslope at L β	h _{max}	22.06 ft	Eq. 7-6
Maximum height of slope influence	h _{maxint}	19.74 ft	Eq. 7-45
External active earth pressure	K _{aext}	0.466	Eq. 7-1
Internal active earth pressure	K _{aint}	0.286	Eq. 7-43
Height above rein. area at int. failure plane	h _{int}	6.58 ft	Eq. 7-26
Horz. influence distance	d _{int}	9.89 ft	Eq. 7-27
Distance dead load applied for broken back	L β_{qd}	15.12 ft	Eq. 7-29
Earth pressure from soil weight	P _s	13903.03 lb/ft	Eq. 7-12
Force of uniform surcharge	P _q	2449.80 lb/ft	Eq. 7-13
Horz. component of P _s	P _{sH}	13903.03 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	P _{qdH}	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	P _{qlH}	2449.80 lb/ft	Eq. 7-16
Horz. component of active earth force	P _{aH}	16352.83 lb/ft	Eq. 7-17
Resisting moment arm for P _{sH}	Y _s	6.92 ft	Eq. 7-18
Resisting moment arm for P _{qH}	Y _q	10.38 ft	Eq. 7-19
Vert. component of P _s	P _{sV}	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	P _{qdV}	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	P _{qlV}	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	P _{aV}	0.00 lb/ft	Eq. 7-23
Resisting moment arm for P _{sV}	X _s	16.48 ft	Eq. 7-24
Resisting moment arm for P _{qV}	X _q	16.73 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	W _{rβ1}	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	W _{rβ2}	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	W _{rβ3}	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	W _G T _d	0.00 lb/ft	Eq.
Weight of reinforced mass	W _{ri}	42333.48 lb/ft	Eq. 7-30
Weight of soil above wall	W _{rβ}	1937.32 lb/ft	Eq. 7-31
Base sliding resistance	R _s	28749.79 lb/ft	Eq. 7-32
Base sliding	F _S s _l	1.758	Eq. 7-33

Overturning

Weight of soil above wall	W _{rβ1}	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	W _{rβ2}	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	W _{rβ3}	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	W _G T _d	0.00 lb/ft	Eq.
Weight of reinforced mass	W _{ri}	42333.48 lb/ft	Eq. 7-30
Weight of soil above wall	W _{rβ}	1937.32 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	X _{ri}	8.67 ft	Eq. 7-35
Resisting moment arm for surcharge	X _{qβ}	9.89 ft	Eq. 7-37
Resisting moment arm in top slope	X _{rβ1}	3.71 ft	Eq. 7-36A1
Resisting moment arm in top slope	X _{rβ2}	10.90 ft	Eq. 7-36A2
Resisting moment arm in top slope	X _{rβ3}	17.45 ft	Eq. 7-36A3
Resisting moment	M _r	387058.92 lb	Eq. 7-34
Driving moment	M _o	121608.25 lb	Eq. 7-38



Overturning

FSot

3.183

Eq. 7-39

Bearing Capacity

Equivalent bearing area

B

11.99 ft

Eq. 7-40

Eccentricity of bearing force

e

2.00 ft

Eq. 7-41

Applied bearing pressure

Qa

3923.45 lb/ft²

Eq. 7-42

Ultimate bearing pressure

Qult

48938.86 lb/ft²

Eq. 12-10

Bearing capacity

FSbc

12.473

Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,074.67	2509.38	1.33	19.07	1076.75
2/3	1,076.00	2509.38	1.33	17.74	1008.12
3/5	1,077.33	2509.38	1.33	16.40	939.50
4/7	1,078.67	1999.00	1.33	15.07	870.88
5/9	1,080.00	1999.00	1.33	13.74	802.25
6/11	1,081.33	1999.00	1.33	12.40	733.63
7/13	1,082.67	1999.00	1.33	11.07	665.01
8/15	1,084.00	1999.00	1.33	9.74	596.39
9/17	1,085.33	1999.00	1.33	8.40	527.76
10/19	1,086.67	1999.00	1.33	7.07	459.14
11/21	1,088.00	1999.00	1.33	5.74	390.52
12/23	1,089.33	1999.00	1.33	4.40	321.90
13/25	1,090.67	1999.00	1.33	3.07	160.88
14/27	1,092.00	1999.00	1.00	1.90	73.44
15/28	1,092.67	1999.00	1.40	0.70	37.97

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,074.67	2.331	1.000	1.000
2/3	1,076.00	2.489	1.000	1.000
3/5	1,077.33	2.671	1.000	1.000
4/7	1,078.67	2.295	1.000	1.000
5/9	1,080.00	2.492	1.000	1.000
6/11	1,081.33	2.725	1.000	1.000
7/13	1,082.67	3.006	1.000	1.000
8/15	1,084.00	3.352	1.000	1.000
9/17	1,085.33	3.788	1.000	1.000
10/19	1,086.67	4.354	1.000	1.000
11/21	1,088.00	5.119	1.000	1.000
12/23	1,089.33	6.210	1.000	1.000
13/25	1,090.67	12.425	1.000	0.031
14/27	1,092.00	27.220	1.000	0.000
15/28	1,092.67	52.651	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,074.67	1076.75	41378.75	14.68	20.09
2/3	1,076.00	1008.12	36973.03	14.05	18.75
3/5	1,077.33	939.50	32803.24	13.42	17.42
4/7	1,078.67	870.88	28869.36	12.79	16.09
5/9	1,080.00	802.25	25171.41	12.16	14.75
6/11	1,081.33	733.63	21709.37	11.53	13.42
7/13	1,082.67	665.01	18483.26	10.90	12.09
8/15	1,084.00	596.39	15493.07	10.27	10.75
9/17	1,085.33	527.76	12738.80	9.64	9.42
10/19	1,086.67	459.14	10220.45	9.01	8.09
11/21	1,088.00	390.52	7938.02	8.38	6.75
12/23	1,089.33	321.90	5891.51	7.75	5.42
13/25	1,090.67	160.88	4080.93	7.12	4.09
14/27	1,092.00	73.44	2506.26	6.49	2.75



Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
15/28	1,092.67	37.97	1807.40	6.17	2.09

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,074.67	38.429
2/3	1,076.00	36.675
3/5	1,077.33	34.916
4/7	1,078.67	33.150
5/9	1,080.00	31.376
6/11	1,081.33	29.592
7/13	1,082.67	27.794
8/15	1,084.00	25.978
9/17	1,085.33	24.137
10/19	1,086.67	22.260
11/21	1,088.00	20.327
12/23	1,089.33	18.303
13/25	1,090.67	25.366
14/27	1,092.00	34.127
15/28	1,092.67	47.605

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,074.67	12698.97	0.00	2341.32	0.00
2/3	1,076.00	11069.16	0.00	2185.91	0.00
3/5	1,077.33	9551.24	0.00	2030.51	0.00
4/7	1,078.67	8145.21	0.00	1875.11	0.00
5/9	1,080.00	6851.07	0.00	1719.71	0.00
6/11	1,081.33	5668.82	0.00	1564.31	0.00
7/13	1,082.67	4598.46	0.00	1408.90	0.00
8/15	1,084.00	3639.98	0.00	1253.50	0.00
9/17	1,085.33	2793.40	0.00	1098.10	0.00
10/19	1,086.67	2058.71	0.00	942.70	0.00
11/21	1,088.00	1435.91	0.00	787.30	0.00
12/23	1,089.33	925.00	0.00	631.90	0.00
13/25	1,090.67	525.97	0.00	476.49	0.00
14/27	1,092.00	238.84	0.00	321.09	0.00
15/28	1,092.67	137.23	0.00	243.39	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,074.67	0.00	0.00	15040.29	0.00
2/3	1,076.00	0.00	0.00	13255.08	0.00
3/5	1,077.33	0.00	0.00	11581.75	0.00
4/7	1,078.67	0.00	0.00	10020.32	0.00
5/9	1,080.00	0.00	0.00	8570.78	0.00
6/11	1,081.33	0.00	0.00	7233.12	0.00
7/13	1,082.67	0.00	0.00	6007.36	0.00
8/15	1,084.00	0.00	0.00	4893.49	0.00
9/17	1,085.33	0.00	0.00	3891.50	0.00
10/19	1,086.67	0.00	0.00	3001.41	0.00
11/21	1,088.00	0.00	0.00	2223.21	0.00
12/23	1,089.33	0.00	0.00	1556.89	0.00
13/25	1,090.67	0.00	0.00	1002.47	0.00
14/27	1,092.00	0.00	0.00	559.93	0.00
15/28	1,092.67	0.00	0.00	380.62	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,074.67	21130.43	38735.19	2443.47	1.567
2/3	1,076.00	19723.35	36026.80	2335.55	1.664
3/5	1,077.33	18316.27	33318.41	2227.63	1.774
4/7	1,078.67	16909.19	30610.02	2119.71	1.899
5/9	1,080.00	15502.11	27901.63	2011.79	2.043
6/11	1,081.33	14095.03	25193.24	1903.87	2.212
7/13	1,082.67	12687.95	22484.85	1795.95	2.411
8/15	1,084.00	11280.87	19776.46	1688.03	2.650
9/17	1,085.33	9873.79	17068.06	1580.11	2.943
10/19	1,086.67	8466.71	14359.67	1472.19	3.311
11/21	1,088.00	7059.63	11651.28	1364.27	3.789
12/23	1,089.33	5652.55	8942.89	1256.35	4.438
13/25	1,090.67	4245.47	6234.50	1148.42	5.381
14/27	1,092.00	2838.39	3526.11	1040.50	6.927
15/28	1,092.67	2134.85	2171.91	986.54	8.201

Connection Strength

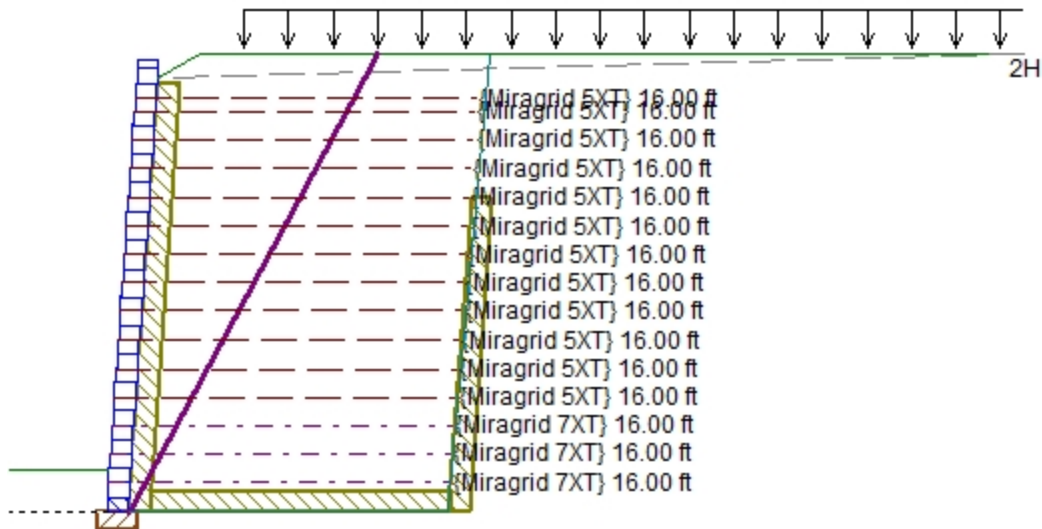
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,074.67	1076.75	2743.99	2.548	5.80
2/3	1,076.00	1008.12	2667.33	2.646	5.80
3/5	1,077.33	939.50	2590.67	2.757	5.80
4/7	1,078.67	870.88	2526.97	2.902	5.80
5/9	1,080.00	802.25	2462.98	3.070	5.80
6/11	1,081.33	733.63	2398.98	3.270	5.80
7/13	1,082.67	665.01	2334.98	3.511	5.80
8/15	1,084.00	596.39	2270.99	3.808	5.80
9/17	1,085.33	527.76	2141.83	4.058	5.80
10/19	1,086.67	459.14	1964.13	4.278	5.80
11/21	1,088.00	390.52	1786.44	4.575	5.80
12/23	1,089.33	321.90	1608.74	4.998	5.80
13/25	1,090.67	160.88	1431.04	8.895	5.80
14/27	1,092.00	73.44	1253.35	17.066	5.80
15/28	1,092.67	37.97	1164.50	30.672	5.80

Crest Toppling

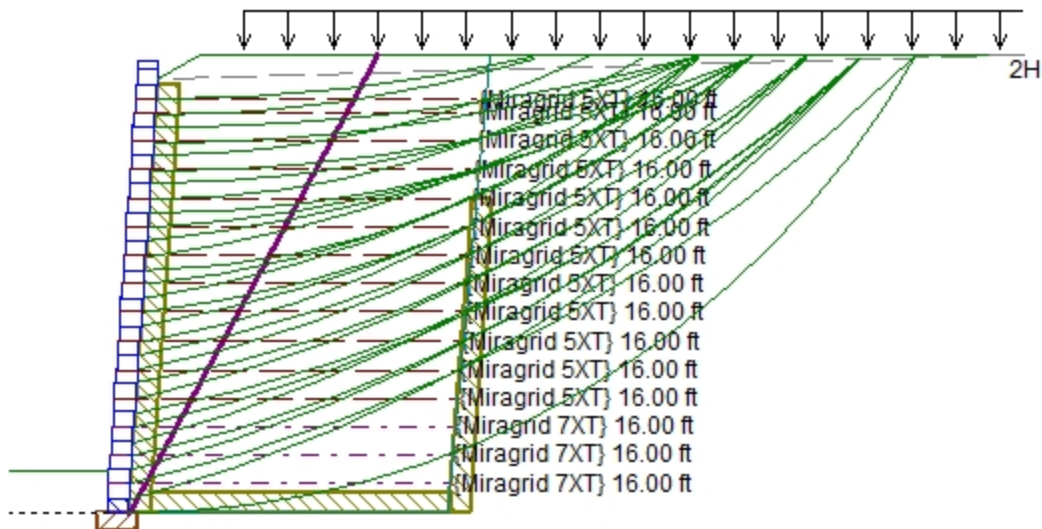
Height from top layer to grade	Hz	1.07 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2449.80 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 6 Details

Section 6 Cross-section



Section 6 Static ICS Cross-section



Section 6 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1075.25 ft
Base of Section		1073.33 ft
Design Height	H	20.28 ft
Embedment Depth	Hemb	1.92 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.4600	Pass
L	Min. Reinforcement Length	4.0000	16.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.7891	Pass
La	Min. Anchorage Length	1.0000	5.8547	Pass
MinHemb	Minimum Embedment	12.0000	23.0472	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	11.73	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.02	Pass
FSl	Base Sliding	1.50	1.70	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSl	FSto
1	1,074.67	2.62	38.20	1.64	2.45
2	1,076.00	2.55	38.43	1.57	2.33
3	1,077.33	1.78	24.71	1.58	1.54
4	1,078.67	1.68	24.55	1.65	1.62
5	1,080.00	1.73	22.66	1.65	1.71
6	1,081.33	1.82	20.87	1.60	1.78
7	1,082.67	2.72	36.44	1.75	2.62
8	1,084.00	2.65	36.68	1.66	2.49
9	1,085.33	2.85	32.85	1.67	2.25
10	1,086.67	2.74	30.14	1.71	2.34
11	1,088.00	2.66	35.68	1.76	2.51
12	1,089.33	2.93	35.90	1.76	2.65
13	1,090.67	2.76	34.68	1.77	2.25
14	1,092.00	2.86	34.92	1.87	2.67
15	1,092.67	2.77	31.09	1.89	2.69

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
9	8	3	1.52	Pass
1	8	1	1.56	Pass
9	7	2	1.57	Pass
8	7	5	1.58	Pass
10	7	4	1.63	Pass
10	7	7	1.64	Pass
10	6	6	1.68	Pass
10	6	9	1.73	Pass
8	7	8	1.76	Pass

Radius Point	Entry Point	Exit Point	Result	Status
8	5	11	1.84	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	21.29 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	15.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.88 °	Eq. 7-46
Elevation of influence of live load	Eq _{linfl}	13.34 ft	Eq. 7-93
Elevation of influence of dead load	Eq _{dinfl}	20.28 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.88 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	15.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.56 ft	Eq. 7-4
Increase in height due to backslope	h	7.95 ft	Eq. 7-5
Increase in height due to backslope at L β	h _{max}	22.33 ft	Eq. 7-6
Maximum height of slope influence	h _{maxint}	20.28 ft	Eq. 7-45
External active earth pressure	K _{aext}	0.466	Eq. 7-1
Internal active earth pressure	K _{aint}	0.286	Eq. 7-43
Height above rein. area at int. failure plane	h _{int}	6.76 ft	Eq. 7-26
Horz. influence distance	d _{int}	10.14 ft	Eq. 7-27
Distance dead load applied for broken back	L β q _d	15.12 ft	Eq. 7-29
Earth pressure from soil weight	P _s	14798.95 lb/ft	Eq. 7-12
Force of uniform surcharge	P _q	2527.50 lb/ft	Eq. 7-13
Horz. component of P _s	P _{sH}	14798.95 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	P _{qdH}	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	P _{qlH}	2527.50 lb/ft	Eq. 7-16
Horz. component of active earth force	P _{aH}	17326.45 lb/ft	Eq. 7-17
Resisting moment arm for P _{sH}	Y _s	7.10 ft	Eq. 7-18
Resisting moment arm for P _{qH}	Y _q	10.65 ft	Eq. 7-19
Vert. component of P _s	P _{sV}	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	P _{qdV}	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	P _{qlV}	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	P _{aV}	0.00 lb/ft	Eq. 7-23
Resisting moment arm for P _{sV}	X _s	16.50 ft	Eq. 7-24
Resisting moment arm for P _{qV}	X _q	16.74 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	W _{rβ1}	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	W _{rβ2}	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	W _{rβ3}	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	W _G T _d	0.00 lb/ft	Eq.
Weight of reinforced mass	W _{ri}	43490.43 lb/ft	Eq. 7-30
Weight of soil above wall	W _{rβ}	1937.32 lb/ft	Eq. 7-31
Base sliding resistance	R _s	29501.12 lb/ft	Eq. 7-32
Base sliding	F _S s _l	1.703	Eq. 7-33

Overturning

Weight of soil above wall	W _{rβ1}	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	W _{rβ2}	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	W _{rβ3}	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	W _G T _d	0.00 lb/ft	Eq.
Weight of reinforced mass	W _{ri}	43490.43 lb/ft	Eq. 7-30
Weight of soil above wall	W _{rβ}	1937.32 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	X _{ri}	8.69 ft	Eq. 7-35
Resisting moment arm for surcharge	X _{qβ}	9.93 ft	Eq. 7-37
Resisting moment arm in top slope	X _{rβ1}	3.75 ft	Eq. 7-36A1
Resisting moment arm in top slope	X _{rβ2}	10.94 ft	Eq. 7-36A2
Resisting moment arm in top slope	X _{rβ3}	17.49 ft	Eq. 7-36A3
Resisting moment	M _r	397979.10 lb	Eq. 7-34
Driving moment	M _o	131955.17 lb	Eq. 7-38



Overturning

FSot

3.016

Eq. 7-39

Bearing Capacity

Equivalent bearing area

B

11.71 ft

Eq. 7-40

Eccentricity of bearing force

e

2.14 ft

Eq. 7-41

Applied bearing pressure

Qa

4116.09 lb/ft²

Eq. 7-42

Ultimate bearing pressure

Qult

48271.67 lb/ft²

Eq. 12-10

Bearing capacity

FSbc

11.728

Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,074.67	2509.38	2.00	19.28	1628.24
2/4	1,076.00	2509.38	1.33	17.61	999.86
3/6	1,077.33	2509.38	1.33	16.28	931.36
4/8	1,078.67	1999.00	1.33	14.94	862.85
5/10	1,080.00	1999.00	1.33	13.61	794.34
6/12	1,081.33	1999.00	1.33	12.28	725.84
7/14	1,082.67	1999.00	1.33	10.94	657.33
8/16	1,084.00	1999.00	1.33	9.61	588.83
9/18	1,085.33	1999.00	1.33	8.28	520.32
10/20	1,086.67	1999.00	1.33	6.94	451.82
11/22	1,088.00	1999.00	1.33	5.61	383.31
12/24	1,089.33	1999.00	1.33	4.28	314.81
13/26	1,090.67	1999.00	1.33	2.94	153.29
14/28	1,092.00	1999.00	1.00	1.78	68.41
15/29	1,092.67	1999.00	1.28	0.64	31.33

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,074.67	1.541	1.000	1.000
2/4	1,076.00	2.510	1.000	1.000
3/6	1,077.33	2.694	1.000	1.000
4/8	1,078.67	2.317	1.000	1.000
5/10	1,080.00	2.517	1.000	1.000
6/12	1,081.33	2.754	1.000	1.000
7/14	1,082.67	3.041	1.000	1.000
8/16	1,084.00	3.395	1.000	1.000
9/18	1,085.33	3.842	1.000	1.000
10/20	1,086.67	4.424	1.000	1.000
11/22	1,088.00	5.215	1.000	1.000
12/24	1,089.33	6.350	1.000	1.000
13/26	1,090.67	13.041	1.000	0.022
14/28	1,092.00	29.221	1.000	0.000
15/29	1,092.67	63.796	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,074.67	1628.24	40233.56	14.37	19.96
2/4	1,076.00	999.86	35898.09	13.74	18.63
3/6	1,077.33	931.36	31798.53	13.11	17.29
4/8	1,078.67	862.85	27934.90	12.48	15.96
5/10	1,080.00	794.34	24307.19	11.85	14.63
6/12	1,081.33	725.84	20915.40	11.22	13.29
7/14	1,082.67	657.33	17759.53	10.59	11.96
8/16	1,084.00	588.83	14839.58	9.95	10.63
9/18	1,085.33	520.32	12155.55	9.32	9.29
10/20	1,086.67	451.82	9707.44	8.69	7.96
11/22	1,088.00	383.31	7495.25	8.06	6.63
12/24	1,089.33	314.81	5518.99	7.43	5.29
13/26	1,090.67	153.29	3778.64	6.80	3.96
14/28	1,092.00	68.41	2274.22	6.17	2.63



Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
15/29	1,092.67	31.33	1610.48	5.85	1.96

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,074.67	24.710
2/4	1,076.00	35.903
3/6	1,077.33	34.142
4/8	1,078.67	32.375
5/10	1,080.00	30.600
6/12	1,081.33	28.815
7/14	1,082.67	27.018
8/16	1,084.00	25.202
9/18	1,085.33	23.362
10/20	1,086.67	21.485
11/22	1,088.00	19.554
12/24	1,089.33	17.531
13/26	1,090.67	24.651
14/28	1,092.00	33.245
15/29	1,092.67	51.397

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,074.67	12538.54	0.00	2326.48	0.00
2/4	1,076.00	10919.41	0.00	2171.08	0.00
3/6	1,077.33	9412.17	0.00	2015.67	0.00
4/8	1,078.67	8016.83	0.00	1860.27	0.00
5/10	1,080.00	6733.37	0.00	1704.87	0.00
6/12	1,081.33	5561.80	0.00	1549.47	0.00
7/14	1,082.67	4502.12	0.00	1394.07	0.00
8/16	1,084.00	3554.33	0.00	1238.67	0.00
9/18	1,085.33	2718.43	0.00	1083.26	0.00
10/20	1,086.67	1994.42	0.00	927.86	0.00
11/22	1,088.00	1382.30	0.00	772.46	0.00
12/24	1,089.33	882.07	0.00	617.06	0.00
13/26	1,090.67	493.73	0.00	461.66	0.00
14/28	1,092.00	217.28	0.00	306.26	0.00
15/29	1,092.67	121.01	0.00	228.55	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,074.67	0.00	0.00	14865.02	0.00
2/4	1,076.00	0.00	0.00	13090.49	0.00
3/6	1,077.33	0.00	0.00	11427.85	0.00
4/8	1,078.67	0.00	0.00	9877.10	0.00
5/10	1,080.00	0.00	0.00	8438.24	0.00
6/12	1,081.33	0.00	0.00	7111.27	0.00
7/14	1,082.67	0.00	0.00	5896.19	0.00
8/16	1,084.00	0.00	0.00	4792.99	0.00
9/18	1,085.33	0.00	0.00	3801.69	0.00
10/20	1,086.67	0.00	0.00	2922.28	0.00
11/22	1,088.00	0.00	0.00	2154.76	0.00
12/24	1,089.33	0.00	0.00	1499.13	0.00
13/26	1,090.67	0.00	0.00	955.39	0.00
14/28	1,092.00	0.00	0.00	523.53	0.00
15/29	1,092.67	0.00	0.00	349.57	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,074.67	20996.10	38476.62	2433.17	1.576
2/4	1,076.00	19589.02	35768.23	2325.25	1.674
3/6	1,077.33	18181.94	33059.84	2217.33	1.785
4/8	1,078.67	16774.86	30351.44	2109.41	1.912
5/10	1,080.00	15367.78	27643.05	2001.49	2.058
6/12	1,081.33	13960.70	24934.66	1893.57	2.229
7/14	1,082.67	12553.62	22226.27	1785.65	2.432
8/16	1,084.00	11146.54	19517.88	1677.73	2.676
9/18	1,085.33	9739.46	16809.49	1569.80	2.975
10/20	1,086.67	8332.38	14101.10	1461.88	3.352
11/22	1,088.00	6925.30	11392.70	1353.96	3.842
12/24	1,089.33	5518.22	8684.31	1246.04	4.512
13/26	1,090.67	4111.14	5975.92	1138.12	5.494
14/28	1,092.00	2704.06	3267.53	1030.20	7.133
15/29	1,092.67	2000.52	1913.33	976.24	8.516

Connection Strength

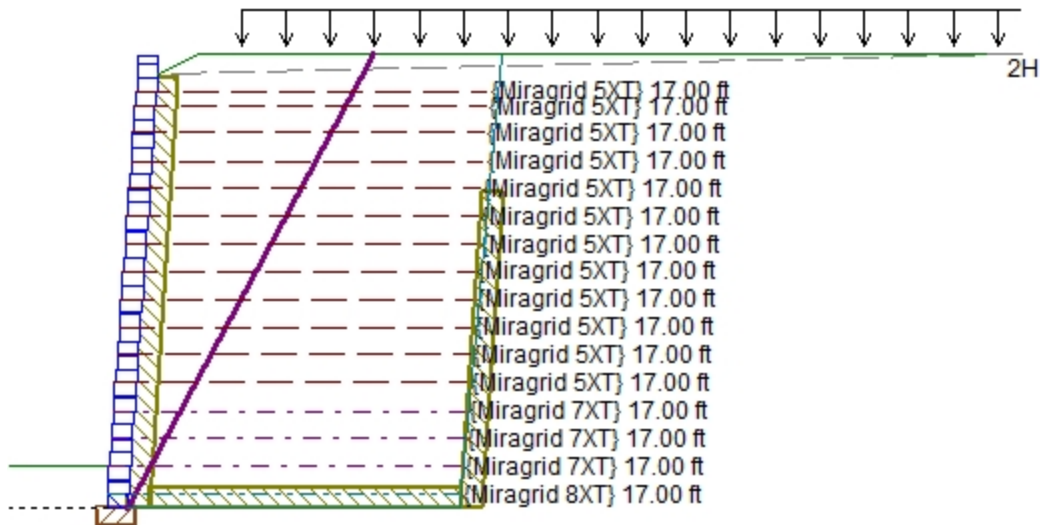
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,074.67	1628.24	2736.67	1.681	5.96
2/4	1,076.00	999.86	2660.01	2.660	5.96
3/6	1,077.33	931.36	2583.35	2.774	5.96
4/8	1,078.67	862.85	2520.86	2.922	5.96
5/10	1,080.00	794.34	2456.87	3.093	5.96
6/12	1,081.33	725.84	2392.87	3.297	5.96
7/14	1,082.67	657.33	2328.87	3.543	5.96
8/16	1,084.00	588.83	2264.88	3.846	5.96
9/18	1,085.33	520.32	2124.86	4.084	5.96
10/20	1,086.67	451.82	1947.17	4.310	5.96
11/22	1,088.00	383.31	1769.47	4.616	5.96
12/24	1,089.33	314.81	1591.77	5.056	5.96
13/26	1,090.67	153.29	1414.08	9.225	5.96
14/28	1,092.00	68.41	1236.38	18.073	5.96
15/29	1,092.67	31.33	1147.53	36.622	5.96

Crest Toppling

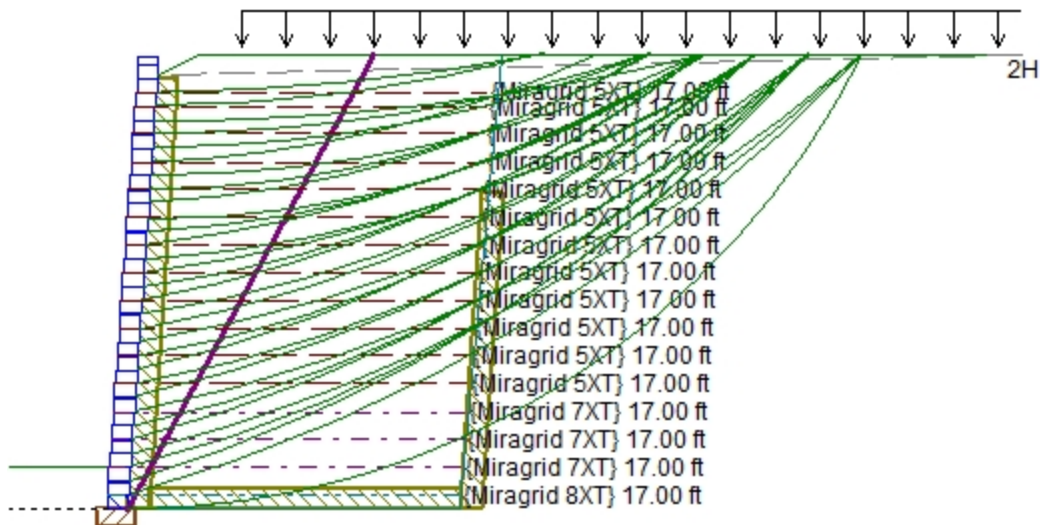
Height from top layer to grade	Hz	0.94 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2527.50 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 7 Details

Section 7 Cross-section



Section 7 Static ICS Cross-section



Section 7 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1074.65 ft
Base of Section		1072.67 ft
Design Height	H	20.81 ft
Embedment Depth	Hemb	1.98 ft
* Embedment is included in Bearing Capacity		

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.5300	Pass
L	Min. Reinforcement Length	4.0000	17.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8167	Pass
La	Min. Anchorage Length	1.0000	6.5394	Pass
MinHemb	Minimum Embedment	12.0000	23.7913	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.70	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.22	Pass
FSsl	Base Sliding	1.50	1.76	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,073.33	2.75	41.27	1.59	2.33
2	1,074.67	2.55	38.20	1.57	2.87
3	1,076.00	2.62	38.43	1.64	2.45
4	1,077.33	1.68	24.55	1.65	1.62
5	1,078.67	1.78	24.71	1.58	1.78
6	1,080.00	1.82	20.87	1.60	1.54
7	1,081.33	1.73	22.66	1.65	1.71
8	1,082.67	2.65	36.68	1.75	2.62
9	1,084.00	2.57	36.44	1.66	2.49
10	1,085.33	2.72	39.51	1.68	2.37
11	1,086.67	2.74	35.68	1.76	2.51
12	1,088.00	2.85	30.14	1.76	2.65
13	1,089.33	2.93	32.85	1.67	2.34
14	1,090.67	2.66	35.90	1.71	2.25
15	1,092.00	2.67	34.92	1.77	2.53
16	1,092.67	2.76	34.68	1.87	2.25

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	2	1.51	Pass
8	6	4	1.58	Pass
10	6	3	1.61	Pass
10	6	6	1.63	Pass
10	7	5	1.66	Pass
1	7	1	1.68	Pass
9	7	8	1.69	Pass
8	6	7	1.74	Pass

Radius Point	Entry Point	Exit Point	Result	Status
8	6	10	1.79	Pass
10	6	9	1.82	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	21.83 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	16.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.80 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	13.88 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	20.81 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.80 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	16.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.59 ft	Eq. 7-4
Increase in height due to backslope	h	8.48 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	23.40 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	20.81 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.285	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.94 ft	Eq. 7-26
Horz. influence distance	dint	10.40 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	16.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	15722.84 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2605.20 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	15722.84 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2605.20 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	18328.04 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	7.28 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	10.92 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	17.51 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	17.76 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	47456.60 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Base sliding resistance	Rs	32166.13 lb/ft	Eq. 7-32
Base sliding	FSsl	1.755	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	47456.60 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	9.20 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	10.47 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.79 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	11.48 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	18.53 ft	Eq. 7-36A3
Resisting moment	Mr	459604.86 lb	Eq. 7-34



Driving moment	Mo	142867.58 lb	Eq. 7-38
Overturning	FSot	3.217	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	12.79 ft	Eq. 7-40
Eccentricity of bearing force	e	2.11 ft	Eq. 7-41
Applied bearing pressure	Qa	4109.77 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	52192.65 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	12.700	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,073.33	3239.26	1.33	20.15	1128.49
2/3	1,074.67	2509.38	1.33	18.81	1060.09
3/5	1,076.00	2509.38	1.33	17.48	991.70
4/7	1,077.33	2509.38	1.33	16.15	923.30
5/9	1,078.67	1999.00	1.33	14.81	854.91
6/11	1,080.00	1999.00	1.33	13.48	786.51
7/13	1,081.33	1999.00	1.33	12.15	718.12
8/15	1,082.67	1999.00	1.33	10.81	649.72
9/17	1,084.00	1999.00	1.33	9.48	581.33
10/19	1,085.33	1999.00	1.33	8.15	512.93
11/21	1,086.67	1999.00	1.33	6.81	444.54
12/23	1,088.00	1999.00	1.33	5.48	376.14
13/25	1,089.33	1999.00	1.33	4.15	307.75
14/27	1,090.67	1999.00	1.33	2.81	145.77
15/29	1,092.00	1999.00	1.00	1.65	63.39
16/30	1,092.67	1999.00	1.15	0.57	25.34

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,073.33	2.870	1.000	1.000
2/3	1,074.67	2.367	1.000	1.000
3/5	1,076.00	2.530	1.000	1.000
4/7	1,077.33	2.718	1.000	1.000
5/9	1,078.67	2.338	1.000	1.000
6/11	1,080.00	2.542	1.000	1.000
7/13	1,081.33	2.784	1.000	1.000
8/15	1,082.67	3.077	1.000	1.000
9/17	1,084.00	3.439	1.000	1.000
10/19	1,085.33	3.897	1.000	1.000
11/21	1,086.67	4.497	1.000	1.000
12/23	1,088.00	5.314	1.000	1.000
13/25	1,089.33	6.496	1.000	1.000
14/27	1,090.67	13.714	1.000	0.015
15/29	1,092.00	31.536	1.000	0.000
16/30	1,092.67	78.902	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,073.33	1128.49	46569.20	15.68	21.17
2/3	1,074.67	1060.09	41881.05	15.05	19.83
3/5	1,076.00	991.70	37428.82	14.42	18.50
4/7	1,077.33	923.30	33212.51	13.79	17.17
5/9	1,078.67	854.91	29232.12	13.16	15.83
6/11	1,080.00	786.51	25487.65	12.53	14.50
7/13	1,081.33	718.12	21979.10	11.90	13.17
8/15	1,082.67	649.72	18706.47	11.27	11.83
9/17	1,084.00	581.33	15669.76	10.64	10.50
10/19	1,085.33	512.93	12868.98	10.01	9.17
11/21	1,086.67	444.54	10304.11	9.38	7.83

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
12/23	1,088.00	376.14	7975.16	8.75	6.50
13/25	1,089.33	307.75	5882.14	8.12	5.17
14/27	1,090.67	145.77	4025.04	7.49	3.83
15/29	1,092.00	63.39	2403.85	6.85	2.50
16/30	1,092.67	25.34	1681.73	6.54	1.83

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,073.33	41.267
2/3	1,074.67	39.507
3/5	1,076.00	37.742
4/7	1,077.33	35.971
5/9	1,078.67	34.193
6/11	1,080.00	32.406
7/13	1,081.33	30.606
8/15	1,082.67	28.791
9/17	1,084.00	26.955
10/19	1,085.33	25.089
11/21	1,086.67	23.179
12/23	1,088.00	21.202
13/25	1,089.33	19.113
14/27	1,090.67	27.613
15/29	1,092.00	37.923
16/30	1,092.67	66.379

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,073.33	14099.03	0.00	2467.01	0.00
2/3	1,074.67	12378.72	0.00	2311.60	0.00
3/5	1,076.00	10770.30	0.00	2156.20	0.00
4/7	1,077.33	9273.77	0.00	2000.80	0.00
5/9	1,078.67	7889.13	0.00	1845.40	0.00
6/11	1,080.00	6616.38	0.00	1690.00	0.00
7/13	1,081.33	5455.52	0.00	1534.59	0.00
8/15	1,082.67	4406.55	0.00	1379.19	0.00
9/17	1,084.00	3469.47	0.00	1223.79	0.00
10/19	1,085.33	2644.29	0.00	1068.39	0.00
11/21	1,086.67	1930.99	0.00	912.99	0.00
12/23	1,088.00	1329.58	0.00	757.59	0.00
13/25	1,089.33	840.06	0.00	602.18	0.00
14/27	1,090.67	462.43	0.00	446.78	0.00
15/29	1,092.00	196.68	0.00	291.38	0.00
16/30	1,092.67	105.77	0.00	213.68	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,073.33	0.00	0.00	16566.03	0.00
2/3	1,074.67	0.00	0.00	14690.32	0.00
3/5	1,076.00	0.00	0.00	12926.50	0.00
4/7	1,077.33	0.00	0.00	11274.57	0.00
5/9	1,078.67	0.00	0.00	9734.53	0.00
6/11	1,080.00	0.00	0.00	8306.38	0.00
7/13	1,081.33	0.00	0.00	6990.12	0.00
8/15	1,082.67	0.00	0.00	5785.75	0.00
9/17	1,084.00	0.00	0.00	4693.27	0.00
10/19	1,085.33	0.00	0.00	3712.67	0.00
11/21	1,086.67	0.00	0.00	2843.97	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
12/23	1,088.00	0.00	0.00	2087.16	0.00
13/25	1,089.33	0.00	0.00	1442.24	0.00
14/27	1,090.67	0.00	0.00	909.21	0.00
15/29	1,092.00	0.00	0.00	488.07	0.00
16/30	1,092.67	0.00	0.00	319.45	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,073.33	23753.04	43645.70	2530.76	1.587
2/3	1,074.67	22252.44	40757.31	2422.84	1.680
3/5	1,076.00	20751.85	37868.91	2314.92	1.784
4/7	1,077.33	19251.26	34980.52	2207.00	1.903
5/9	1,078.67	17750.66	32092.13	2099.08	2.039
6/11	1,080.00	16250.07	29203.74	1991.16	2.196
7/13	1,081.33	14749.47	26315.35	1883.24	2.379
8/15	1,082.67	13248.88	23426.96	1775.32	2.597
9/17	1,084.00	11748.28	20538.57	1667.40	2.858
10/19	1,085.33	10247.69	17650.18	1559.47	3.180
11/21	1,086.67	8747.09	14761.78	1451.55	3.586
12/23	1,088.00	7246.50	11873.39	1343.63	4.116
13/25	1,089.33	5745.90	8985.00	1235.71	4.841
14/27	1,090.67	4245.31	6096.61	1127.79	5.910
15/29	1,092.00	2744.71	3208.22	1019.87	7.713
16/30	1,092.67	1994.42	1764.02	965.91	9.267

Connection Strength

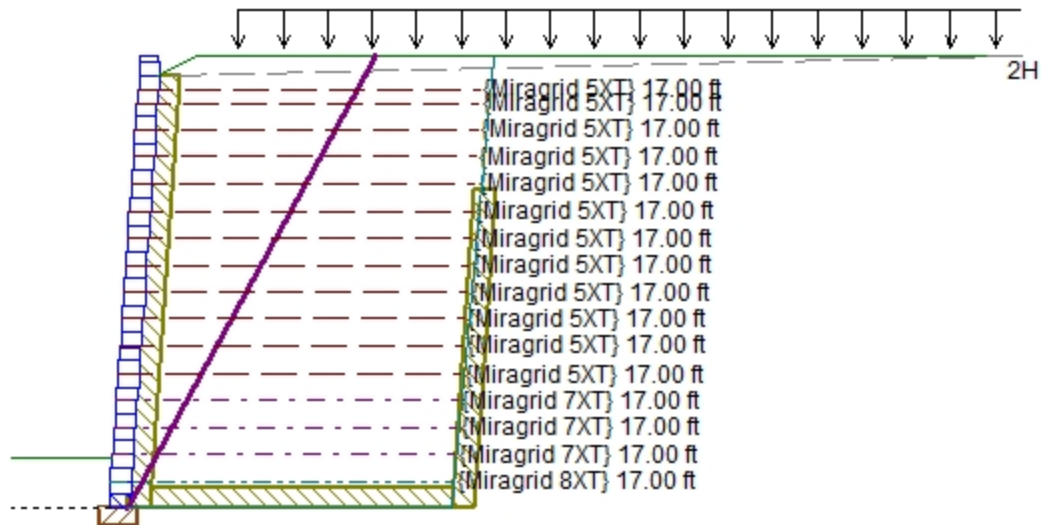
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinflmax (ft) [7-92]
1/1	1,073.33	1128.49	3106.81	2.753	6.12
2/3	1,074.67	1060.09	2729.33	2.575	6.12
3/5	1,076.00	991.70	2652.67	2.675	6.12
4/7	1,077.33	923.30	2576.01	2.790	6.12
5/9	1,078.67	854.91	2514.74	2.942	6.12
6/11	1,080.00	786.51	2450.74	3.116	6.12
7/13	1,081.33	718.12	2386.75	3.324	6.12
8/15	1,082.67	649.72	2322.75	3.575	6.12
9/17	1,084.00	581.33	2258.75	3.885	6.12
10/19	1,085.33	512.93	2107.86	4.109	6.12
11/21	1,086.67	444.54	1930.16	4.342	6.12
12/23	1,088.00	376.14	1752.46	4.659	6.12
13/25	1,089.33	307.75	1574.77	5.117	6.12
14/27	1,090.67	145.77	1397.07	9.584	6.12
15/29	1,092.00	63.39	1219.37	19.237	6.12
16/30	1,092.67	25.34	1130.52	44.623	6.12

Crest Toppling

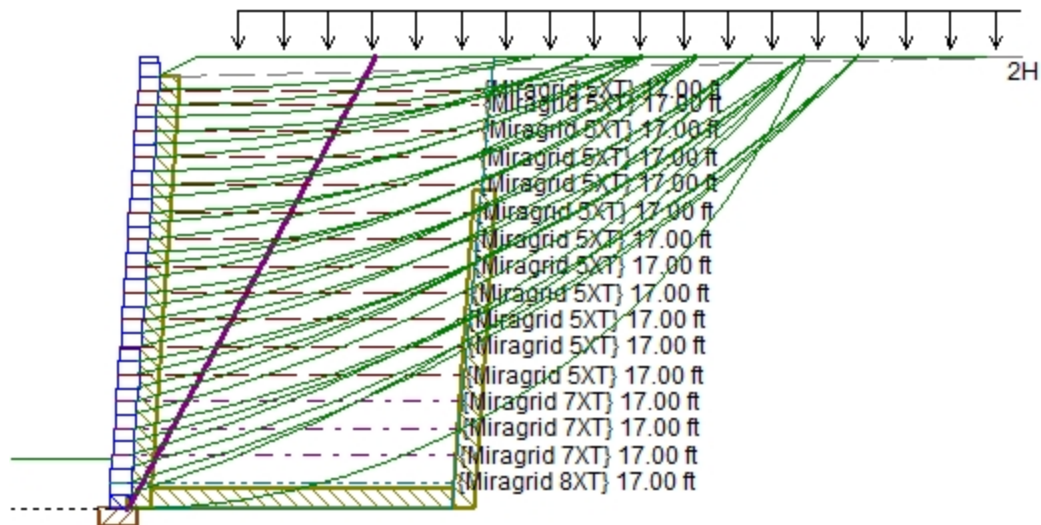
Height from top layer to grade	Hz	0.81 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2605.20 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqIV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 8 Details

Section 8 Cross-section



Section 8 Static ICS Cross-section



Section 8 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1074.55 ft
Base of Section		1072.00 ft
Design Height	H	21.35 ft
Embedment Depth	Hemb	2.55 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	13.5700	Pass
L	Min. Reinforcement Length	4.0000	17.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.7961	Pass
La	Min. Anchorage Length	1.0000	6.2241	Pass
MinHemb	Minimum Embedment	12.0000	30.6142	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.52	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.06	Pass
FSsl	Base Sliding	1.50	1.70	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,073.33	2.62	38.43	1.64	2.45
2	1,074.67	2.55	38.20	1.57	2.87
3	1,076.00	2.75	41.27	1.59	2.33
4	1,077.33	1.73	22.66	1.60	1.90
5	1,078.67	1.82	26.59	1.65	1.78
6	1,080.00	1.82	24.55	1.58	1.62
7	1,081.33	1.68	24.71	1.60	1.71
8	1,082.67	1.78	20.87	1.65	1.54
9	1,084.00	2.72	36.44	1.68	2.49
10	1,085.33	2.57	39.51	1.66	2.37
11	1,086.67	2.65	36.68	1.75	2.62
12	1,088.00	2.59	38.73	1.69	2.65
13	1,089.33	2.66	32.85	1.76	2.51
14	1,090.67	2.74	30.14	1.76	2.34
15	1,092.00	2.85	35.90	1.71	2.39
16	1,092.67	2.93	35.68	1.67	2.25

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	3	1.53	Pass
10	6	5	1.59	Pass
10	6	2	1.59	Pass
1	6	1	1.61	Pass
9	7	4	1.63	Pass
8	7	7	1.65	Pass
10	7	6	1.69	Pass
10	5	9	1.71	Pass

Radius Point	Entry Point	Exit Point	Result	Status
10	6	8	1.75	Pass
10	6	11	1.81	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	22.37 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	16.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.73 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	14.42 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	21.35 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.73 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	16.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.59 ft	Eq. 7-4
Increase in height due to backslope	h	8.48 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	23.68 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	21.35 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.285	Eq. 7-43
Height above rein. area at int. failure plane	hint	7.12 ft	Eq. 7-26
Horz. influence distance	dint	10.65 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	16.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	16674.70 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2682.90 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	16674.70 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2682.90 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	19357.60 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	7.46 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	11.19 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	17.52 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	17.78 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	48686.37 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Base sliding resistance	Rs	32964.75 lb/ft	Eq. 7-32
Base sliding	FSsl	1.703	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	48686.37 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	9.22 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	10.51 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.83 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	11.52 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	18.56 ft	Eq. 7-36A3
Resisting moment	Mr	471920.53 lb	Eq. 7-34

Driving moment	Mo	154364.76 lb	Eq. 7-38
Overturning	FSot	3.057	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	12.51 ft	Eq. 7-40
Eccentricity of bearing force	e	2.24 ft	Eq. 7-41
Applied bearing pressure	Qa	4299.24 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	53830.57 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	12.521	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,073.33	3239.26	2.00	20.35	1705.97
2/4	1,074.67	2509.38	1.33	18.69	1051.95
3/6	1,076.00	2509.38	1.33	17.35	983.66
4/8	1,077.33	2509.38	1.33	16.02	915.37
5/10	1,078.67	1999.00	1.33	14.69	847.08
6/12	1,080.00	1999.00	1.33	13.35	778.79
7/14	1,081.33	1999.00	1.33	12.02	710.50
8/16	1,082.67	1999.00	1.33	10.69	642.21
9/18	1,084.00	1999.00	1.33	9.35	573.92
10/20	1,085.33	1999.00	1.33	8.02	505.63
11/22	1,086.67	1999.00	1.33	6.69	437.34
12/24	1,088.00	1999.00	1.33	5.35	369.05
13/26	1,089.33	1999.00	1.33	4.02	300.76
14/28	1,090.67	1999.00	1.33	2.69	138.35
15/30	1,092.00	1999.00	1.00	1.52	58.40
16/31	1,092.67	1999.00	1.02	0.51	20.00

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,073.33	1.899	1.000	1.000
2/4	1,074.67	2.385	1.000	1.000
3/6	1,076.00	2.551	1.000	1.000
4/8	1,077.33	2.741	1.000	1.000
5/10	1,078.67	2.360	1.000	1.000
6/12	1,080.00	2.567	1.000	1.000
7/14	1,081.33	2.814	1.000	1.000
8/16	1,082.67	3.113	1.000	1.000
9/18	1,084.00	3.483	1.000	1.000
10/20	1,085.33	3.953	1.000	1.000
11/22	1,086.67	4.571	1.000	1.000
12/24	1,088.00	5.417	1.000	1.000
13/26	1,089.33	6.647	1.000	1.000
14/28	1,090.67	14.449	1.000	0.008
15/30	1,092.00	34.229	1.000	0.000
16/31	1,092.67	99.971	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,073.33	1705.97	45358.46	15.37	21.04
2/4	1,074.67	1051.95	40740.55	14.74	19.71
3/6	1,076.00	983.66	36358.56	14.11	18.37
4/8	1,077.33	915.37	32212.49	13.48	17.04
5/10	1,078.67	847.08	28302.34	12.85	15.71
6/12	1,080.00	778.79	24628.11	12.22	14.37
7/14	1,081.33	710.50	21189.80	11.59	13.04
8/16	1,082.67	642.21	17987.42	10.95	11.71
9/18	1,084.00	573.92	15020.95	10.32	10.37
10/20	1,085.33	505.63	12290.41	9.69	9.04
11/22	1,086.67	437.34	9795.78	9.06	7.71

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
12/24	1,088.00	369.05	7537.08	8.43	6.37
13/26	1,089.33	300.76	5514.30	7.80	5.04
14/28	1,090.67	138.35	3727.44	7.17	3.71
15/30	1,092.00	58.40	2176.50	6.54	2.37
16/31	1,092.67	20.00	1489.50	6.22	1.71

Layer/ Course	Elevation (ft)	FSpo [7-66]
1/2	1,073.33	26.588
2/4	1,074.67	38.729
3/6	1,076.00	36.963
4/8	1,077.33	35.191
5/10	1,078.67	33.412
6/12	1,080.00	31.624
7/14	1,081.33	29.824
8/16	1,082.67	28.009
9/18	1,084.00	26.173
10/20	1,085.33	24.307
11/22	1,086.67	22.399
12/24	1,088.00	20.423
13/26	1,089.33	18.335
14/28	1,090.67	26.942
15/30	1,092.00	37.268
16/31	1,092.67	74.490

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,073.33	13929.95	0.00	2452.17	0.00
2/4	1,074.67	12220.33	0.00	2296.77	0.00
3/6	1,076.00	10622.59	0.00	2141.37	0.00
4/8	1,077.33	9136.74	0.00	1985.96	0.00
5/10	1,078.67	7762.79	0.00	1830.56	0.00
6/12	1,080.00	6500.72	0.00	1675.16	0.00
7/14	1,081.33	5350.54	0.00	1519.76	0.00
8/16	1,082.67	4312.26	0.00	1364.36	0.00
9/18	1,084.00	3385.86	0.00	1208.95	0.00
10/20	1,085.33	2571.35	0.00	1053.55	0.00
11/22	1,086.67	1868.74	0.00	898.15	0.00
12/24	1,088.00	1278.01	0.00	742.75	0.00
13/26	1,089.33	799.17	0.00	587.35	0.00
14/28	1,090.67	432.22	0.00	431.95	0.00
15/30	1,092.00	177.17	0.00	276.54	0.00
16/31	1,092.67	91.59	0.00	198.84	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,073.33	0.00	0.00	16382.12	0.00
2/4	1,074.67	0.00	0.00	14517.09	0.00
3/6	1,076.00	0.00	0.00	12763.96	0.00
4/8	1,077.33	0.00	0.00	11122.71	0.00
5/10	1,078.67	0.00	0.00	9593.35	0.00
6/12	1,080.00	0.00	0.00	8175.88	0.00
7/14	1,081.33	0.00	0.00	6870.30	0.00
8/16	1,082.67	0.00	0.00	5676.61	0.00
9/18	1,084.00	0.00	0.00	4594.82	0.00
10/20	1,085.33	0.00	0.00	3624.91	0.00
11/22	1,086.67	0.00	0.00	2766.89	0.00



Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
12/24	1,088.00	0.00	0.00	2020.76	0.00
13/26	1,089.33	0.00	0.00	1386.52	0.00
14/28	1,090.67	0.00	0.00	864.17	0.00
15/30	1,092.00	0.00	0.00	453.71	0.00
16/31	1,092.67	0.00	0.00	290.44	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,073.33	23609.77	43369.94	2520.46	1.595
2/4	1,074.67	22109.18	40481.54	2412.54	1.689
3/6	1,076.00	20608.58	37593.15	2304.62	1.795
4/8	1,077.33	19107.99	34704.76	2196.70	1.915
5/10	1,078.67	17607.39	31816.37	2088.78	2.053
6/12	1,080.00	16106.80	28927.98	1980.85	2.212
7/14	1,081.33	14606.21	26039.59	1872.93	2.399
8/16	1,082.67	13105.61	23151.20	1765.01	2.620
9/18	1,084.00	11605.02	20262.80	1657.09	2.886
10/20	1,085.33	10104.42	17374.41	1549.17	3.215
11/22	1,086.67	8603.83	14486.02	1441.25	3.630
12/24	1,088.00	7103.23	11597.63	1333.33	4.175
13/26	1,089.33	5602.64	8709.24	1225.41	4.925
14/28	1,090.67	4102.04	5820.85	1117.49	6.040
15/30	1,092.00	2601.45	2932.46	1009.57	7.959
16/31	1,092.67	1851.15	1488.26	955.61	9.664

Connection Strength

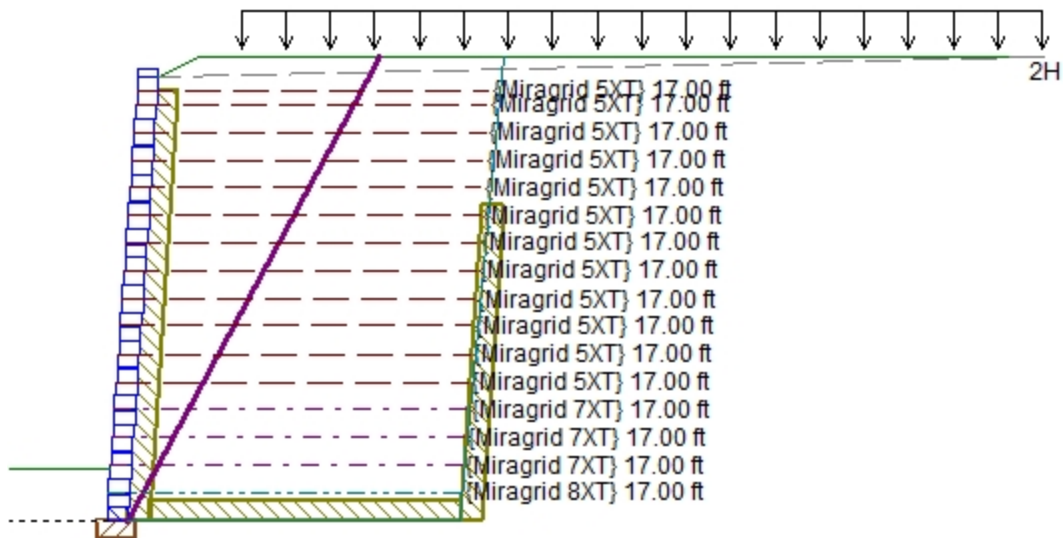
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinflmax (ft) [7-92]
1/2	1,073.33	1705.97	3098.17	1.816	6.28
2/4	1,074.67	1051.95	2722.01	2.588	6.28
3/6	1,076.00	983.66	2645.35	2.689	6.28
4/8	1,077.33	915.37	2568.70	2.806	6.28
5/10	1,078.67	847.08	2508.63	2.962	6.28
6/12	1,080.00	778.79	2444.63	3.139	6.28
7/14	1,081.33	710.50	2380.64	3.351	6.28
8/16	1,082.67	642.21	2316.64	3.607	6.28
9/18	1,084.00	573.92	2252.64	3.925	6.28
10/20	1,085.33	505.63	2090.89	4.135	6.28
11/22	1,086.67	437.34	1913.19	4.375	6.28
12/24	1,088.00	369.05	1735.50	4.703	6.28
13/26	1,089.33	300.76	1557.80	5.180	6.28
14/28	1,090.67	138.35	1380.10	9.975	6.28
15/30	1,092.00	58.40	1202.41	20.589	6.28
16/31	1,092.67	20.00	1113.56	55.689	6.28

Crest Toppling

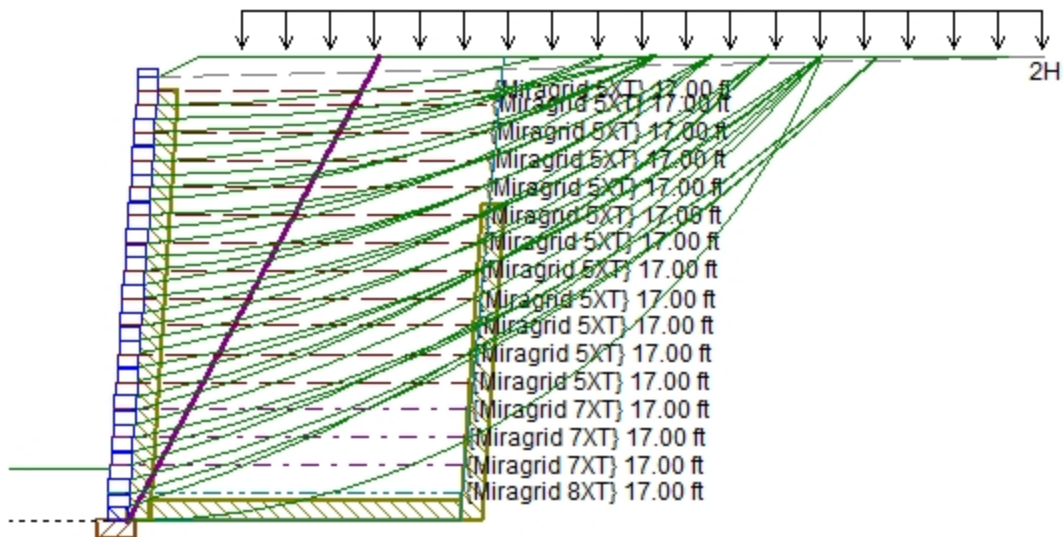
Height from top layer to grade	H _z	0.69 ft	Eq.
Horz. component of P _s	P _s H	0.00 lb/ft	Eq. 7-83
Uniform surcharge	P _q H	2682.90 lb/ft	Eq. 7-84
Vert. component of P _s	P _s V	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	P _q dV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	P _q IV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X _w	0.53 ft	Eq. 7-90
Resisting moment	M _r	0.00 lb	Eq. 7-89
Overturning moment	M _o	0.00 lb	Eq. 7-91
Crest toppling	FS _{ct}	0.000	Eq. 7-88

Section 9 Details

Section 9 Cross-section



Section 9 Static ICS Cross-section



Section 9 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1074.50 ft
Base of Section		1072.00 ft
Design Height	H	21.33 ft
Embedment Depth	Hemb	2.50 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	13.2700	Pass
L	Min. Reinforcement Length	4.0000	17.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.7969	Pass
La	Min. Anchorage Length	1.0000	6.2241	Pass
MinHemb	Minimum Embedment	12.0000	30.0000	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	1.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.04	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.22	Pass
FSsl	Base Sliding	1.50	1.80	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,073.33	2.75	41.27	1.59	2.33
2	1,074.67	2.55	38.20	1.57	2.87
3	1,076.00	2.62	38.43	1.64	2.45
4	1,077.33	1.68	20.87	1.65	1.90
5	1,078.67	1.78	26.54	1.60	1.54
6	1,080.00	1.81	24.71	1.58	1.78
7	1,081.33	1.73	22.66	1.65	1.90
8	1,082.67	1.82	26.59	1.60	1.71
9	1,084.00	1.82	24.55	1.60	1.62
10	1,085.33	2.72	39.51	1.68	2.49
11	1,086.67	2.57	36.68	1.66	2.37
12	1,088.00	2.65	36.44	1.75	2.62
13	1,089.33	2.59	38.73	1.69	2.38
14	1,090.67	2.66	30.14	1.76	2.34
15	1,092.00	2.59	32.85	1.76	2.39
16	1,092.67	2.74	35.68	1.69	2.65

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	7	3	1.53	Pass
10	6	5	1.59	Pass
10	6	2	1.59	Pass
1	6	1	1.61	Pass
9	7	4	1.63	Pass
8	7	7	1.65	Pass
10	7	6	1.69	Pass
10	5	9	1.71	Pass

Radius Point	Entry Point	Exit Point	Result	Status
10	6	8	1.76	Pass
10	6	11	1.81	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	22.35 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	16.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.73 °	Eq. 7-46
Elevation of influence of live load	Eq _{linfl}	14.40 ft	Eq. 7-93
Elevation of influence of dead load	Eq _{dinfl}	21.33 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.73 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	16.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.59 ft	Eq. 7-4
Increase in height due to backslope	h	8.48 ft	Eq. 7-5
Increase in height due to backslope at L β	h _{max}	23.67 ft	Eq. 7-6
Maximum height of slope influence	h _{maxint}	21.33 ft	Eq. 7-45
External active earth pressure	Ka _{ext}	0.466	Eq. 7-1
Internal active earth pressure	Ka _{int}	0.285	Eq. 7-43
Height above rein. area at int. failure plane	h _{int}	7.11 ft	Eq. 7-26
Horz. influence distance	d _{int}	10.64 ft	Eq. 7-27
Distance dead load applied for broken back	L β _{qd}	16.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	15722.84 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2605.20 lb/ft	Eq. 7-13
Horz. component of Ps	Ps _H	15722.84 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	Pq _{dH}	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	Pq _{lH}	2605.20 lb/ft	Eq. 7-16
Horz. component of active earth force	Pa _H	18328.04 lb/ft	Eq. 7-17
Resisting moment arm for Ps _H	Y _s	7.45 ft	Eq. 7-18
Resisting moment arm for Pq _H	Y _q	11.18 ft	Eq. 7-19
Vert. component of Ps	Ps _V	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	Pq _{dV}	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	Pq _{lV}	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	Pa _V	0.00 lb/ft	Eq. 7-23
Resisting moment arm for Ps _V	X _s	17.52 ft	Eq. 7-24
Resisting moment arm for Pq _V	X _q	17.78 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β ₁	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β ₂	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β ₃	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WG _{Tdl}	0.00 lb/ft	Eq.
Weight of reinforced mass	W _{ri}	48639.24 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Base sliding resistance	Rs	32934.14 lb/ft	Eq. 7-32
Base sliding	FS _{sl}	1.797	Eq. 7-33

Overturning

Weight of soil above wall	Wr β ₁	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β ₂	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β ₃	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WG _{Tdl}	0.00 lb/ft	Eq.
Weight of reinforced mass	W _{ri}	48639.24 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	X _{ri}	9.22 ft	Eq. 7-35
Resisting moment arm for surcharge	X _{qβ}	10.50 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β ₁	3.83 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β ₂	11.52 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β ₃	18.56 ft	Eq. 7-36A3
Resisting moment	Mr	471447.72 lb	Eq. 7-34

Driving moment	Mo	146261.72 lb	Eq. 7-38
Overturning	FSot	3.223	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	12.82 ft	Eq. 7-40
Eccentricity of bearing force	e	2.09 ft	Eq. 7-41
Applied bearing pressure	Qa	4190.79 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	54654.66 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.042	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,073.33	3239.26	2.00	20.33	1707.09
2/4	1,074.67	2509.38	1.33	18.67	1052.56
3/6	1,076.00	2509.38	1.33	17.33	984.16
4/8	1,077.33	2509.38	1.33	16.00	915.77
5/10	1,078.67	1999.00	1.33	14.67	847.37
6/12	1,080.00	1999.00	1.33	13.33	778.97
7/14	1,081.33	1999.00	1.33	12.00	710.57
8/16	1,082.67	1999.00	1.33	10.67	642.17
9/18	1,084.00	1999.00	1.33	9.33	573.77
10/20	1,085.33	1999.00	1.33	8.00	505.37
11/22	1,086.67	1999.00	1.33	6.67	436.97
12/24	1,088.00	1999.00	1.33	5.33	368.58
13/26	1,089.33	1999.00	1.33	4.00	300.18
14/28	1,090.67	1999.00	1.33	2.67	137.41
15/30	1,092.00	1999.00	1.00	1.50	57.70
16/31	1,092.67	1999.00	1.00	0.50	19.22

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,073.33	1.898	1.000	1.000
2/4	1,074.67	2.384	1.000	1.000
3/6	1,076.00	2.550	1.000	1.000
4/8	1,077.33	2.740	1.000	1.000
5/10	1,078.67	2.359	1.000	1.000
6/12	1,080.00	2.566	1.000	1.000
7/14	1,081.33	2.813	1.000	1.000
8/16	1,082.67	3.113	1.000	1.000
9/18	1,084.00	3.484	1.000	1.000
10/20	1,085.33	3.955	1.000	1.000
11/22	1,086.67	4.575	1.000	1.000
12/24	1,088.00	5.424	1.000	1.000
13/26	1,089.33	6.659	1.000	1.000
14/28	1,090.67	14.548	1.000	0.007
15/30	1,092.00	34.645	1.000	0.000
16/31	1,092.67	103.982	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,073.33	1707.09	45313.90	15.37	21.02
2/4	1,074.67	1052.56	40697.81	14.74	19.69
3/6	1,076.00	984.16	36317.65	14.11	18.35
4/8	1,077.33	915.77	32173.41	13.48	17.02
5/10	1,078.67	847.37	28265.09	12.85	15.69
6/12	1,080.00	778.97	24592.69	12.22	14.35
7/14	1,081.33	710.57	21156.21	11.59	13.02
8/16	1,082.67	642.17	17955.66	10.95	11.69
9/18	1,084.00	573.77	14991.02	10.32	10.35
10/20	1,085.33	505.37	12262.30	9.69	9.02
11/22	1,086.67	436.97	9769.51	9.06	7.69

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
12/24	1,088.00	368.58	7512.63	8.43	6.35
13/26	1,089.33	300.18	5491.68	7.80	5.02
14/28	1,090.67	137.41	3706.65	7.17	3.69
15/30	1,092.00	57.70	2157.54	6.54	2.35
16/31	1,092.67	19.22	1471.45	6.22	1.69

Layer/ Course	Elevation (ft)	FSpo [7-66]
1/2	1,073.33	26.544
2/4	1,074.67	38.665
3/6	1,076.00	36.902
4/8	1,077.33	35.133
5/10	1,078.67	33.356
6/12	1,080.00	31.571
7/14	1,081.33	29.774
8/16	1,082.67	27.961
9/18	1,084.00	26.127
10/20	1,085.33	24.264
11/22	1,086.67	22.357
12/24	1,088.00	20.383
13/26	1,089.33	18.295
14/28	1,090.67	26.975
15/30	1,092.00	37.393
16/31	1,092.67	76.540

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,073.33	13902.60	0.00	2449.76	0.00
2/4	1,074.67	12194.71	0.00	2294.36	0.00
3/6	1,076.00	10598.70	0.00	2138.96	0.00
4/8	1,077.33	9114.59	0.00	1983.55	0.00
5/10	1,078.67	7742.37	0.00	1828.15	0.00
6/12	1,080.00	6482.04	0.00	1672.75	0.00
7/14	1,081.33	5333.60	0.00	1517.35	0.00
8/16	1,082.67	4297.04	0.00	1361.95	0.00
9/18	1,084.00	3372.38	0.00	1206.55	0.00
10/20	1,085.33	2559.61	0.00	1051.14	0.00
11/22	1,086.67	1858.72	0.00	895.74	0.00
12/24	1,088.00	1269.73	0.00	740.34	0.00
13/26	1,089.33	792.63	0.00	584.94	0.00
14/28	1,090.67	427.42	0.00	429.54	0.00
15/30	1,092.00	174.09	0.00	274.14	0.00
16/31	1,092.67	89.39	0.00	196.43	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,073.33	0.00	0.00	16352.36	0.00
2/4	1,074.67	0.00	0.00	14489.06	0.00
3/6	1,076.00	0.00	0.00	12737.66	0.00
4/8	1,077.33	0.00	0.00	11098.15	0.00
5/10	1,078.67	0.00	0.00	9570.52	0.00
6/12	1,080.00	0.00	0.00	8154.79	0.00
7/14	1,081.33	0.00	0.00	6850.94	0.00
8/16	1,082.67	0.00	0.00	5658.99	0.00
9/18	1,084.00	0.00	0.00	4578.93	0.00
10/20	1,085.33	0.00	0.00	3610.75	0.00
11/22	1,086.67	0.00	0.00	2754.47	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
12/24	1,088.00	0.00	0.00	2010.07	0.00
13/26	1,089.33	0.00	0.00	1377.57	0.00
14/28	1,090.67	0.00	0.00	856.95	0.00
15/30	1,092.00	0.00	0.00	448.23	0.00
16/31	1,092.67	0.00	0.00	285.82	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,073.33	23586.51	43325.16	2518.79	1.596
2/4	1,074.67	22085.92	40436.77	2410.86	1.691
3/6	1,076.00	20585.32	37548.38	2302.94	1.797
4/8	1,077.33	19084.73	34659.99	2195.02	1.917
5/10	1,078.67	17584.13	31771.59	2087.10	2.055
6/12	1,080.00	16083.54	28883.20	1979.18	2.215
7/14	1,081.33	14582.94	25994.81	1871.26	2.402
8/16	1,082.67	13082.35	23106.42	1763.34	2.623
9/18	1,084.00	11581.75	20218.03	1655.42	2.891
10/20	1,085.33	10081.16	17329.64	1547.50	3.221
11/22	1,086.67	8580.57	14441.25	1439.58	3.638
12/24	1,088.00	7079.97	11552.85	1331.66	4.185
13/26	1,089.33	5579.38	8664.46	1223.74	4.938
14/28	1,090.67	4078.78	5776.07	1115.82	6.062
15/30	1,092.00	2578.19	2887.68	1007.89	8.001
16/31	1,092.67	1827.89	1443.48	953.93	9.733

Connection Strength

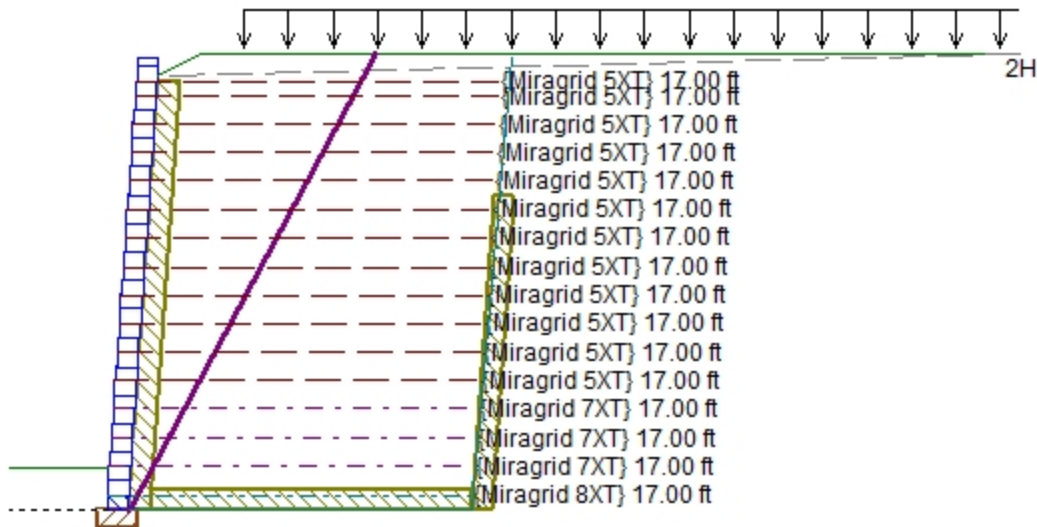
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinflmax (ft) [7-92]
1/2	1,073.33	1707.09	3096.77	1.814	6.27
2/4	1,074.67	1052.56	2720.83	2.585	6.27
3/6	1,076.00	984.16	2644.17	2.687	6.27
4/8	1,077.33	915.77	2567.51	2.804	6.27
5/10	1,078.67	847.37	2507.64	2.959	6.27
6/12	1,080.00	778.97	2443.64	3.137	6.27
7/14	1,081.33	710.57	2379.64	3.349	6.27
8/16	1,082.67	642.17	2315.65	3.606	6.27
9/18	1,084.00	573.77	2251.65	3.924	6.27
10/20	1,085.33	505.37	2088.14	4.132	6.27
11/22	1,086.67	436.97	1910.44	4.372	6.27
12/24	1,088.00	368.58	1732.74	4.701	6.27
13/26	1,089.33	300.18	1555.05	5.180	6.27
14/28	1,090.67	137.41	1377.35	10.024	6.27
15/30	1,092.00	57.70	1199.65	20.792	6.27
16/31	1,092.67	19.22	1110.80	57.781	6.27

Crest Toppling

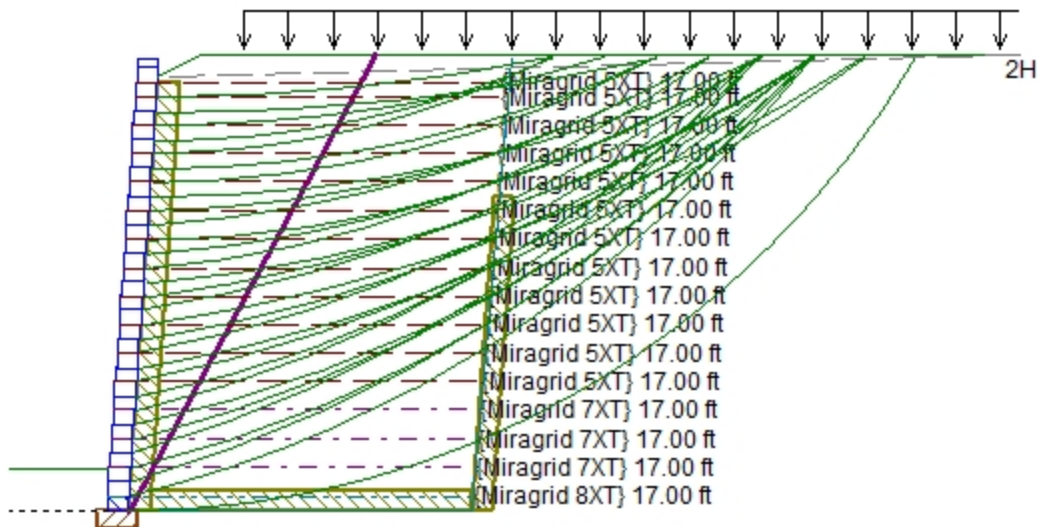
Height from top layer to grade	H _z	0.67 ft	Eq.
Horz. component of P _s	P _s H	0.00 lb/ft	Eq. 7-83
Uniform surcharge	P _q H	2605.20 lb/ft	Eq. 7-84
Vert. component of P _s	P _s V	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	P _q dV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	P _q IV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X _w	0.51 ft	Eq. 7-90
Resisting moment	M _r	0.00 lb	Eq. 7-89
Overturning moment	M _o	0.00 lb	Eq. 7-91
Crest toppling	FS _{ct}	0.000	Eq. 7-88

Section 10 Details

Section 10 Cross-section



Section 10 Static ICS Cross-section



Section 10 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1074.58 ft
Base of Section		1072.67 ft
Design Height	H	20.18 ft
Embedment Depth	Hemb	1.91 ft
* Embedment is included in Bearing Capacity		

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.4600	Pass
L	Min. Reinforcement Length	4.0000	17.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8424	Pass
La	Min. Anchorage Length	1.0000	6.5394	Pass
MinHemb	Minimum Embedment	12.0000	22.9370	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	1.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.47	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.39	Pass
FSsl	Base Sliding	1.50	1.80	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,073.33	2.62	41.15	1.63	2.95
2	1,074.67	2.79	38.43	1.64	2.33
3	1,076.00	2.75	41.27	1.57	2.45
4	1,077.33	2.55	38.20	1.59	2.87
5	1,078.67	1.82	24.55	1.60	1.62
6	1,080.00	1.81	26.54	1.58	1.54
7	1,081.33	1.73	20.87	1.65	1.90
8	1,082.67	1.78	24.71	1.60	1.78
9	1,084.00	1.82	26.59	1.60	1.71
10	1,085.33	1.68	22.66	1.65	1.90
11	1,086.67	2.62	39.39	1.73	2.37
12	1,088.00	2.65	36.44	1.75	2.62
13	1,089.33	2.57	36.68	1.66	2.49
14	1,090.67	2.72	39.51	1.68	2.44
15	1,092.00	2.74	38.67	1.76	2.39
16	1,092.67	2.85	35.68	1.76	2.34

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	6	2	1.56	Pass
8	6	4	1.61	Pass
10	6	3	1.65	Pass
10	6	6	1.67	Pass
1	8	1	1.72	Pass
9	5	5	1.72	Pass
9	5	8	1.74	Pass
8	6	7	1.78	Pass

Radius Point	Entry Point	Exit Point	Result	Status
9	6	10	1.84	Pass
7	5	9	1.87	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	21.20 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	16.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.89 °	Eq. 7-46
Elevation of influence of live load	Eq β_{infl}	13.25 ft	Eq. 7-93
Elevation of influence of dead load	Eq β_{infl}	20.18 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.89 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	16.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.59 ft	Eq. 7-4
Increase in height due to backslope	h	8.48 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	23.08 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	20.18 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.286	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.72 ft	Eq. 7-26
Horz. influence distance	dint	10.10 ft	Eq. 7-27
Distance dead load applied for broken back	L β_{qd}	16.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	14798.95 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2527.50 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	14798.95 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2527.50 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	17326.45 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	7.07 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	10.60 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	17.49 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	17.74 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β_1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β_2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β_3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	46009.16 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Base sliding resistance	Rs	31226.15 lb/ft	Eq. 7-32
Base sliding	FSsl	1.802	Eq. 7-33

Overturning

Weight of soil above wall	Wr β_1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β_2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β_3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	46009.16 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	9.18 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	10.42 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β_1	3.74 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β_2	11.43 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β_3	18.48 ft	Eq. 7-36A3
Resisting moment	Mr	445168.65 lb	Eq. 7-34

Driving moment	Mo	131361.52 lb	Eq. 7-38
Overturning	FSot	3.389	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	13.05 ft	Eq. 7-40
Eccentricity of bearing force	e	1.97 ft	Eq. 7-41
Applied bearing pressure	Qa	3916.03 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	52759.08 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.473	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,073.33	3239.26	1.33	19.51	1097.68
2/3	1,074.67	2509.38	1.33	18.18	1029.18
3/5	1,076.00	2509.38	1.33	16.85	960.67
4/7	1,077.33	2509.38	1.33	15.51	892.17
5/9	1,078.67	1999.00	1.33	14.18	823.67
6/11	1,080.00	1999.00	1.33	12.85	755.16
7/13	1,081.33	1999.00	1.33	11.51	686.66
8/15	1,082.67	1999.00	1.33	10.18	618.15
9/17	1,084.00	1999.00	1.33	8.85	549.65
10/19	1,085.33	1999.00	1.33	7.51	481.14
11/21	1,086.67	1999.00	1.33	6.18	412.64
12/23	1,088.00	1999.00	1.33	4.85	344.13
13/25	1,089.33	1999.00	1.33	3.51	185.83
14/27	1,090.67	1999.00	1.33	2.18	111.98
15/29	1,092.00	1999.00	1.00	1.01	39.03
16/30	1,092.67	1999.00	0.51	0.26	5.07

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,073.33	2.951	1.000	1.000
2/3	1,074.67	2.438	1.000	1.000
3/5	1,076.00	2.612	1.000	1.000
4/7	1,077.33	2.813	1.000	1.000
5/9	1,078.67	2.427	1.000	1.000
6/11	1,080.00	2.647	1.000	1.000
7/13	1,081.33	2.911	1.000	1.000
8/15	1,082.67	3.234	1.000	1.000
9/17	1,084.00	3.637	1.000	1.000
10/19	1,085.33	4.155	1.000	1.000
11/21	1,086.67	4.844	1.000	1.000
12/23	1,088.00	5.809	1.000	1.000
13/25	1,089.33	10.757	1.000	0.056
14/27	1,090.67	17.852	1.000	0.000
15/29	1,092.00	51.221	1.000	0.000
16/30	1,092.67	394.559	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,073.33	1097.68	45172.48	15.68	20.53
2/3	1,074.67	1029.18	40540.49	15.05	19.20
3/5	1,076.00	960.67	36144.42	14.42	17.87
4/7	1,077.33	892.17	31984.27	13.79	16.53
5/9	1,078.67	823.67	28060.05	13.16	15.20
6/11	1,080.00	755.16	24371.74	12.53	13.87
7/13	1,081.33	686.66	20919.36	11.90	12.53
8/15	1,082.67	618.15	17702.89	11.27	11.20
9/17	1,084.00	549.65	14722.35	10.64	9.87
10/19	1,085.33	481.14	11977.73	10.01	8.53
11/21	1,086.67	412.64	9469.03	9.38	7.20

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
12/23	1,088.00	344.13	7196.25	8.75	5.87
13/25	1,089.33	185.83	5159.39	8.12	4.53
14/27	1,090.67	111.98	3358.45	7.49	3.20
15/29	1,092.00	39.03	1793.43	6.85	1.87
16/30	1,092.67	5.07	1099.39	6.54	1.20

Layer/ Course	Elevation (ft)	FSpo [7-66]
1/1	1,073.33	41.153
2/3	1,074.67	39.391
3/5	1,076.00	37.624
4/7	1,077.33	35.850
5/9	1,078.67	34.067
6/11	1,080.00	32.274
7/13	1,081.33	30.466
8/15	1,082.67	28.638
9/17	1,084.00	26.785
10/19	1,085.33	24.894
11/21	1,086.67	22.948
12/23	1,088.00	20.911
13/25	1,089.33	27.764
14/27	1,090.67	29.992
15/29	1,092.00	45.954
16/30	1,092.67	216.996

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,073.33	13265.98	0.00	2393.01	0.00
2/3	1,074.67	11598.94	0.00	2237.61	0.00
3/5	1,076.00	10043.80	0.00	2082.21	0.00
4/7	1,077.33	8600.55	0.00	1926.81	0.00
5/9	1,078.67	7269.18	0.00	1771.41	0.00
6/11	1,080.00	6049.71	0.00	1616.00	0.00
7/13	1,081.33	4942.12	0.00	1460.60	0.00
8/15	1,082.67	3946.43	0.00	1305.20	0.00
9/17	1,084.00	3062.62	0.00	1149.80	0.00
10/19	1,085.33	2290.71	0.00	994.40	0.00
11/21	1,086.67	1630.68	0.00	839.00	0.00
12/23	1,088.00	1082.54	0.00	683.59	0.00
13/25	1,089.33	646.30	0.00	528.19	0.00
14/27	1,090.67	321.94	0.00	372.79	0.00
15/29	1,092.00	109.48	0.00	217.39	0.00
16/30	1,092.67	45.20	0.00	139.69	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,073.33	0.00	0.00	15658.99	0.00
2/3	1,074.67	0.00	0.00	13836.56	0.00
3/5	1,076.00	0.00	0.00	12126.01	0.00
4/7	1,077.33	0.00	0.00	10527.35	0.00
5/9	1,078.67	0.00	0.00	9040.59	0.00
6/11	1,080.00	0.00	0.00	7665.71	0.00
7/13	1,081.33	0.00	0.00	6402.72	0.00
8/15	1,082.67	0.00	0.00	5251.63	0.00
9/17	1,084.00	0.00	0.00	4212.42	0.00
10/19	1,085.33	0.00	0.00	3285.10	0.00
11/21	1,086.67	0.00	0.00	2469.68	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
12/23	1,088.00	0.00	0.00	1766.14	0.00
13/25	1,089.33	0.00	0.00	1174.49	0.00
14/27	1,090.67	0.00	0.00	694.73	0.00
15/29	1,092.00	0.00	0.00	326.87	0.00
16/30	1,092.67	0.00	0.00	184.89	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,073.33	23038.56	42270.44	2479.38	1.630
2/3	1,074.67	21537.96	39382.05	2371.46	1.728
3/5	1,076.00	20037.37	36493.66	2263.54	1.839
4/7	1,077.33	18536.77	33605.27	2155.61	1.966
5/9	1,078.67	17036.18	30716.88	2047.69	2.111
6/11	1,080.00	15535.58	27828.49	1939.77	2.280
7/13	1,081.33	14034.99	24940.09	1831.85	2.478
8/15	1,082.67	12534.40	22051.70	1723.93	2.715
9/17	1,084.00	11033.80	19163.31	1616.01	3.003
10/19	1,085.33	9533.21	16274.92	1508.09	3.361
11/21	1,086.67	8032.61	13386.53	1400.17	3.819
12/23	1,088.00	6532.02	10498.14	1292.25	4.430
13/25	1,089.33	5031.42	7609.75	1184.33	5.292
14/27	1,090.67	3530.83	4721.35	1076.41	6.632
15/29	1,092.00	2030.23	1832.96	968.49	9.174
16/30	1,092.67	1279.94	388.77	914.53	11.869

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,073.33	1097.68	3063.71	2.791	5.93
2/3	1,074.67	1029.18	2692.83	2.616	5.93
3/5	1,076.00	960.67	2616.17	2.723	5.93
4/7	1,077.33	892.17	2539.51	2.846	5.93
5/9	1,078.67	823.67	2484.27	3.016	5.93
6/11	1,080.00	755.16	2420.27	3.205	5.93
7/13	1,081.33	686.66	2356.27	3.432	5.93
8/15	1,082.67	618.15	2292.28	3.708	5.93
9/17	1,084.00	549.65	2200.94	4.004	5.93
10/19	1,085.33	481.14	2023.25	4.205	5.93
11/21	1,086.67	412.64	1845.55	4.473	5.93
12/23	1,088.00	344.13	1667.86	4.847	5.93
13/25	1,089.33	185.83	1490.16	8.019	5.93
14/27	1,090.67	111.98	1312.46	11.721	5.93
15/29	1,092.00	39.03	1134.77	29.076	5.93
16/30	1,092.67	5.07	1045.92	206.441	5.93

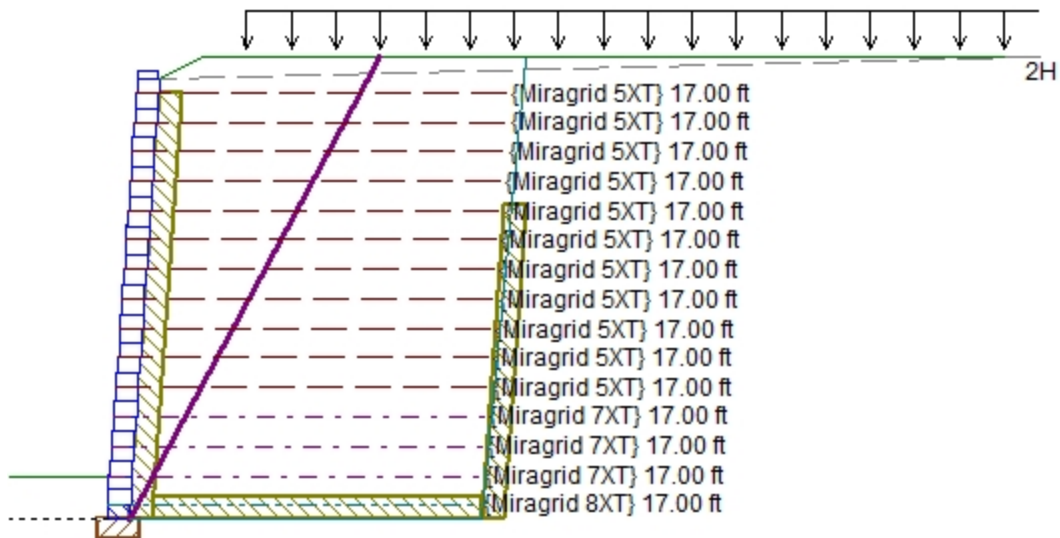
Crest Toppling

Height from top layer to grade	H _z	0.18 ft	Eq.
Horz. component of P _s	P _{sH}	0.00 lb/ft	Eq. 7-83
Uniform surcharge	P _{qH}	2527.50 lb/ft	Eq. 7-84
Vert. component of P _s	P _{sV}	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	P _{qdV}	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	P _{qIV}	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X _w	0.51 ft	Eq. 7-90
Resisting moment	M _r	0.00 lb	Eq. 7-89
Overturning moment	M _o	0.00 lb	Eq. 7-91
Crest toppling	FS _{ct}	0.000	Eq. 7-88

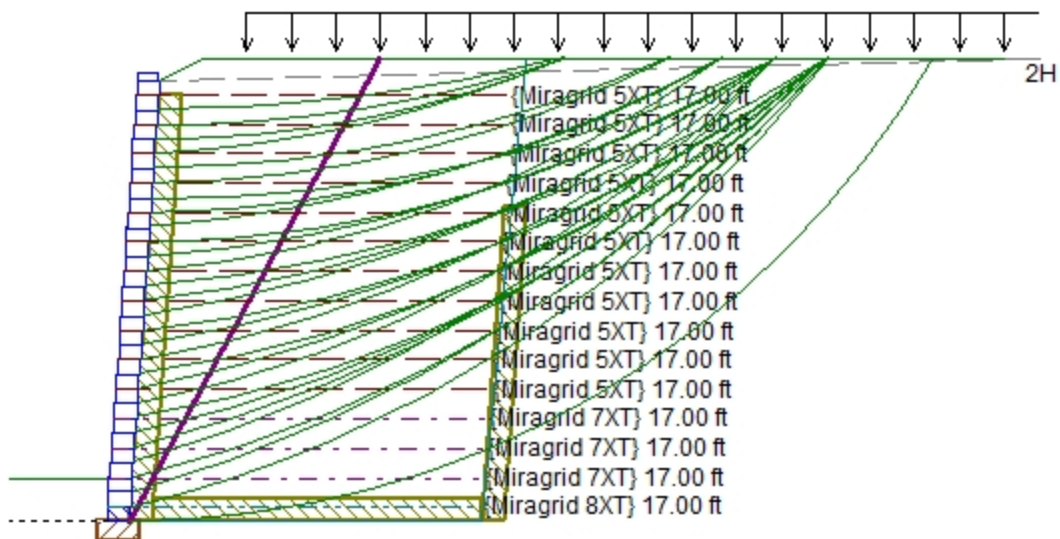


Section 11 Details

Section 11 Cross-section



Section 11 Static ICS Cross-section



Section 11 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.00 ft
Bottom Grade		1074.61 ft
Base of Section		1072.67 ft
Design Height	H	20.00 ft
Embedment Depth	Hemb	1.94 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.7700	Pass
L	Min. Reinforcement Length	4.0000	17.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8500	Pass
La	Min. Anchorage Length	1.0000	6.8547	Pass
MinHemb	Minimum Embedment	12.0000	23.3386	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	1.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.17	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.58	Pass
FSsl	Base Sliding	1.50	1.89	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,073.33	2.55	38.20	1.64	2.97
2	1,074.67	2.80	41.07	1.59	2.95
3	1,076.00	2.75	41.15	1.57	2.33
4	1,077.33	2.62	38.43	1.64	2.87
5	1,078.67	2.79	41.27	1.63	2.45
6	1,080.00	1.68	22.66	1.65	1.90
7	1,081.33	1.73	26.54	1.65	1.54
8	1,082.67	1.78	24.55	1.60	1.62
9	1,084.00	1.81	20.87	1.58	1.90
10	1,085.33	1.82	26.59	1.60	1.71
11	1,086.67	1.82	24.71	1.60	1.78
12	1,088.00	2.63	39.31	1.68	2.46
13	1,089.33	2.65	36.68	1.66	2.49
14	1,090.67	2.62	39.51	1.75	2.44
15	1,092.00	2.72	39.39	1.73	2.37

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	6	2	1.57	Pass
8	6	4	1.62	Pass
10	6	3	1.66	Pass
10	6	6	1.68	Pass
1	8	1	1.72	Pass
9	5	5	1.73	Pass
6	6	8	1.75	Pass
8	6	7	1.80	Pass
9	6	10	1.85	Pass

Radius Point	Entry Point	Exit Point	Result	Status
7	5	9	1.89	Pass

Static Calculations

General Equations

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	21.02 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	16.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	2.92 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	13.07 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	20.00 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	2.92 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	16.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.59 ft	Eq. 7-4
Increase in height due to backslope	h	8.48 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	22.99 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	20.00 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.286	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.66 ft	Eq. 7-26
Horz. influence distance	dint	10.01 ft	Eq. 7-27
Distance dead load applied for broken back	L β_{qd}	16.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	13903.03 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2449.80 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	13903.03 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2449.80 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	16352.83 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	7.01 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	10.51 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	17.49 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	17.73 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β_1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β_2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β_3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	45598.49 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Base sliding resistance	Rs	30959.46 lb/ft	Eq. 7-32
Base sliding	FSsl	1.893	Eq. 7-33

Overturning

Weight of soil above wall	Wr β_1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β_2	1932.42 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β_3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	45598.49 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	2074.89 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	9.18 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	10.41 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β_1	3.73 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β_2	11.42 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β_3	18.47 ft	Eq. 7-36A3
Resisting moment	Mr	441084.50 lb	Eq. 7-34
Driving moment	Mo	123151.88 lb	Eq. 7-38

Overturning

FSot

3.582

Eq. 7-39

Bearing Capacity

Equivalent bearing area

B

13.34 ft

Eq. 7-40

Eccentricity of bearing force

e

1.83 ft

Eq. 7-41

Applied bearing pressure

Qa

3801.42 lb/ft²

Eq. 7-42

Ultimate bearing pressure

Qult

53875.33 lb/ft²

Eq. 12-10

Bearing capacity

FSbc

14.172

Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,073.33	3239.26	1.33	19.33	1090.34
2/3	1,074.67	2509.38	1.33	18.00	1021.72
3/5	1,076.00	2509.38	1.33	16.67	953.09
4/7	1,077.33	2509.38	1.33	15.33	884.47
5/9	1,078.67	1999.00	1.33	14.00	815.84
6/11	1,080.00	1999.00	1.33	12.67	747.22
7/13	1,081.33	1999.00	1.33	11.33	678.59
8/15	1,082.67	1999.00	1.33	10.00	609.97
9/17	1,084.00	1999.00	1.33	8.67	541.34
10/19	1,085.33	1999.00	1.33	7.33	472.72
11/21	1,086.67	1999.00	1.33	6.00	404.09
12/23	1,088.00	1999.00	1.33	4.67	335.47
13/25	1,089.33	1999.00	1.33	3.33	175.90
14/27	1,090.67	1999.00	1.33	2.00	102.90
15/29	1,092.00	1999.00	1.33	0.67	34.28

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,073.33	2.971	1.000	1.000
2/3	1,074.67	2.456	1.000	1.000
3/5	1,076.00	2.633	1.000	1.000
4/7	1,077.33	2.837	1.000	1.000
5/9	1,078.67	2.450	1.000	1.000
6/11	1,080.00	2.675	1.000	1.000
7/13	1,081.33	2.946	1.000	1.000
8/15	1,082.67	3.277	1.000	1.000
9/17	1,084.00	3.693	1.000	1.000
10/19	1,085.33	4.229	1.000	1.000
11/21	1,086.67	4.947	1.000	1.000
12/23	1,088.00	5.959	1.000	1.000
13/25	1,089.33	11.365	1.000	0.046
14/27	1,090.67	19.426	1.000	0.000
15/29	1,092.00	58.316	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,073.33	1090.34	44776.20	15.68	20.35
2/3	1,074.67	1021.72	40160.14	15.05	19.02
3/5	1,076.00	953.09	35780.01	14.42	17.69
4/7	1,077.33	884.47	31635.80	13.79	16.35
5/9	1,078.67	815.84	27727.51	13.16	15.02
6/11	1,080.00	747.22	24055.14	12.53	13.69
7/13	1,081.33	678.59	20618.69	11.90	12.35
8/15	1,082.67	609.97	17418.16	11.27	11.02
9/17	1,084.00	541.34	14453.55	10.64	9.69
10/19	1,085.33	472.72	11724.86	10.01	8.35
11/21	1,086.67	404.09	9232.10	9.38	7.02
12/23	1,088.00	335.47	6975.25	8.75	5.69
13/25	1,089.33	175.90	4954.33	8.12	4.35
14/27	1,090.67	102.90	3169.33	7.49	3.02



Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
15/29	1,092.00	34.28	1620.24	6.85	1.69

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,073.33	41.066
2/3	1,074.67	39.306
3/5	1,076.00	37.541
4/7	1,077.33	35.768
5/9	1,078.67	33.986
6/11	1,080.00	32.193
7/13	1,081.33	30.385
8/15	1,082.67	28.556
9/17	1,084.00	26.699
10/19	1,085.33	24.803
11/21	1,086.67	22.847
12/23	1,088.00	20.793
13/25	1,089.33	28.166
14/27	1,090.67	30.799
15/29	1,092.00	47.267

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,073.33	13034.25	0.00	2372.02	0.00
2/3	1,074.67	11382.33	0.00	2216.62	0.00
3/5	1,076.00	9842.30	0.00	2061.22	0.00
4/7	1,077.33	8414.16	0.00	1905.82	0.00
5/9	1,078.67	7097.91	0.00	1750.41	0.00
6/11	1,080.00	5893.55	0.00	1595.01	0.00
7/13	1,081.33	4801.08	0.00	1439.61	0.00
8/15	1,082.67	3820.50	0.00	1284.21	0.00
9/17	1,084.00	2951.81	0.00	1128.81	0.00
10/19	1,085.33	2195.01	0.00	973.40	0.00
11/21	1,086.67	1550.10	0.00	818.00	0.00
12/23	1,088.00	1017.08	0.00	662.60	0.00
13/25	1,089.33	595.95	0.00	507.20	0.00
14/27	1,090.67	286.71	0.00	351.80	0.00
15/29	1,092.00	89.35	0.00	196.40	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,073.33	0.00	0.00	15406.27	0.00
2/3	1,074.67	0.00	0.00	13598.94	0.00
3/5	1,076.00	0.00	0.00	11903.51	0.00
4/7	1,077.33	0.00	0.00	10319.97	0.00
5/9	1,078.67	0.00	0.00	8848.32	0.00
6/11	1,080.00	0.00	0.00	7488.56	0.00
7/13	1,081.33	0.00	0.00	6240.69	0.00
8/15	1,082.67	0.00	0.00	5104.71	0.00
9/17	1,084.00	0.00	0.00	4080.61	0.00
10/19	1,085.33	0.00	0.00	3168.41	0.00
11/21	1,086.67	0.00	0.00	2368.10	0.00
12/23	1,088.00	0.00	0.00	1679.68	0.00
13/25	1,089.33	0.00	0.00	1103.15	0.00
14/27	1,090.67	0.00	0.00	638.50	0.00
15/29	1,092.00	0.00	0.00	285.75	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,073.33	22835.84	41880.25	2464.80	1.642
2/3	1,074.67	21335.25	38991.86	2356.88	1.742
3/5	1,076.00	19834.66	36103.47	2248.96	1.855
4/7	1,077.33	18334.06	33215.08	2141.04	1.984
5/9	1,078.67	16833.47	30326.69	2033.12	2.132
6/11	1,080.00	15332.87	27438.30	1925.19	2.305
7/13	1,081.33	13832.28	24549.91	1817.27	2.508
8/15	1,082.67	12331.68	21661.51	1709.35	2.751
9/17	1,084.00	10831.09	18773.12	1601.43	3.047
10/19	1,085.33	9330.49	15884.73	1493.51	3.416
11/21	1,086.67	7829.90	12996.34	1385.59	3.892
12/23	1,088.00	6329.30	10107.95	1277.67	4.529
13/25	1,089.33	4828.71	7219.56	1169.75	5.438
14/27	1,090.67	3328.11	4331.17	1061.83	6.875
15/29	1,092.00	1827.52	1442.77	953.91	9.734

Connection Strength

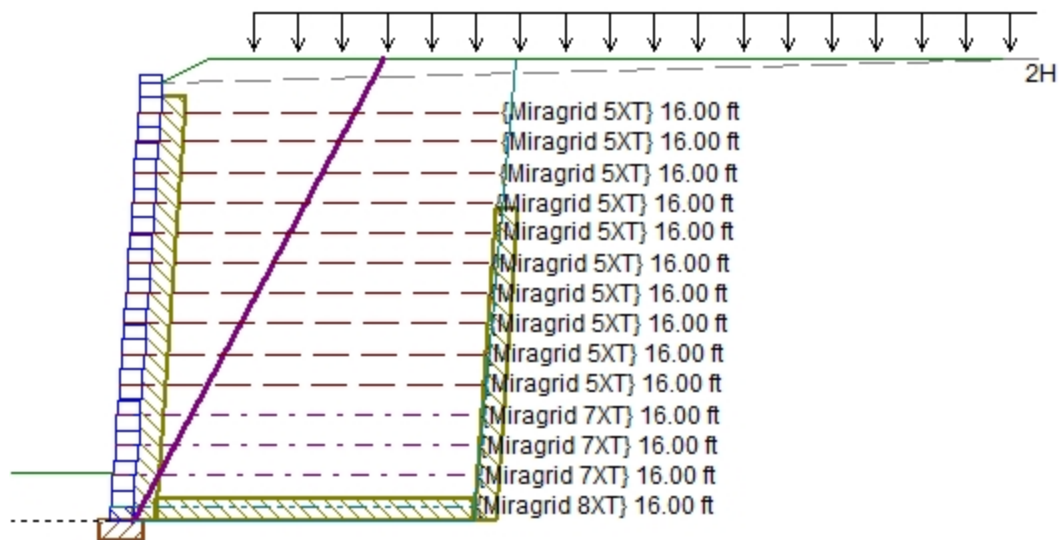
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,073.33	1090.34	3051.48	2.799	5.88
2/3	1,074.67	1021.72	2682.48	2.625	5.88
3/5	1,076.00	953.09	2605.82	2.734	5.88
4/7	1,077.33	884.47	2529.16	2.860	5.88
5/9	1,078.67	815.84	2475.62	3.034	5.88
6/11	1,080.00	747.22	2411.63	3.227	5.88
7/13	1,081.33	678.59	2347.63	3.460	5.88
8/15	1,082.67	609.97	2283.63	3.744	5.88
9/17	1,084.00	541.34	2176.94	4.021	5.88
10/19	1,085.33	472.72	1999.24	4.229	5.88
11/21	1,086.67	404.09	1821.55	4.508	5.88
12/23	1,088.00	335.47	1643.85	4.900	5.88
13/25	1,089.33	175.90	1466.15	8.335	5.88
14/27	1,090.67	102.90	1288.46	12.521	5.88
15/29	1,092.00	34.28	1110.76	32.404	5.88

Crest Toppling

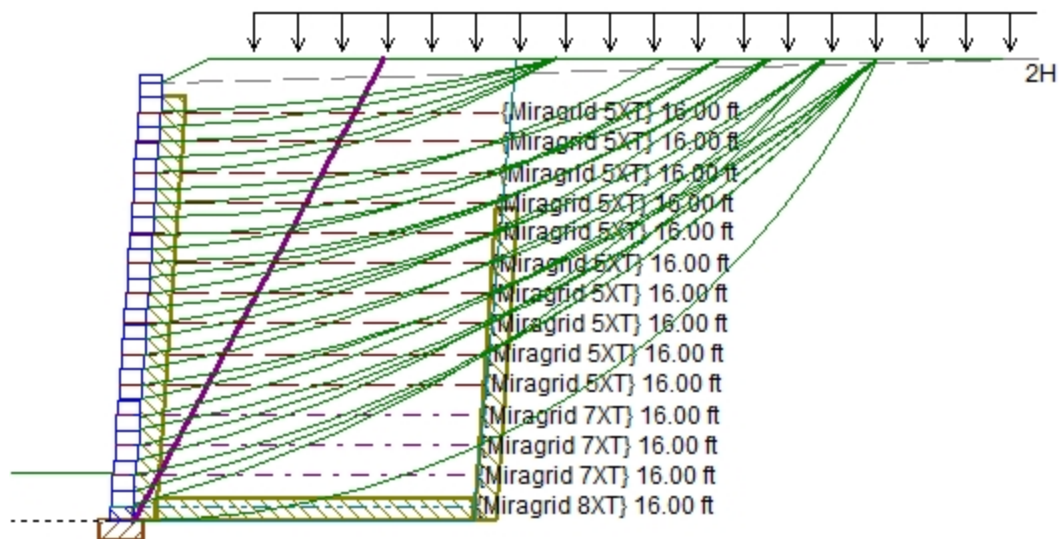
Height from top layer to grade	Hz	0.67 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2449.80 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.51 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 12 Details

Section 12 Cross-section



Section 12 Static ICS Cross-section



Section 12 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1092.33 ft
Bottom Grade		1074.75 ft
Base of Section		1072.67 ft
Design Height	H	19.33 ft
Embedment Depth	Hemb	2.08 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	12.0500	Pass
L	Min. Reinforcement Length	4.0000	16.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8276	Pass
La	Min. Anchorage Length	1.0000	6.4856	Pass
MinHemb	Minimum Embedment	12.0000	24.9567	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.52	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.37	Pass
FSsl	Base Sliding	1.50	1.83	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,073.33	2.62	41.27	1.63	3.06
2	1,074.67	2.79	38.33	1.60	2.45
3	1,076.00	2.84	38.43	1.59	2.33
4	1,077.33	2.55	41.07	1.64	2.87
5	1,078.67	2.80	38.20	1.64	2.97
6	1,080.00	2.75	41.15	1.57	2.95
7	1,081.33	1.82	24.71	1.60	1.78
8	1,082.67	1.73	24.55	1.65	1.62
9	1,084.00	1.68	20.87	1.65	1.54
10	1,085.33	1.78	26.54	1.60	1.90
11	1,086.67	1.82	26.59	1.60	1.71
12	1,088.00	1.81	22.66	1.58	1.90
13	1,089.33	2.67	39.31	1.70	2.54
14	1,090.67	2.72	39.51	1.75	2.49

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	6	2	1.56	Pass
7	7	4	1.61	Pass
9	7	3	1.66	Pass
9	7	6	1.66	Pass
1	7	1	1.69	Pass
8	6	5	1.72	Pass
8	6	8	1.74	Pass
7	7	7	1.80	Pass
6	7	10	1.85	Pass
9	7	9	1.88	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	20.35 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	15.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.02 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	12.40 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	19.33 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.02 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	15.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.56 ft	Eq. 7-4
Increase in height due to backslope	h	7.95 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	21.85 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	19.33 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.287	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.44 ft	Eq. 7-26
Horz. influence distance	dint	9.70 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	15.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	13035.09 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2372.10 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	13035.09 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2372.10 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	15407.18 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.78 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	10.18 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	16.47 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	16.71 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	41469.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1937.32 lb/ft	Eq. 7-31
Base sliding resistance	Rs	28189.04 lb/ft	Eq. 7-32
Base sliding	FSsl	1.830	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1794.85 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	41469.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1937.32 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.65 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.86 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.69 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.88 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	17.42 ft	Eq. 7-36A3
Resisting moment	Mr	378937.08 lb	Eq. 7-34
Driving moment	Mo	112570.61 lb	Eq. 7-38
Overturning	FSot	3.366	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	12.27 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.86 ft	Eq. 7-41
Applied bearing pressure	Qa	3763.34 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	50887.72 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.522	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,073.33	3239.26	1.33	18.67	1057.96
2/3	1,074.67	2509.38	1.33	17.33	989.21
3/5	1,076.00	2509.38	1.33	16.00	920.46
4/7	1,077.33	2509.38	1.33	14.67	851.71
5/9	1,078.67	1999.00	1.33	13.33	782.97
6/11	1,080.00	1999.00	1.33	12.00	714.22
7/13	1,081.33	1999.00	1.33	10.67	645.47
8/15	1,082.67	1999.00	1.33	9.33	576.72
9/17	1,084.00	1999.00	1.33	8.00	507.97
10/19	1,085.33	1999.00	1.33	6.67	439.22
11/21	1,086.67	1999.00	1.33	5.33	370.48
12/23	1,088.00	1999.00	1.33	4.00	301.73
13/25	1,089.33	1999.00	1.33	2.67	138.20
14/27	1,090.67	1999.00	2.00	1.00	77.34

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,073.33	3.062	1.000	1.000
2/3	1,074.67	2.537	1.000	1.000
3/5	1,076.00	2.726	1.000	1.000
4/7	1,077.33	2.946	1.000	1.000
5/9	1,078.67	2.553	1.000	1.000
6/11	1,080.00	2.799	1.000	1.000
7/13	1,081.33	3.097	1.000	1.000
8/15	1,082.67	3.466	1.000	1.000
9/17	1,084.00	3.935	1.000	1.000
10/19	1,085.33	4.551	1.000	1.000
11/21	1,086.67	5.396	1.000	1.000
12/23	1,088.00	6.625	1.000	1.000
13/25	1,089.33	14.464	1.000	0.007
14/27	1,090.67	25.846	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,073.33	1057.96	40549.54	14.68	19.69
2/3	1,074.67	989.21	36179.44	14.05	18.35
3/5	1,076.00	920.46	32045.26	13.42	17.02
4/7	1,077.33	851.71	28146.99	12.79	15.69
5/9	1,078.67	782.97	24484.66	12.16	14.35
6/11	1,080.00	714.22	21058.24	11.53	13.02
7/13	1,081.33	645.47	17867.74	10.90	11.69
8/15	1,082.67	576.72	14913.16	10.27	10.35
9/17	1,084.00	507.97	12194.51	9.64	9.02
10/19	1,085.33	439.22	9711.77	9.01	7.69
11/21	1,086.67	370.48	7464.96	8.38	6.35
12/23	1,088.00	301.73	5454.06	7.75	5.02
13/25	1,089.33	138.20	3679.09	7.12	3.69
14/27	1,090.67	77.34	2140.04	6.49	2.35

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,073.33	38.328
2/3	1,074.67	36.574



Layer/ Course	Elevation (ft)	FSpo [7-66]
3/5	1,076.00	34.814
4/7	1,077.33	33.047
5/9	1,078.67	31.272
6/11	1,080.00	29.484
7/13	1,081.33	27.682
8/15	1,082.67	25.859
9/17	1,084.00	24.006
10/19	1,085.33	22.111
11/21	1,086.67	20.150
12/23	1,088.00	18.076
13/25	1,089.33	26.621
14/27	1,090.67	27.670

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,073.33	12195.11	0.00	2294.40	0.00
2/3	1,074.67	10599.08	0.00	2138.99	0.00
3/5	1,076.00	9114.94	0.00	1983.59	0.00
4/7	1,077.33	7742.69	0.00	1828.19	0.00
5/9	1,078.67	6482.33	0.00	1672.79	0.00
6/11	1,080.00	5333.86	0.00	1517.39	0.00
7/13	1,081.33	4297.28	0.00	1361.99	0.00
8/15	1,082.67	3372.59	0.00	1206.58	0.00
9/17	1,084.00	2559.79	0.00	1051.18	0.00
10/19	1,085.33	1858.88	0.00	895.78	0.00
11/21	1,086.67	1269.86	0.00	740.38	0.00
12/23	1,088.00	792.73	0.00	584.98	0.00
13/25	1,089.33	427.49	0.00	429.58	0.00
14/27	1,090.67	174.14	0.00	274.17	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,073.33	0.00	0.00	14489.51	0.00
2/3	1,074.67	0.00	0.00	12738.08	0.00
3/5	1,076.00	0.00	0.00	11098.54	0.00
4/7	1,077.33	0.00	0.00	9570.88	0.00
5/9	1,078.67	0.00	0.00	8155.12	0.00
6/11	1,080.00	0.00	0.00	6851.25	0.00
7/13	1,081.33	0.00	0.00	5659.27	0.00
8/15	1,082.67	0.00	0.00	4579.18	0.00
9/17	1,084.00	0.00	0.00	3610.98	0.00
10/19	1,085.33	0.00	0.00	2754.66	0.00
11/21	1,086.67	0.00	0.00	2010.24	0.00
12/23	1,088.00	0.00	0.00	1377.71	0.00
13/25	1,089.33	0.00	0.00	857.07	0.00
14/27	1,090.67	0.00	0.00	448.31	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,073.33	20705.61	37917.48	2410.89	1.595
2/3	1,074.67	19298.53	35209.09	2302.97	1.696
3/5	1,076.00	17891.45	32500.70	2195.05	1.810
4/7	1,077.33	16484.37	29792.31	2087.13	1.940
5/9	1,078.67	15077.29	27083.91	1979.21	2.092
6/11	1,080.00	13670.21	24375.52	1871.29	2.268
7/13	1,081.33	12263.13	21667.13	1763.37	2.478
8/15	1,082.67	10856.05	18958.74	1655.45	2.732

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
9/17	1,084.00	9448.97	16250.35	1547.52	3.045
10/19	1,085.33	8041.89	13541.96	1439.60	3.442
11/21	1,086.67	6634.81	10833.57	1331.68	3.963
12/23	1,088.00	5227.73	8125.17	1223.76	4.683
13/25	1,089.33	3820.65	5416.78	1115.84	5.760
14/27	1,090.67	2413.57	2708.39	1007.92	7.632

Connection Strength

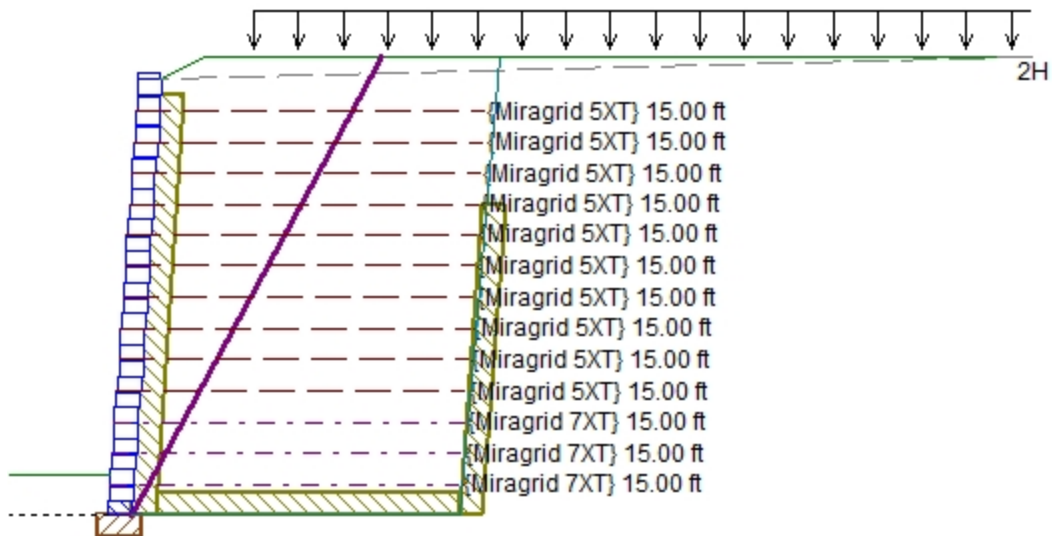
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,073.33	1057.96	3006.26	2.842	5.68
2/3	1,074.67	989.21	2644.19	2.673	5.68
3/5	1,076.00	920.46	2567.53	2.789	5.68
4/7	1,077.33	851.71	2490.87	2.925	5.68
5/9	1,078.67	782.97	2443.65	3.121	5.68
6/11	1,080.00	714.22	2379.66	3.332	5.68
7/13	1,081.33	645.47	2315.66	3.588	5.68
8/15	1,082.67	576.72	2251.67	3.904	5.68
9/17	1,084.00	507.97	2088.18	4.111	5.68
10/19	1,085.33	439.22	1910.48	4.350	5.68
11/21	1,086.67	370.48	1732.79	4.677	5.68
12/23	1,088.00	301.73	1555.09	5.154	5.68
13/25	1,089.33	138.20	1377.39	9.966	5.68
14/27	1,090.67	77.34	1199.70	15.512	5.68

Crest Toppling

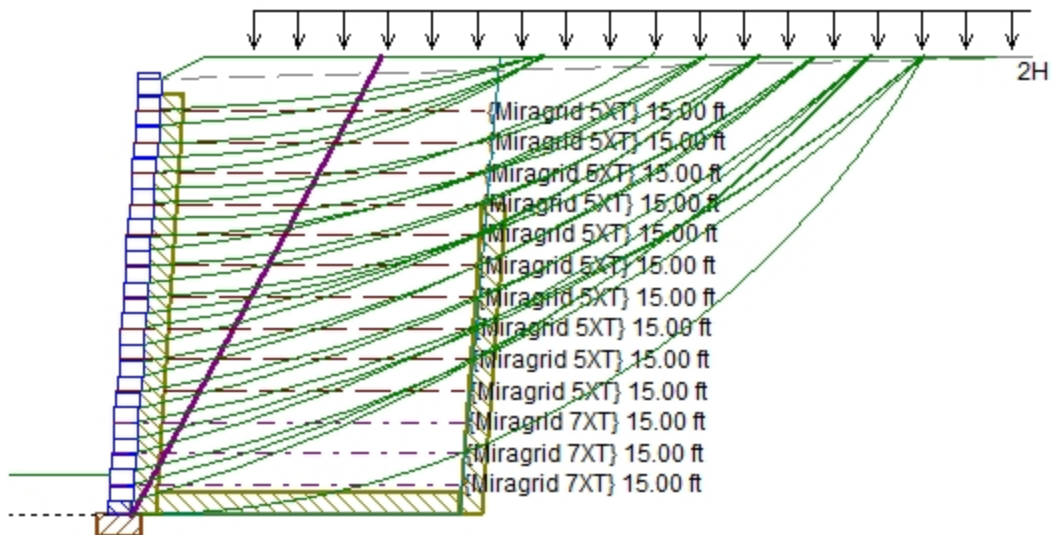
Height from top layer to grade	H _z	1.33 ft	Eq.
Horz. component of P _s	P _{sH}	0.00 lb/ft	Eq. 7-83
Uniform surcharge	P _{qH}	2372.10 lb/ft	Eq. 7-84
Vert. component of P _s	P _{sV}	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	P _{qdV}	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	P _{qLV}	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X _w	0.53 ft	Eq. 7-90
Resisting moment	M _r	0.00 lb	Eq. 7-89
Overtopping moment	M _o	0.00 lb	Eq. 7-91
Crest toppling	FS _{ct}	0.000	Eq. 7-88

Section 13 Details

Section 13 Cross-section



Section 13 Static ICS Cross-section



Section 13 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1092.33 ft
Bottom Grade		1075.06 ft
Base of Section		1073.33 ft
Design Height	H	18.67 ft
Embedment Depth	Hemb	1.73 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.2000	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8036	Pass
La	Min. Anchorage Length	1.0000	5.8009	Pass
MinHemb	Minimum Embedment	12.0000	20.7283	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.21	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.15	Pass
FSsl	Base Sliding	1.50	1.76	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,074.67	2.55	41.07	1.64	2.87
2	1,076.00	2.80	38.20	1.64	2.97
3	1,077.33	2.75	41.15	1.57	2.95
4	1,078.67	2.62	41.27	1.63	3.06
5	1,080.00	2.79	38.33	1.60	2.45
6	1,081.33	2.84	38.43	1.59	2.33
7	1,082.67	1.82	26.59	1.58	1.90
8	1,084.00	1.81	22.66	1.59	1.66
9	1,085.33	1.75	22.76	1.60	1.54
10	1,086.67	1.78	24.55	1.60	1.90
11	1,088.00	1.82	24.71	1.65	1.62
12	1,089.33	1.73	26.54	1.60	1.71
13	1,090.67	1.68	20.87	1.65	1.78

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	7	3	1.56	Pass
1	8	1	1.59	Pass
10	7	2	1.62	Pass
10	7	5	1.62	Pass
8	8	4	1.67	Pass
8	8	7	1.69	Pass
10	8	6	1.74	Pass
7	7	9	1.79	Pass
10	7	8	1.82	Pass
7	6	11	1.92	Pass



Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	19.69 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.12 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	11.74 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	18.67 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.12 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	20.71 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	18.67 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.287	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.22 ft	Eq. 7-26
Horz. influence distance	dint	9.38 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	12195.11 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2294.40 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	12195.11 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2294.40 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	14489.51 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.56 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.84 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.46 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.69 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	37519.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	25534.54 lb/ft	Eq. 7-32
Base sliding	FSsl	1.762	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	37519.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.13 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.32 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.64 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.33 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.38 ft	Eq. 7-36A3
Resisting moment	Mr	322711.00 lb	Eq. 7-34
Driving moment	Mo	102606.60 lb	Eq. 7-38
Overturning	FSot	3.145	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.20 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.90 ft	Eq. 7-41
Applied bearing pressure	Qa	3738.02 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	45651.69 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	12.213	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,074.67	2509.38	2.00	17.67	1512.47
2/4	1,076.00	2509.38	1.33	16.00	922.21
3/6	1,077.33	2509.38	1.33	14.67	853.33
4/8	1,078.67	1999.00	1.33	13.33	784.45
5/10	1,080.00	1999.00	1.33	12.00	715.57
6/12	1,081.33	1999.00	1.33	10.67	646.70
7/14	1,082.67	1999.00	1.33	9.33	577.82
8/16	1,084.00	1999.00	1.33	8.00	508.94
9/18	1,085.33	1999.00	1.33	6.67	440.06
10/20	1,086.67	1999.00	1.33	5.33	371.18
11/22	1,088.00	1999.00	1.33	4.00	302.30
12/24	1,089.33	1999.00	1.33	2.67	138.49
13/26	1,090.67	1999.00	2.00	1.00	77.49

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,074.67	1.659	1.000	1.000
2/4	1,076.00	2.721	1.000	1.000
3/6	1,077.33	2.941	1.000	1.000
4/8	1,078.67	2.548	1.000	1.000
5/10	1,080.00	2.794	1.000	1.000
6/12	1,081.33	3.091	1.000	1.000
7/14	1,082.67	3.460	1.000	1.000
8/16	1,084.00	3.928	1.000	1.000
9/18	1,085.33	4.543	1.000	1.000
10/20	1,086.67	5.386	1.000	1.000
11/22	1,088.00	6.613	1.000	1.000
12/24	1,089.33	14.434	1.000	0.008
13/26	1,090.67	25.797	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,074.67	1512.47	34416.93	13.37	18.35
2/4	1,076.00	922.21	30410.80	12.74	17.02
3/6	1,077.33	853.33	26640.59	12.11	15.69
4/8	1,078.67	784.45	23106.30	11.48	14.35
5/10	1,080.00	715.57	19807.93	10.85	13.02
6/12	1,081.33	646.70	16745.48	10.22	11.69
7/14	1,082.67	577.82	13918.95	9.59	10.35
8/16	1,084.00	508.94	11328.34	8.95	9.02
9/18	1,085.33	440.06	8973.66	8.32	7.69
10/20	1,086.67	371.18	6854.89	7.69	6.35
11/22	1,088.00	302.30	4972.05	7.06	5.02
12/24	1,089.33	138.49	3325.13	6.43	3.69
13/26	1,090.67	77.49	1914.12	5.80	2.35

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,074.67	22.756
2/4	1,076.00	32.976
3/6	1,077.33	31.219
4/8	1,078.67	29.455
5/10	1,080.00	27.681

Layer/ Course	Elevation (ft)	FSpo [7-66]
6/12	1,081.33	25.894
7/14	1,082.67	24.089
8/16	1,084.00	22.259
9/18	1,085.33	20.392
10/20	1,086.67	18.468
11/22	1,088.00	16.447
12/24	1,089.33	24.009
13/26	1,090.67	24.702

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,074.67	10599.08	0.00	2138.99	0.00
2/4	1,076.00	9114.94	0.00	1983.59	0.00
3/6	1,077.33	7742.69	0.00	1828.19	0.00
4/8	1,078.67	6482.33	0.00	1672.79	0.00
5/10	1,080.00	5333.86	0.00	1517.39	0.00
6/12	1,081.33	4297.28	0.00	1361.99	0.00
7/14	1,082.67	3372.59	0.00	1206.58	0.00
8/16	1,084.00	2559.79	0.00	1051.18	0.00
9/18	1,085.33	1858.88	0.00	895.78	0.00
10/20	1,086.67	1269.86	0.00	740.38	0.00
11/22	1,088.00	792.73	0.00	584.98	0.00
12/24	1,089.33	427.49	0.00	429.58	0.00
13/26	1,090.67	174.14	0.00	274.17	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,074.67	0.00	0.00	12738.08	0.00
2/4	1,076.00	0.00	0.00	11098.54	0.00
3/6	1,077.33	0.00	0.00	9570.88	0.00
4/8	1,078.67	0.00	0.00	8155.12	0.00
5/10	1,080.00	0.00	0.00	6851.25	0.00
6/12	1,081.33	0.00	0.00	5659.27	0.00
7/14	1,082.67	0.00	0.00	4579.18	0.00
8/16	1,084.00	0.00	0.00	3610.98	0.00
9/18	1,085.33	0.00	0.00	2754.66	0.00
10/20	1,086.67	0.00	0.00	2010.24	0.00
11/22	1,088.00	0.00	0.00	1377.71	0.00
12/24	1,089.33	0.00	0.00	857.07	0.00
13/26	1,090.67	0.00	0.00	448.31	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,074.67	18011.36	32869.09	2302.97	1.595
2/4	1,076.00	16697.80	30340.70	2195.05	1.702
3/6	1,077.33	15384.23	27812.30	2087.13	1.825
4/8	1,078.67	14070.67	25283.91	1979.21	1.968
5/10	1,080.00	12757.10	22755.52	1871.29	2.135
6/12	1,081.33	11443.54	20227.13	1763.37	2.334
7/14	1,082.67	10129.97	17698.74	1655.45	2.574
8/16	1,084.00	8816.41	15170.35	1547.52	2.870
9/18	1,085.33	7502.84	12641.96	1439.60	3.246
10/20	1,086.67	6189.28	10113.57	1331.68	3.741
11/22	1,088.00	4875.71	7585.17	1223.76	4.427
12/24	1,089.33	3562.15	5056.78	1115.84	5.458
13/26	1,090.67	2248.58	2528.39	1007.92	7.264

Connection Strength

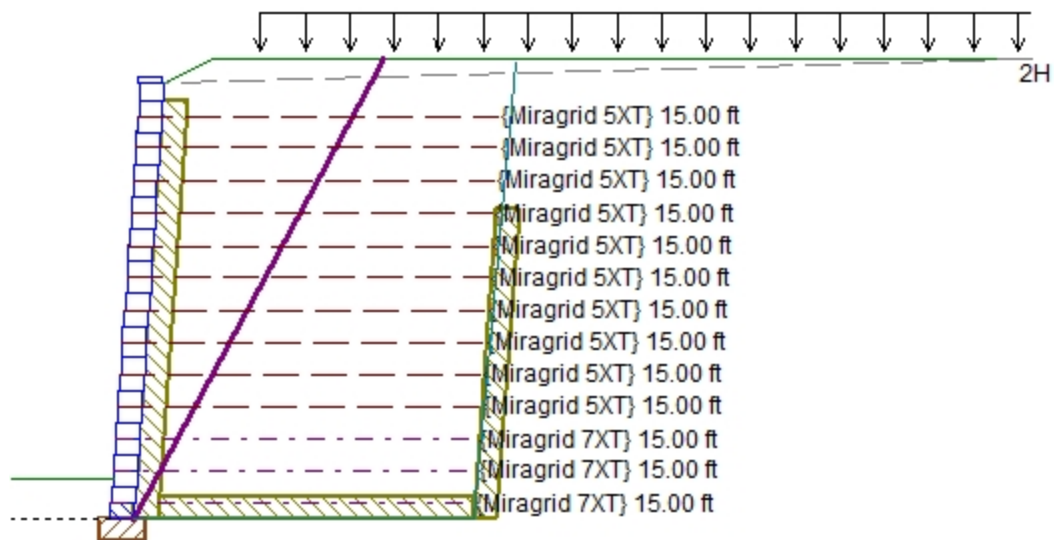
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,074.67	1512.47	2644.19	1.748	5.49
2/4	1,076.00	922.21	2567.53	2.784	5.49
3/6	1,077.33	853.33	2490.87	2.919	5.49
4/8	1,078.67	784.45	2443.65	3.115	5.49
5/10	1,080.00	715.57	2379.66	3.326	5.49
6/12	1,081.33	646.70	2315.66	3.581	5.49
7/14	1,082.67	577.82	2251.67	3.897	5.49
8/16	1,084.00	508.94	2088.18	4.103	5.49
9/18	1,085.33	440.06	1910.48	4.341	5.49
10/20	1,086.67	371.18	1732.79	4.668	5.49
11/22	1,088.00	302.30	1555.09	5.144	5.49
12/24	1,089.33	138.49	1377.39	9.946	5.49
13/26	1,090.67	77.49	1199.70	15.482	5.49

Crest Toppling

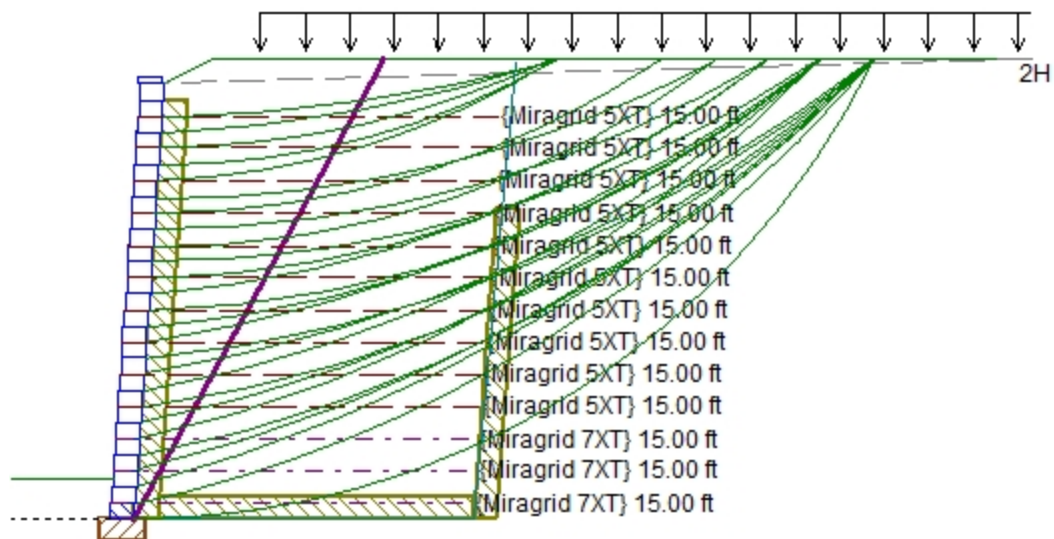
Height from top layer to grade	H _z	1.33 ft	Eq.
Horz. component of P _s	P _{sH}	0.00 lb/ft	Eq. 7-83
Uniform surcharge	P _{qH}	2294.40 lb/ft	Eq. 7-84
Vert. component of P _s	P _{sV}	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	P _{qdV}	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	P _{qLV}	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X _w	0.53 ft	Eq. 7-90
Resisting moment	M _r	0.00 lb	Eq. 7-89
Overturning moment	M _o	0.00 lb	Eq. 7-91
Crest toppling	F _{Sct}	0.000	Eq. 7-88

Section 14 Details

Section 14 Cross-section



Section 14 Static ICS Cross-section



Section 14 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1092.33 ft
Bottom Grade		1075.67 ft
Base of Section		1074.00 ft
Design Height	H	18.00 ft
Embedment Depth	Hemb	1.67 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.2100	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8333	Pass
La	Min. Anchorage Length	1.0000	6.1161	Pass
MinHemb	Minimum Embedment	12.0000	20.0039	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.09	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.33	Pass
FSsl	Base Sliding	1.50	1.81	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,074.67	2.79	38.33	1.59	2.33
2	1,076.00	2.84	38.43	1.59	2.53
3	1,077.33	2.66	35.47	1.60	2.97
4	1,078.67	2.62	38.20	1.64	2.87
5	1,080.00	2.55	41.07	1.64	2.95
6	1,081.33	2.80	41.27	1.63	2.45
7	1,082.67	2.75	41.15	1.57	3.06
8	1,084.00	1.68	20.87	1.65	1.78
9	1,085.33	1.73	26.54	1.60	1.71
10	1,086.67	1.81	22.66	1.59	1.66
11	1,088.00	1.82	26.59	1.58	1.54
12	1,089.33	1.75	22.76	1.60	1.90
13	1,090.67	1.82	24.71	1.65	1.62

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	7	2	1.55	Pass
9	7	4	1.60	Pass
8	6	6	1.68	Pass
10	7	3	1.69	Pass
1	7	1	1.70	Pass
7	7	5	1.74	Pass
6	7	8	1.77	Pass
9	7	7	1.81	Pass
9	7	10	1.90	Pass
8	6	9	1.94	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	19.02 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.24 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	11.07 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	18.00 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.24 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	20.37 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	18.00 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.288	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.00 ft	Eq. 7-26
Horz. influence distance	dint	9.07 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	11383.11 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2216.70 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	11383.11 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2216.70 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	13599.81 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.34 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.51 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.44 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.66 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTDl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	36179.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	24664.33 lb/ft	Eq. 7-32
Base sliding	FSsl	1.814	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTDl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	36179.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.11 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.27 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.59 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.28 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.33 ft	Eq. 7-36A3
Resisting moment	Mr	310890.47 lb	Eq. 7-34
Driving moment	Mo	93245.05 lb	Eq. 7-38
Overturning	FSot	3.334	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.46 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.77 ft	Eq. 7-41
Applied bearing pressure	Qa	3534.50 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	46275.29 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.092	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,074.67	2509.38	1.33	17.33	993.11
2/3	1,076.00	2509.38	1.33	16.00	924.09
3/5	1,077.33	2509.38	1.33	14.67	855.07
4/7	1,078.67	1999.00	1.33	13.33	786.05
5/9	1,080.00	1999.00	1.33	12.00	717.03
6/11	1,081.33	1999.00	1.33	10.67	648.01
7/13	1,082.67	1999.00	1.33	9.33	578.99
8/15	1,084.00	1999.00	1.33	8.00	509.97
9/17	1,085.33	1999.00	1.33	6.67	440.95
10/19	1,086.67	1999.00	1.33	5.33	371.94
11/21	1,088.00	1999.00	1.33	4.00	302.92
12/23	1,089.33	1999.00	1.33	2.67	138.81
13/25	1,090.67	1999.00	2.00	1.00	77.65

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,074.67	2.527	1.000	1.000
2/3	1,076.00	2.716	1.000	1.000
3/5	1,077.33	2.935	1.000	1.000
4/7	1,078.67	2.543	1.000	1.000
5/9	1,080.00	2.788	1.000	1.000
6/11	1,081.33	3.085	1.000	1.000
7/13	1,082.67	3.453	1.000	1.000
8/15	1,084.00	3.920	1.000	1.000
9/17	1,085.33	4.533	1.000	1.000
10/19	1,086.67	5.375	1.000	1.000
11/21	1,088.00	6.599	1.000	1.000
12/23	1,089.33	14.401	1.000	0.008
13/25	1,090.67	25.745	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,074.67	993.11	35228.75	13.68	18.35
2/3	1,076.00	924.09	31163.64	13.05	17.02
3/5	1,077.33	855.07	27334.45	12.42	15.69
4/7	1,078.67	786.05	23741.18	11.79	14.35
5/9	1,080.00	717.03	20383.83	11.16	13.02
6/11	1,081.33	648.01	17262.40	10.53	11.69
7/13	1,082.67	578.99	14376.89	9.90	10.35
8/15	1,084.00	509.97	11727.30	9.27	9.02
9/17	1,085.33	440.95	9313.64	8.64	7.69
10/19	1,086.67	371.94	7135.89	8.01	6.35
11/21	1,088.00	302.92	5194.07	7.38	5.02
12/23	1,089.33	138.81	3488.16	6.75	3.69
13/25	1,090.67	77.65	2018.18	6.12	2.35

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,074.67	35.473
2/3	1,076.00	33.724
3/5	1,077.33	31.968
4/7	1,078.67	30.203
5/9	1,080.00	28.428

Layer/ Course	Elevation (ft)	FSpo [7-66]
6/11	1,081.33	26.639
7/13	1,082.67	24.831
8/15	1,084.00	22.996
9/17	1,085.33	21.122
10/19	1,086.67	19.186
11/21	1,088.00	17.147
12/23	1,089.33	25.130
13/25	1,090.67	25.992

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,074.67	10599.08	0.00	2138.99	0.00
2/3	1,076.00	9114.94	0.00	1983.59	0.00
3/5	1,077.33	7742.69	0.00	1828.19	0.00
4/7	1,078.67	6482.33	0.00	1672.79	0.00
5/9	1,080.00	5333.86	0.00	1517.39	0.00
6/11	1,081.33	4297.28	0.00	1361.99	0.00
7/13	1,082.67	3372.59	0.00	1206.58	0.00
8/15	1,084.00	2559.79	0.00	1051.18	0.00
9/17	1,085.33	1858.88	0.00	895.78	0.00
10/19	1,086.67	1269.86	0.00	740.38	0.00
11/21	1,088.00	792.73	0.00	584.98	0.00
12/23	1,089.33	427.49	0.00	429.58	0.00
13/25	1,090.67	174.14	0.00	274.17	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,074.67	0.00	0.00	12738.08	0.00
2/3	1,076.00	0.00	0.00	11098.54	0.00
3/5	1,077.33	0.00	0.00	9570.88	0.00
4/7	1,078.67	0.00	0.00	8155.12	0.00
5/9	1,080.00	0.00	0.00	6851.25	0.00
6/11	1,081.33	0.00	0.00	5659.27	0.00
7/13	1,082.67	0.00	0.00	4579.18	0.00
8/15	1,084.00	0.00	0.00	3610.98	0.00
9/17	1,085.33	0.00	0.00	2754.66	0.00
10/19	1,086.67	0.00	0.00	2010.24	0.00
11/21	1,088.00	0.00	0.00	1377.71	0.00
12/23	1,089.33	0.00	0.00	857.07	0.00
13/25	1,090.67	0.00	0.00	448.31	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,074.67	18011.36	32869.09	2302.97	1.595
2/3	1,076.00	16697.80	30340.70	2195.05	1.702
3/5	1,077.33	15384.23	27812.30	2087.13	1.825
4/7	1,078.67	14070.67	25283.91	1979.21	1.968
5/9	1,080.00	12757.10	22755.52	1871.29	2.135
6/11	1,081.33	11443.54	20227.13	1763.37	2.334
7/13	1,082.67	10129.97	17698.74	1655.45	2.574
8/15	1,084.00	8816.41	15170.35	1547.52	2.870
9/17	1,085.33	7502.84	12641.96	1439.60	3.246
10/19	1,086.67	6189.28	10113.57	1331.68	3.741
11/21	1,088.00	4875.71	7585.17	1223.76	4.427
12/23	1,089.33	3562.15	5056.78	1115.84	5.458
13/25	1,090.67	2248.58	2528.39	1007.92	7.264



Connection Strength

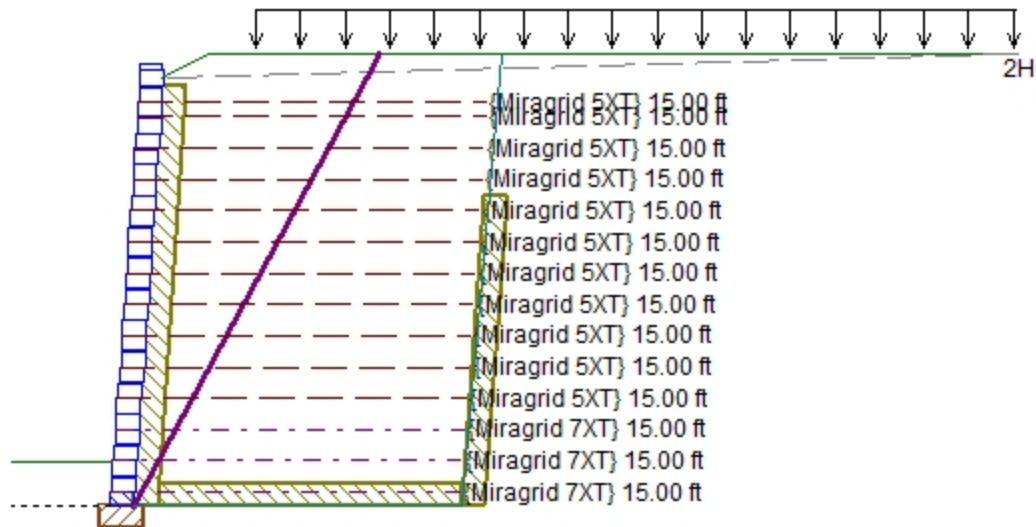
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,074.67	993.11	2644.19	2.663	5.29
2/3	1,076.00	924.09	2567.53	2.778	5.29
3/5	1,077.33	855.07	2490.87	2.913	5.29
4/7	1,078.67	786.05	2443.65	3.109	5.29
5/9	1,080.00	717.03	2379.66	3.319	5.29
6/11	1,081.33	648.01	2315.66	3.573	5.29
7/13	1,082.67	578.99	2251.67	3.889	5.29
8/15	1,084.00	509.97	2088.18	4.095	5.29
9/17	1,085.33	440.95	1910.48	4.333	5.29
10/19	1,086.67	371.94	1732.79	4.659	5.29
11/21	1,088.00	302.92	1555.09	5.134	5.29
12/23	1,089.33	138.81	1377.39	9.923	5.29
13/25	1,090.67	77.65	1199.70	15.451	5.29

Crest Toppling

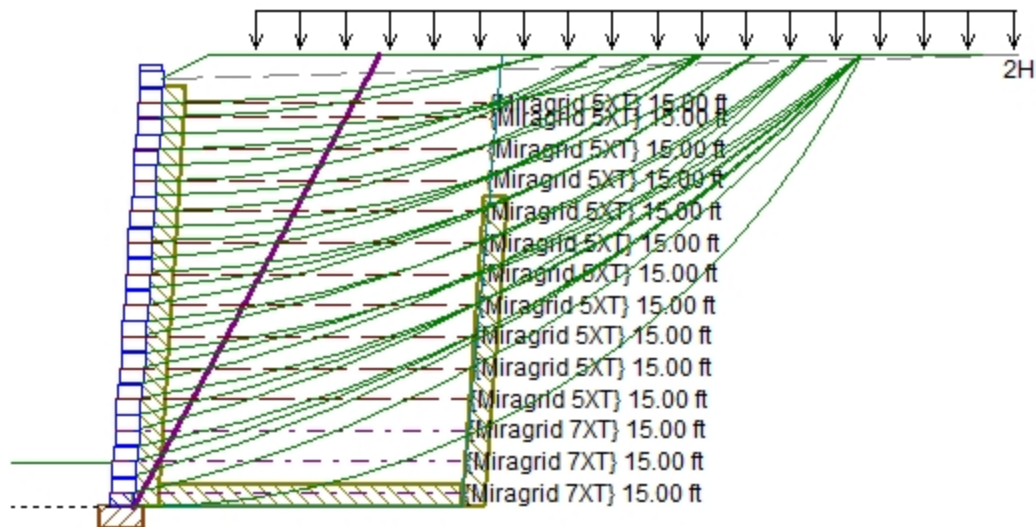
Height from top layer to grade	Hz	1.33 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2216.70 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 15 Details

Section 15 Cross-section



Section 15 Static ICS Cross-section



Section 15 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.00 ft
Bottom Grade		1075.91 ft
Base of Section		1074.00 ft
Design Height	H	18.32 ft
Embedment Depth	Hemb	1.91 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	11.6300	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8187	Pass
La	Min. Anchorage Length	1.0000	5.8009	Pass
MinHemb	Minimum Embedment	12.0000	22.8976	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.59	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.14	Pass
FSsl	Base Sliding	1.50	1.73	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,074.67	2.80	41.27	1.63	3.06
2	1,076.00	2.55	41.15	1.57	2.49
3	1,077.33	2.64	35.57	1.57	2.45
4	1,078.67	2.75	41.07	1.59	2.53
5	1,080.00	2.84	38.43	1.60	2.33
6	1,081.33	2.79	38.33	1.59	2.97
7	1,082.67	2.62	38.20	1.64	2.95
8	1,084.00	2.66	35.47	1.64	2.87
9	1,085.33	1.78	24.55	1.60	1.90
10	1,086.67	1.82	24.71	1.65	1.62
11	1,088.00	1.81	26.54	1.60	1.71
12	1,089.33	1.82	20.87	1.65	1.66
13	1,090.67	1.73	22.66	1.59	1.54
14	1,091.33	1.75	22.76	1.60	1.90

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
7	7	2	1.54	Pass
9	7	4	1.59	Pass
8	6	6	1.66	Pass
10	7	3	1.67	Pass
1	7	1	1.69	Pass
7	7	5	1.71	Pass
6	7	8	1.75	Pass
9	7	7	1.78	Pass
9	7	10	1.87	Pass
8	6	9	1.91	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	19.34 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.18 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	11.39 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	18.32 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.18 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	20.54 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	18.32 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.287	Eq. 7-43
Height above rein. area at int. failure plane	hint	6.10 ft	Eq. 7-26
Horz. influence distance	dint	9.22 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	12195.11 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2294.40 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	12195.11 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2294.40 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	14489.51 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.45 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.67 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.45 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.68 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	36825.59 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	25083.59 lb/ft	Eq. 7-32
Base sliding	FSsl	1.731	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	36825.59 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.12 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.29 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.61 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.30 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.35 ft	Eq. 7-36A3
Resisting moment	Mr	316577.70 lb	Eq. 7-34
Driving moment	Mo	100805.91 lb	Eq. 7-38
Overturning	FSot	3.140	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.17 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.91 ft	Eq. 7-41
Applied bearing pressure	Qa	3683.58 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	46392.72 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	12.594	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,074.67	2509.38	1.33	17.65	1007.63
2/3	1,076.00	2509.38	1.33	16.32	938.75
3/5	1,077.33	2509.38	1.33	14.99	869.88
4/7	1,078.67	1999.00	1.33	13.65	801.00
5/9	1,080.00	1999.00	1.33	12.32	732.13
6/11	1,081.33	1999.00	1.33	10.99	663.25
7/13	1,082.67	1999.00	1.33	9.65	594.38
8/15	1,084.00	1999.00	1.33	8.32	525.50
9/17	1,085.33	1999.00	1.33	6.99	456.63
10/19	1,086.67	1999.00	1.33	5.65	387.75
11/21	1,088.00	1999.00	1.33	4.32	318.88
12/23	1,089.33	1999.00	1.33	2.99	157.03
13/25	1,090.67	1999.00	1.00	1.82	70.56
14/26	1,091.33	1999.00	1.32	0.66	33.81

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,074.67	2.490	1.000	1.000
2/3	1,076.00	2.673	1.000	1.000
3/5	1,077.33	2.885	1.000	1.000
4/7	1,078.67	2.496	1.000	1.000
5/9	1,080.00	2.730	1.000	1.000
6/11	1,081.33	3.014	1.000	1.000
7/13	1,082.67	3.363	1.000	1.000
8/15	1,084.00	3.804	1.000	1.000
9/17	1,085.33	4.378	1.000	1.000
10/19	1,086.67	5.155	1.000	1.000
11/21	1,088.00	6.269	1.000	1.000
12/23	1,089.33	12.730	1.000	0.028
13/25	1,090.67	28.332	1.000	0.000
14/26	1,091.33	59.119	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,074.67	1007.63	35845.31	13.68	18.67
2/3	1,076.00	938.75	31751.78	13.05	17.34
3/5	1,077.33	869.88	27894.17	12.42	16.01
4/7	1,078.67	801.00	24272.48	11.79	14.67
5/9	1,080.00	732.13	20886.72	11.16	13.34
6/11	1,081.33	663.25	17736.87	10.53	12.01
7/13	1,082.67	594.38	14822.95	9.90	10.67
8/15	1,084.00	525.50	12144.95	9.27	9.34
9/17	1,085.33	456.63	9702.86	8.64	8.01
10/19	1,086.67	387.75	7496.70	8.01	6.67
11/21	1,088.00	318.88	5526.46	7.38	5.34
12/23	1,089.33	157.03	3792.14	6.75	4.01
13/25	1,090.67	70.56	2293.74	6.12	2.67
14/26	1,091.33	33.81	1633.01	5.80	2.01

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,074.67	35.574
2/3	1,076.00	33.823



Layer/ Course	Elevation (ft)	FSpo [7-66]
3/5	1,077.33	32.067
4/7	1,078.67	30.303
5/9	1,080.00	28.529
6/11	1,081.33	26.742
7/13	1,082.67	24.939
8/15	1,084.00	23.111
9/17	1,085.33	21.249
10/19	1,086.67	19.334
11/21	1,088.00	17.331
12/23	1,089.33	24.149
13/25	1,090.67	32.509
14/26	1,091.33	48.295

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,074.67	10973.33	0.00	2176.43	0.00
2/3	1,076.00	9462.24	0.00	2021.03	0.00
3/5	1,077.33	8063.03	0.00	1865.63	0.00
4/7	1,078.67	6775.72	0.00	1710.22	0.00
5/9	1,080.00	5600.30	0.00	1554.82	0.00
6/11	1,081.33	4536.76	0.00	1399.42	0.00
7/13	1,082.67	3585.12	0.00	1244.02	0.00
8/15	1,084.00	2745.36	0.00	1088.62	0.00
9/17	1,085.33	2017.50	0.00	933.22	0.00
10/19	1,086.67	1401.52	0.00	777.81	0.00
11/21	1,088.00	897.44	0.00	622.41	0.00
12/23	1,089.33	505.25	0.00	467.01	0.00
13/25	1,090.67	224.94	0.00	311.61	0.00
14/26	1,091.33	126.75	0.00	233.91	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,074.67	0.00	0.00	13149.76	0.00
2/3	1,076.00	0.00	0.00	11483.26	0.00
3/5	1,077.33	0.00	0.00	9928.66	0.00
4/7	1,078.67	0.00	0.00	8485.94	0.00
5/9	1,080.00	0.00	0.00	7155.12	0.00
6/11	1,081.33	0.00	0.00	5936.18	0.00
7/13	1,082.67	0.00	0.00	4829.14	0.00
8/15	1,084.00	0.00	0.00	3833.98	0.00
9/17	1,085.33	0.00	0.00	2950.72	0.00
10/19	1,086.67	0.00	0.00	2179.34	0.00
11/21	1,088.00	0.00	0.00	1519.85	0.00
12/23	1,089.33	0.00	0.00	972.26	0.00
13/25	1,090.67	0.00	0.00	536.55	0.00
14/26	1,091.33	0.00	0.00	360.66	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,074.67	18327.80	33478.17	2328.97	1.571
2/3	1,076.00	17014.23	30949.77	2221.05	1.675
3/5	1,077.33	15700.67	28421.38	2113.13	1.794
4/7	1,078.67	14387.10	25892.99	2005.21	1.932
5/9	1,080.00	13073.54	23364.60	1897.28	2.092
6/11	1,081.33	11759.97	20836.21	1789.36	2.282
7/13	1,082.67	10446.41	18307.82	1681.44	2.511
8/15	1,084.00	9132.84	15779.43	1573.52	2.792

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
9/17	1,085.33	7819.28	13251.04	1465.60	3.147
10/19	1,086.67	6505.71	10722.64	1357.68	3.608
11/21	1,088.00	5192.14	8194.25	1249.76	4.239
12/23	1,089.33	3878.58	5665.86	1141.84	5.164
13/25	1,090.67	2565.01	3137.47	1033.92	6.708
14/26	1,091.33	1908.23	1873.27	979.96	8.008

Connection Strength

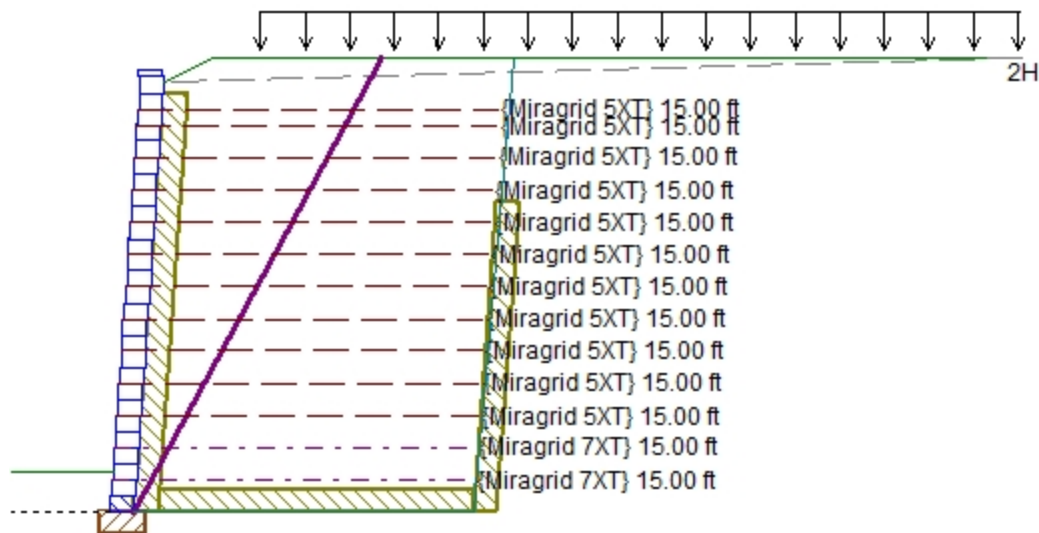
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,074.67	1007.63	2662.65	2.643	5.39
2/3	1,076.00	938.75	2585.99	2.755	5.39
3/5	1,077.33	869.88	2509.33	2.885	5.39
4/7	1,078.67	801.00	2459.07	3.070	5.39
5/9	1,080.00	732.13	2395.08	3.271	5.39
6/11	1,081.33	663.25	2331.08	3.515	5.39
7/13	1,082.67	594.38	2267.08	3.814	5.39
8/15	1,084.00	525.50	2130.99	4.055	5.39
9/17	1,085.33	456.63	1953.29	4.278	5.39
10/19	1,086.67	387.75	1775.59	4.579	5.39
11/21	1,088.00	318.88	1597.90	5.011	5.39
12/23	1,089.33	157.03	1420.20	9.044	5.39
13/25	1,090.67	70.56	1242.50	17.610	5.39
14/26	1,091.33	33.81	1153.65	34.118	5.39

Crest Toppling

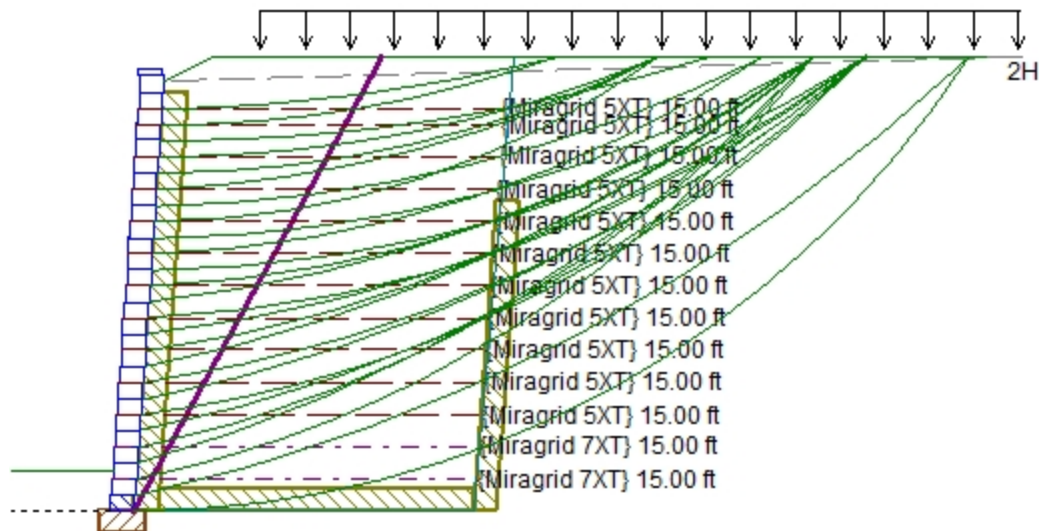
Height from top layer to grade	Hz	0.99 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2294.40 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturing moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 16 Details

Section 16 Cross-section



Section 16 Static ICS Cross-section



Section 16 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.00 ft
Bottom Grade		1076.36 ft
Base of Section		1074.67 ft
Design Height	H	17.78 ft
Embedment Depth	Hemb	1.69 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.5000	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8435	Pass
La	Min. Anchorage Length	1.0000	6.1161	Pass
MinHemb	Minimum Embedment	12.0000	20.2795	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.23	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.33	Pass
FSsl	Base Sliding	1.50	1.79	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,076.00	2.79	38.33	1.59	2.97
2	1,077.33	2.84	38.43	1.60	2.33
3	1,078.67	2.66	35.47	1.64	2.87
4	1,080.00	2.62	38.20	1.64	2.95
5	1,081.33	2.55	41.15	1.57	2.49
6	1,082.67	2.80	41.27	1.63	3.06
7	1,084.00	2.75	41.07	1.59	2.53
8	1,085.33	2.64	35.57	1.57	2.45
9	1,086.67	1.75	22.76	1.60	1.78
10	1,088.00	1.73	26.59	1.58	1.73
11	1,089.33	1.79	22.64	1.66	1.90
12	1,090.67	1.68	22.66	1.65	1.62
13	1,091.33	1.82	24.71	1.60	1.90

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
6	6	3	1.61	Pass
1	9	1	1.61	Pass
7	6	5	1.65	Pass
9	9	2	1.67	Pass
10	6	4	1.72	Pass
5	7	7	1.74	Pass
8	7	6	1.78	Pass
7	7	9	1.85	Pass
10	7	8	1.90	Pass
7	6	11	2.00	Pass



Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	18.80 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.28 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	10.85 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	17.78 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.28 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	20.26 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	17.78 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.288	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.93 ft	Eq. 7-26
Horz. influence distance	dint	8.96 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	11383.11 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2216.70 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	11383.11 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2216.70 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	13599.81 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.27 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.40 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.44 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.66 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	35742.12 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	24379.97 lb/ft	Eq. 7-32
Base sliding	FSsl	1.793	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	35742.12 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.10 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.26 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.58 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.27 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.31 ft	Eq. 7-36A3
Resisting moment	Mr	307041.40 lb	Eq. 7-34
Driving moment	Mo	92177.00 lb	Eq. 7-38
Overturning	FSot	3.331	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.45 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.78 ft	Eq. 7-41
Applied bearing pressure	Qa	3500.72 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	46330.41 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.235	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,076.00	2509.38	2.00	16.78	1446.81
2/4	1,077.33	2509.38	1.33	15.12	878.27
3/6	1,078.67	1999.00	1.33	13.78	809.25
4/8	1,080.00	1999.00	1.33	12.45	740.23
5/10	1,081.33	1999.00	1.33	11.12	671.22
6/12	1,082.67	1999.00	1.33	9.78	602.20
7/14	1,084.00	1999.00	1.33	8.45	533.19
8/16	1,085.33	1999.00	1.33	7.12	464.17
9/18	1,086.67	1999.00	1.33	5.78	395.15
10/20	1,088.00	1999.00	1.33	4.45	326.14
11/22	1,089.33	1999.00	1.33	3.12	164.87
12/24	1,090.67	1999.00	1.00	1.95	75.66
13/25	1,091.33	1999.00	1.45	0.72	40.74

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,076.00	1.734	1.000	1.000
2/4	1,077.33	2.857	1.000	1.000
3/6	1,078.67	2.470	1.000	1.000
4/8	1,080.00	2.700	1.000	1.000
5/10	1,081.33	2.978	1.000	1.000
6/12	1,082.67	3.319	1.000	1.000
7/14	1,084.00	3.749	1.000	1.000
8/16	1,085.33	4.307	1.000	1.000
9/18	1,086.67	5.059	1.000	1.000
10/20	1,088.00	6.129	1.000	1.000
11/22	1,089.33	12.125	1.000	0.038
12/24	1,090.67	26.422	1.000	0.000
13/25	1,091.33	49.061	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,076.00	1446.81	32758.17	13.37	17.47
2/4	1,077.33	878.27	28830.29	12.74	16.13
3/6	1,078.67	809.25	25138.33	12.11	14.80
4/8	1,080.00	740.23	21682.29	11.48	13.47
5/10	1,081.33	671.22	18462.18	10.85	12.13
6/12	1,082.67	602.20	15477.98	10.22	10.80
7/14	1,084.00	533.19	12729.71	9.59	9.47
8/16	1,085.33	464.17	10217.35	8.95	8.13
9/18	1,086.67	395.15	7940.92	8.32	6.80
10/20	1,088.00	326.14	5900.41	7.69	5.47
11/22	1,089.33	164.87	4095.82	7.06	4.13
12/24	1,090.67	75.66	2527.15	6.43	2.80
13/25	1,091.33	40.74	1831.28	6.12	2.13

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,076.00	22.642
2/4	1,077.33	32.826
3/6	1,078.67	31.064
4/8	1,080.00	29.291
5/10	1,081.33	27.505



Layer/ Course	Elevation (ft)	FSpo [7-66]
6/12	1,082.67	25.702
7/14	1,084.00	23.875
8/16	1,085.33	22.012
9/18	1,086.67	20.096
10/20	1,088.00	18.092
11/22	1,089.33	24.842
12/24	1,090.67	33.403
13/25	1,091.33	44.945

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,076.00	9602.03	0.00	2035.90	0.00
2/4	1,077.33	8192.12	0.00	1880.50	0.00
3/6	1,078.67	6894.10	0.00	1725.10	0.00
4/8	1,080.00	5707.96	0.00	1569.70	0.00
5/10	1,081.33	4633.72	0.00	1414.30	0.00
6/12	1,082.67	3671.37	0.00	1258.89	0.00
7/14	1,084.00	2820.90	0.00	1103.49	0.00
8/16	1,085.33	2082.33	0.00	948.09	0.00
9/18	1,086.67	1455.64	0.00	792.69	0.00
10/20	1,088.00	940.85	0.00	637.29	0.00
11/22	1,089.33	537.94	0.00	481.89	0.00
12/24	1,090.67	246.93	0.00	326.48	0.00
13/25	1,091.33	143.38	0.00	248.78	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,076.00	0.00	0.00	11637.94	0.00
2/4	1,077.33	0.00	0.00	10072.62	0.00
3/6	1,078.67	0.00	0.00	8619.20	0.00
4/8	1,080.00	0.00	0.00	7277.66	0.00
5/10	1,081.33	0.00	0.00	6048.02	0.00
6/12	1,082.67	0.00	0.00	4930.26	0.00
7/14	1,084.00	0.00	0.00	3924.39	0.00
8/16	1,085.33	0.00	0.00	3030.42	0.00
9/18	1,086.67	0.00	0.00	2248.33	0.00
10/20	1,088.00	0.00	0.00	1578.14	0.00
11/22	1,089.33	0.00	0.00	1019.83	0.00
12/24	1,090.67	0.00	0.00	573.41	0.00
13/25	1,091.33	0.00	0.00	392.16	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,076.00	17139.96	31191.79	2231.38	1.664
2/4	1,077.33	15826.40	28663.40	2123.46	1.782
3/6	1,078.67	14512.83	26135.01	2015.54	1.918
4/8	1,080.00	13199.27	23606.61	1907.61	2.076
5/10	1,081.33	11885.70	21078.22	1799.69	2.263
6/12	1,082.67	10572.14	18549.83	1691.77	2.487
7/14	1,084.00	9258.57	16021.44	1583.85	2.763
8/16	1,085.33	7945.01	13493.05	1475.93	3.109
9/18	1,086.67	6631.44	10964.66	1368.01	3.558
10/20	1,088.00	5317.88	8436.27	1260.09	4.168
11/22	1,089.33	4004.31	5907.88	1152.17	5.056
12/24	1,090.67	2690.75	3379.48	1044.25	6.514
13/25	1,091.33	2033.96	2115.29	990.29	7.712

Connection Strength

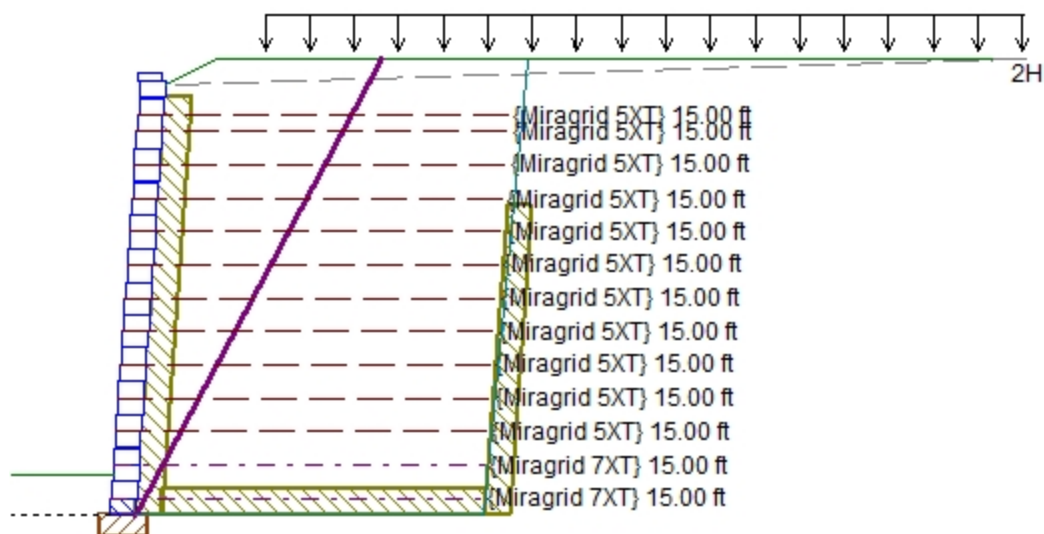
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,076.00	1446.81	2593.33	1.792	5.23
2/4	1,077.33	878.27	2516.67	2.865	5.23
3/6	1,078.67	809.25	2465.20	3.046	5.23
4/8	1,080.00	740.23	2401.20	3.244	5.23
5/10	1,081.33	671.22	2337.20	3.482	5.23
6/12	1,082.67	602.20	2273.21	3.775	5.23
7/14	1,084.00	533.19	2147.99	4.029	5.23
8/16	1,085.33	464.17	1970.30	4.245	5.23
9/18	1,086.67	395.15	1792.60	4.536	5.23
10/20	1,088.00	326.14	1614.90	4.952	5.23
11/22	1,089.33	164.87	1437.21	8.717	5.23
12/24	1,090.67	75.66	1259.51	16.648	5.23
13/25	1,091.33	40.74	1170.66	28.732	5.23

Crest Toppling

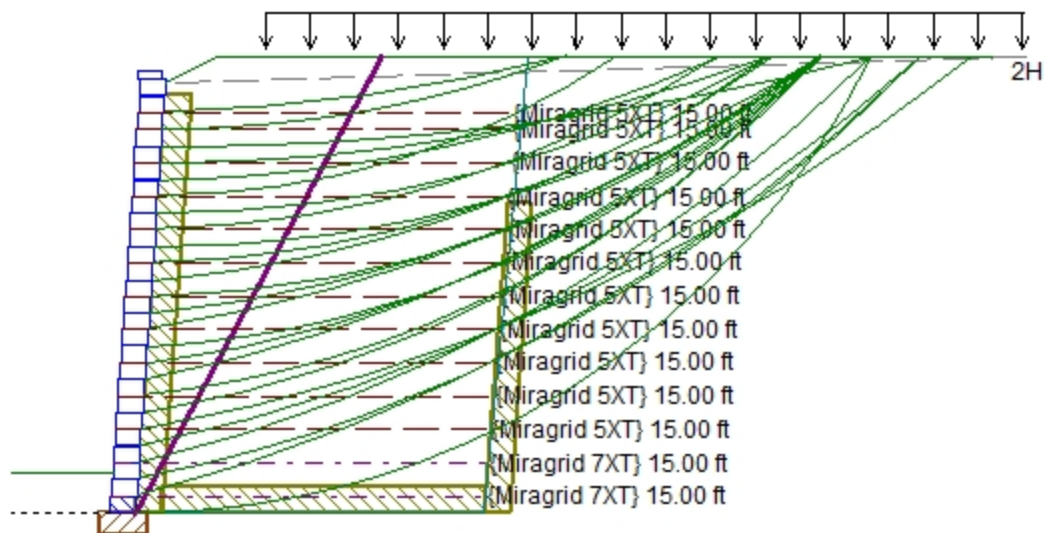
Height from top layer to grade	Hz	1.12 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2216.70 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 17 Details

Section 17 Cross-section



Section 17 Static ICS Cross-section



Section 17 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.00 ft
Bottom Grade		1076.97 ft
Base of Section		1075.33 ft
Design Height	H	17.24 ft
Embedment Depth	Hemb	1.63 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.4700	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8699	Pass
La	Min. Anchorage Length	1.0000	6.4314	Pass
MinHemb	Minimum Embedment	12.0000	19.6142	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.11	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.54	Pass
FSsl	Base Sliding	1.50	1.86	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,076.00	2.75	41.07	1.59	2.53
2	1,077.33	2.80	41.27	1.57	2.45
3	1,078.67	2.72	35.33	1.65	2.62
4	1,080.00	2.64	35.57	1.63	2.87
5	1,081.33	2.55	38.43	1.60	2.33
6	1,082.67	2.84	38.33	1.64	2.97
7	1,084.00	2.79	35.47	1.59	3.06
8	1,085.33	2.62	41.15	1.57	2.49
9	1,086.67	2.66	38.20	1.64	2.95
10	1,088.00	1.82	20.87	1.59	1.54
11	1,089.33	1.81	26.54	1.65	1.66
12	1,090.67	1.79	22.64	1.58	1.90
13	1,091.33	1.73	26.59	1.66	1.73

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	8	2	1.58	Pass
9	7	4	1.65	Pass
7	8	3	1.72	Pass
9	9	6	1.74	Pass
1	7	1	1.77	Pass
9	8	5	1.77	Pass
4	6	8	1.85	Pass
6	6	7	1.88	Pass
6	6	10	1.97	Pass
9	6	9	2.02	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	18.26 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.38 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	10.31 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	17.24 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.38 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	19.99 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	17.24 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.289	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.75 ft	Eq. 7-26
Horz. influence distance	dint	8.71 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	10599.08 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2138.99 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	10599.08 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2138.99 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	12738.08 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	6.09 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	9.13 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.43 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.64 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTDl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	34658.64 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	23676.36 lb/ft	Eq. 7-32
Base sliding	FSsl	1.859	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTDl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	34658.64 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.08 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.22 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.54 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.23 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.28 ft	Eq. 7-36A3
Resisting moment	Mr	297545.93 lb	Eq. 7-34
Driving moment	Mo	84052.05 lb	Eq. 7-38
Overturning	FSot	3.540	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.71 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.64 ft	Eq. 7-41
Applied bearing pressure	Qa	3329.00 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	46974.54 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	14.111	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,076.00	2509.38	1.33	16.58	955.99
2/3	1,077.33	2509.38	1.33	15.24	886.82
3/5	1,078.67	1999.00	1.33	13.91	817.65
4/7	1,080.00	1999.00	1.33	12.58	748.48
5/9	1,081.33	1999.00	1.33	11.24	679.32
6/11	1,082.67	1999.00	1.33	9.91	610.15
7/13	1,084.00	1999.00	1.33	8.58	540.98
8/15	1,085.33	1999.00	1.33	7.24	471.81
9/17	1,086.67	1999.00	1.33	5.91	402.64
10/19	1,088.00	1999.00	1.33	4.58	333.47
11/21	1,089.33	1999.00	1.33	3.24	172.86
12/23	1,090.67	1999.00	1.00	2.08	80.79
13/24	1,091.33	1999.00	1.58	0.79	48.35

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,076.00	2.625	1.000	1.000
2/3	1,077.33	2.830	1.000	1.000
3/5	1,078.67	2.445	1.000	1.000
4/7	1,080.00	2.671	1.000	1.000
5/9	1,081.33	2.943	1.000	1.000
6/11	1,082.67	3.276	1.000	1.000
7/13	1,084.00	3.695	1.000	1.000
8/15	1,085.33	4.237	1.000	1.000
9/17	1,086.67	4.965	1.000	1.000
10/19	1,088.00	5.994	1.000	1.000
11/21	1,089.33	11.565	1.000	0.048
12/23	1,090.67	24.744	1.000	0.000
13/24	1,091.33	41.348	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,076.00	955.99	33775.85	13.68	17.60
2/3	1,077.33	886.82	29777.70	13.05	16.26
3/5	1,078.67	817.65	26015.47	12.42	14.93
4/7	1,080.00	748.48	22489.16	11.79	13.60
5/9	1,081.33	679.32	19198.77	11.16	12.26
6/11	1,082.67	610.15	16144.30	10.53	10.93
7/13	1,084.00	540.98	13325.76	9.90	9.60
8/15	1,085.33	471.81	10743.13	9.27	8.26
9/17	1,086.67	402.64	8396.43	8.64	6.93
10/19	1,088.00	333.47	6285.65	8.01	5.60
11/21	1,089.33	172.86	4410.78	7.38	4.26
12/23	1,090.67	80.79	2771.84	6.75	2.93
13/24	1,091.33	48.35	2040.84	6.43	2.26

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,076.00	35.331
2/3	1,077.33	33.578
3/5	1,078.67	31.817
4/7	1,080.00	30.046
5/9	1,081.33	28.262

Layer/ Course	Elevation (ft)	FSpo [7-66]
6/11	1,082.67	26.460
7/13	1,084.00	24.633
8/15	1,085.33	22.770
9/17	1,086.67	20.853
10/19	1,088.00	18.849
11/21	1,089.33	25.517
12/23	1,090.67	34.310
13/24	1,091.33	42.214

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,076.00	9742.86	0.00	2050.78	0.00
2/3	1,077.33	8322.23	0.00	1895.38	0.00
3/5	1,078.67	7013.50	0.00	1739.97	0.00
4/7	1,080.00	5816.66	0.00	1584.57	0.00
5/9	1,081.33	4731.70	0.00	1429.17	0.00
6/11	1,082.67	3758.64	0.00	1273.77	0.00
7/13	1,084.00	2897.46	0.00	1118.37	0.00
8/15	1,085.33	2148.18	0.00	962.97	0.00
9/17	1,086.67	1510.79	0.00	807.56	0.00
10/19	1,088.00	985.28	0.00	652.16	0.00
11/21	1,089.33	571.67	0.00	496.76	0.00
12/23	1,090.67	269.94	0.00	341.36	0.00
13/24	1,091.33	161.04	0.00	263.66	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,076.00	0.00	0.00	11793.63	0.00
2/3	1,077.33	0.00	0.00	10217.61	0.00
3/5	1,078.67	0.00	0.00	8753.47	0.00
4/7	1,080.00	0.00	0.00	7401.23	0.00
5/9	1,081.33	0.00	0.00	6160.87	0.00
6/11	1,082.67	0.00	0.00	5032.41	0.00
7/13	1,084.00	0.00	0.00	4015.83	0.00
8/15	1,085.33	0.00	0.00	3111.15	0.00
9/17	1,086.67	0.00	0.00	2318.35	0.00
10/19	1,088.00	0.00	0.00	1637.44	0.00
11/21	1,089.33	0.00	0.00	1068.43	0.00
12/23	1,090.67	0.00	0.00	611.30	0.00
13/24	1,091.33	0.00	0.00	424.70	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,076.00	17265.70	31433.80	2241.71	1.654
2/3	1,077.33	15952.13	28905.41	2133.79	1.770
3/5	1,078.67	14638.57	26377.02	2025.87	1.904
4/7	1,080.00	13325.00	23848.63	1917.94	2.060
5/9	1,081.33	12011.44	21320.24	1810.02	2.243
6/11	1,082.67	10697.87	18791.85	1702.10	2.464
7/13	1,084.00	9384.31	16263.45	1594.18	2.734
8/15	1,085.33	8070.74	13735.06	1486.26	3.072
9/17	1,086.67	6757.17	11206.67	1378.34	3.509
10/19	1,088.00	5443.61	8678.28	1270.42	4.100
11/21	1,089.33	4130.04	6149.89	1162.50	4.954
12/23	1,090.67	2816.48	3621.50	1054.58	6.332
13/24	1,091.33	2159.70	2357.30	1000.62	7.441

Connection Strength

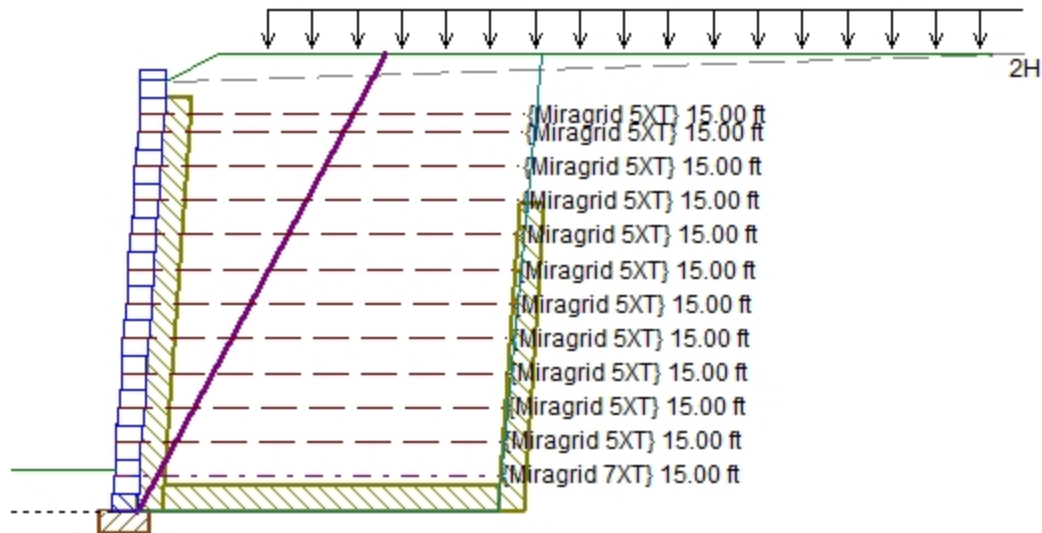
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,076.00	955.99	2600.67	2.720	5.07
2/3	1,077.33	886.82	2524.01	2.846	5.07
3/5	1,078.67	817.65	2471.32	3.022	5.07
4/7	1,080.00	748.48	2407.33	3.216	5.07
5/9	1,081.33	679.32	2343.33	3.450	5.07
6/11	1,082.67	610.15	2279.33	3.736	5.07
7/13	1,084.00	540.98	2165.00	4.002	5.07
8/15	1,085.33	471.81	1987.31	4.212	5.07
9/17	1,086.67	402.64	1809.61	4.494	5.07
10/19	1,088.00	333.47	1631.91	4.894	5.07
11/21	1,089.33	172.86	1454.22	8.413	5.07
12/23	1,090.67	80.79	1276.52	15.801	5.07
13/24	1,091.33	48.35	1187.67	24.566	5.07

Crest Toppling

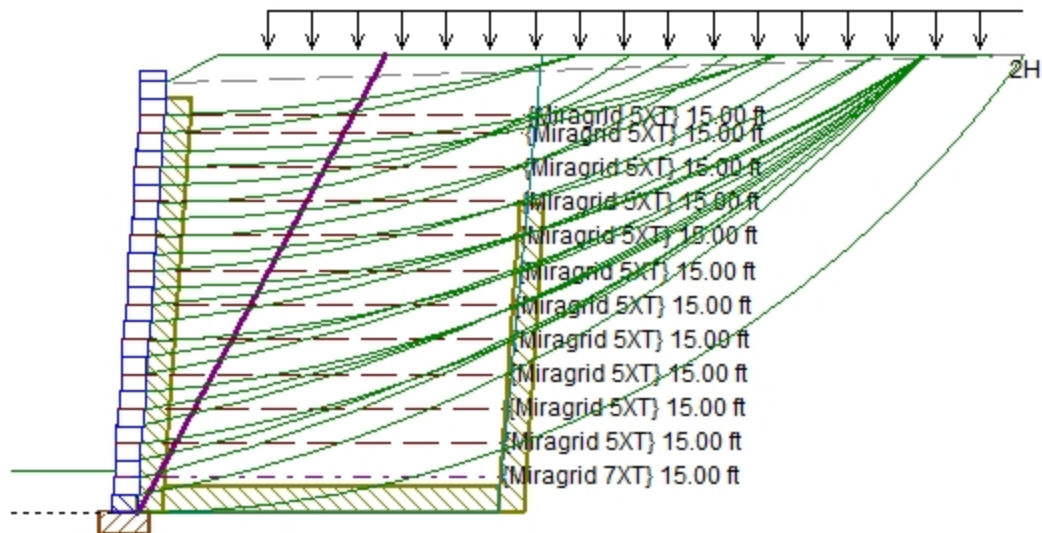
Height from top layer to grade	Hz	1.24 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2138.99 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 18 Details

Section 18 Cross-section



Section 18 Static ICS Cross-section



Section 18 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.00 ft
Bottom Grade		1077.58 ft
Base of Section		1076.00 ft
Design Height	H	16.66 ft
Embedment Depth	Hemb	1.58 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.4700	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.9006	Pass
La	Min. Anchorage Length	1.0000	6.7470	Pass
MinHemb	Minimum Embedment	12.0000	18.9488	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	15.06	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.77	Pass
FSSl	Base Sliding	1.50	1.92	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSSl	FSto
1	1,077.33	2.79	35.47	1.59	3.06
2	1,078.67	2.84	38.33	1.64	2.97
3	1,080.00	2.66	38.20	1.64	2.95
4	1,081.33	2.62	41.15	1.57	2.49
5	1,082.67	2.55	38.43	1.60	2.33
6	1,084.00	2.80	41.27	1.57	2.45
7	1,085.33	2.75	41.07	1.59	2.53
8	1,086.67	2.64	35.57	1.63	2.87
9	1,088.00	2.72	35.33	1.65	2.62
10	1,089.33	1.82	24.71	1.60	1.90
11	1,090.67	1.78	24.55	1.60	1.62
12	1,091.33	1.85	22.44	1.76	1.84

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	8	3	1.64	Pass
1	10	1	1.67	Pass
6	8	2	1.72	Pass
5	8	5	1.74	Pass
8	8	4	1.78	Pass
7	8	7	1.84	Pass
10	8	6	1.88	Pass
10	8	9	1.99	Pass
4	8	8	2.04	Pass
3	8	11	2.16	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	17.68 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.50 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	9.72 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	16.66 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.50 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	19.69 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	16.66 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.289	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.55 ft	Eq. 7-26
Horz. influence distance	dint	8.43 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	9843.03 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2061.29 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	9843.03 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2061.29 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	11904.32 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	5.89 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	8.84 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.41 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.62 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	33478.89 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	22910.22 lb/ft	Eq. 7-32
Base sliding	FSsl	1.925	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	33478.89 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.06 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.18 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.50 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.19 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.24 ft	Eq. 7-36A3
Resisting moment	Mr	287253.13 lb	Eq. 7-34
Driving moment	Mo	76209.46 lb	Eq. 7-38
Overturning	FSot	3.769	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.96 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.52 ft	Eq. 7-41
Applied bearing pressure	Qa	3160.07 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	47577.28 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	15.056	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,077.33	2509.38	2.00	15.66	1365.55
2/4	1,078.67	1999.00	1.33	13.99	823.71
3/6	1,080.00	1999.00	1.33	12.66	754.38
4/8	1,081.33	1999.00	1.33	11.32	685.05
5/10	1,082.67	1999.00	1.33	9.99	615.72
6/12	1,084.00	1999.00	1.33	8.66	546.39
7/14	1,085.33	1999.00	1.33	7.32	477.06
8/16	1,086.67	1999.00	1.33	5.99	407.73
9/18	1,088.00	1999.00	1.33	4.66	338.40
10/20	1,089.33	1999.00	1.33	3.32	178.17
11/22	1,090.67	1999.00	1.00	2.16	84.09
12/23	1,091.33	1999.00	1.66	0.83	53.48

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,077.33	1.838	1.000	1.000
2/4	1,078.67	2.427	1.000	1.000
3/6	1,080.00	2.650	1.000	1.000
4/8	1,081.33	2.918	1.000	1.000
5/10	1,082.67	3.247	1.000	1.000
6/12	1,084.00	3.659	1.000	1.000
7/14	1,085.33	4.190	1.000	1.000
8/16	1,086.67	4.903	1.000	1.000
9/18	1,088.00	5.907	1.000	1.000
10/20	1,089.33	11.219	1.000	0.056
11/22	1,090.67	23.773	1.000	0.000
12/23	1,091.33	37.376	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,077.33	1365.55	30646.56	13.37	16.34
2/4	1,078.67	823.71	26818.30	12.74	15.01
3/6	1,080.00	754.38	23225.96	12.11	13.68
4/8	1,081.33	685.05	19869.54	11.48	12.34
5/10	1,082.67	615.72	16749.04	10.85	11.01
6/12	1,084.00	546.39	13864.46	10.22	9.68
7/14	1,085.33	477.06	11215.80	9.59	8.34
8/16	1,086.67	407.73	8803.07	8.95	7.01
9/18	1,088.00	338.40	6626.25	8.32	5.68
10/20	1,089.33	178.17	4685.35	7.69	4.34
11/22	1,090.67	84.09	2980.38	7.06	3.01
12/23	1,091.33	53.48	2216.36	6.75	2.34

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,077.33	22.443
2/4	1,078.67	32.558
3/6	1,080.00	30.788
4/8	1,081.33	29.005
5/10	1,082.67	27.203
6/12	1,084.00	25.375
7/14	1,085.33	23.510
8/16	1,086.67	21.591

Layer/ Course	Elevation (ft)	FSpo [7-66]
9/18	1,088.00	19.581
10/20	1,089.33	26.297
11/22	1,090.67	35.444
12/23	1,091.33	41.440

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,077.33	8404.03	0.00	1904.67	0.00
2/4	1,078.67	7088.61	0.00	1749.27	0.00
3/6	1,080.00	5885.07	0.00	1593.86	0.00
4/8	1,081.33	4793.43	0.00	1438.46	0.00
5/10	1,082.67	3813.68	0.00	1283.06	0.00
6/12	1,084.00	2945.81	0.00	1127.66	0.00
7/14	1,085.33	2189.84	0.00	972.26	0.00
8/16	1,086.67	1545.75	0.00	816.86	0.00
9/18	1,088.00	1013.56	0.00	661.45	0.00
10/20	1,089.33	593.25	0.00	506.05	0.00
11/22	1,090.67	284.84	0.00	350.65	0.00
12/23	1,091.33	172.59	0.00	272.95	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,077.33	0.00	0.00	10308.70	0.00
2/4	1,078.67	0.00	0.00	8837.87	0.00
3/6	1,080.00	0.00	0.00	7478.94	0.00
4/8	1,081.33	0.00	0.00	6231.89	0.00
5/10	1,082.67	0.00	0.00	5096.74	0.00
6/12	1,084.00	0.00	0.00	4073.47	0.00
7/14	1,085.33	0.00	0.00	3162.09	0.00
8/16	1,086.67	0.00	0.00	2362.61	0.00
9/18	1,088.00	0.00	0.00	1675.01	0.00
10/20	1,089.33	0.00	0.00	1099.31	0.00
11/22	1,090.67	0.00	0.00	635.49	0.00
12/23	1,091.33	0.00	0.00	445.54	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,077.33	16030.67	29056.59	2140.24	1.763
2/4	1,078.67	14717.11	26528.20	2032.32	1.895
3/6	1,080.00	13403.54	23999.81	1924.40	2.049
4/8	1,081.33	12089.98	21471.42	1816.48	2.231
5/10	1,082.67	10776.41	18943.03	1708.56	2.450
6/12	1,084.00	9462.85	16414.64	1600.64	2.716
7/14	1,085.33	8149.28	13886.24	1492.71	3.049
8/16	1,086.67	6835.72	11357.85	1384.79	3.479
9/18	1,088.00	5522.15	8829.46	1276.87	4.059
10/20	1,089.33	4208.59	6301.07	1168.95	4.892
11/22	1,090.67	2895.02	3772.68	1061.03	6.225
12/23	1,091.33	2238.24	2508.48	1007.07	7.284

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,077.33	1365.55	2528.59	1.852	4.90
2/4	1,078.67	823.71	2475.15	3.005	4.90
3/6	1,080.00	754.38	2411.15	3.196	4.90



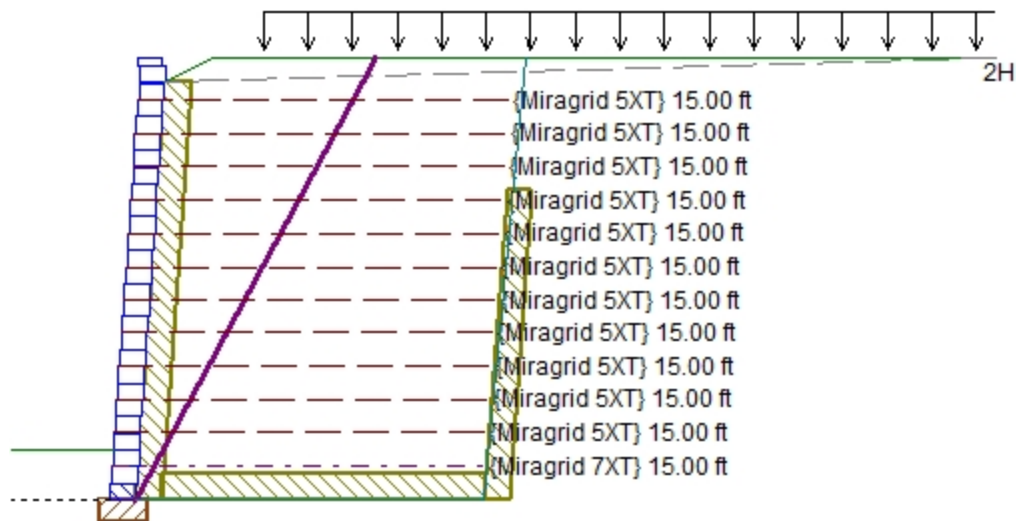
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinfmax (ft) [7-92]
4/8	1,081.33	685.05	2347.16	3.426	4.90
5/10	1,082.67	615.72	2283.16	3.708	4.90
6/12	1,084.00	546.39	2175.63	3.982	4.90
7/14	1,085.33	477.06	1997.93	4.188	4.90
8/16	1,086.67	407.73	1820.24	4.464	4.90
9/18	1,088.00	338.40	1642.54	4.854	4.90
10/20	1,089.33	178.17	1464.84	8.221	4.90
11/22	1,090.67	84.09	1287.15	15.307	4.90
12/23	1,091.33	53.48	1198.30	22.405	4.90

Crest Toppling

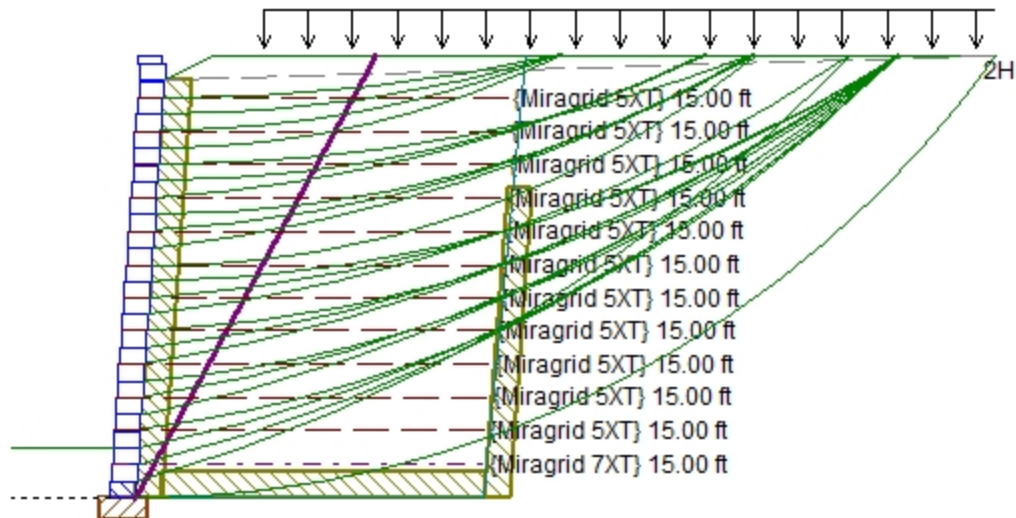
Height from top layer to grade	Hz	1.32 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2061.29 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overtopping moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 19 Details

Section 19 Cross-section



Section 19 Static ICS Cross-section



Section 19 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1077.96 ft
Base of Section		1076.00 ft
Design Height	H	16.71 ft
Embedment Depth	Hemb	1.96 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	13.2900	Pass
L	Min. Reinforcement Length	4.0000	15.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8974	Pass
La	Min. Anchorage Length	1.0000	6.4314	Pass
MinHemb	Minimum Embedment	12.0000	23.5315	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.88	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.53	Pass
FSsl	Base Sliding	1.50	1.80	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpo	FSsl	FSto
1	1,077.33	2.75	41.07	1.59	2.53
2	1,078.67	2.80	41.27	1.57	2.45
3	1,080.00	2.72	35.33	1.65	2.62
4	1,081.33	2.64	35.57	1.63	2.87
5	1,082.67	2.55	38.43	1.60	2.33
6	1,084.00	2.84	38.33	1.64	2.97
7	1,085.33	2.79	35.47	1.59	3.06
8	1,086.67	2.62	41.15	1.57	2.49
9	1,088.00	2.66	38.20	1.64	2.95
10	1,089.33	1.82	22.76	1.65	1.78
11	1,090.67	1.81	22.64	1.59	1.73
12	1,092.00	1.73	22.50	1.76	1.84

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	8	3	1.63	Pass
1	10	1	1.67	Pass
10	7	2	1.71	Pass
5	8	5	1.74	Pass
8	8	4	1.77	Pass
7	8	7	1.84	Pass
10	8	6	1.88	Pass
10	8	9	1.98	Pass
4	8	8	2.03	Pass
3	8	11	2.15	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	17.73 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	14.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.49 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	9.78 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	16.71 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.49 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	14.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.52 ft	Eq. 7-4
Increase in height due to backslope	h	7.42 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	19.72 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	16.71 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.289	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.57 ft	Eq. 7-26
Horz. influence distance	dint	8.46 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	14.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	10599.08 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2138.99 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	10599.08 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2138.99 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	12738.08 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	5.91 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	8.87 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	15.41 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	15.62 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	33596.93 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Base sliding resistance	Rs	22986.87 lb/ft	Eq. 7-32
Base sliding	FSsl	1.805	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1657.28 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	33596.93 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1799.75 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	8.06 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	9.18 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.50 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	10.19 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	16.24 ft	Eq. 7-36A3
Resisting moment	Mr	288280.80 lb	Eq. 7-34
Driving moment	Mo	81620.93 lb	Eq. 7-38
Overturning	FSot	3.532	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	11.68 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.66 ft	Eq. 7-41
Applied bearing pressure	Qa	3248.01 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	48335.68 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	14.882	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,077.33	2509.38	2.00	15.71	1366.79
2/4	1,078.67	1999.00	1.33	14.05	824.74
3/6	1,080.00	1999.00	1.33	12.71	755.58
4/8	1,081.33	1999.00	1.33	11.38	686.42
5/10	1,082.67	1999.00	1.33	10.05	617.26
6/12	1,084.00	1999.00	1.33	8.71	548.10
7/14	1,085.33	1999.00	1.33	7.38	478.94
8/16	1,086.67	1999.00	1.33	6.05	409.78
9/18	1,088.00	1999.00	1.33	4.71	340.62
10/20	1,089.33	1999.00	1.33	3.38	181.19
11/22	1,090.67	1999.00	1.33	2.05	106.24
12/24	1,092.00	1999.00	1.38	0.69	37.13

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,077.33	1.836	1.000	1.000
2/4	1,078.67	2.424	1.000	1.000
3/6	1,080.00	2.646	1.000	1.000
4/8	1,081.33	2.912	1.000	1.000
5/10	1,082.67	3.239	1.000	1.000
6/12	1,084.00	3.647	1.000	1.000
7/14	1,085.33	4.174	1.000	1.000
8/16	1,086.67	4.878	1.000	1.000
9/18	1,088.00	5.869	1.000	1.000
10/20	1,089.33	11.033	1.000	0.060
11/22	1,090.67	18.815	1.000	0.000
12/24	1,092.00	53.842	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,077.33	1366.79	30756.70	13.37	16.40
2/4	1,078.67	824.74	26923.24	12.74	15.07
3/6	1,080.00	755.58	23325.70	12.11	13.73
4/8	1,081.33	686.42	19964.09	11.48	12.40
5/10	1,082.67	617.26	16838.39	10.85	11.07
6/12	1,084.00	548.10	13948.62	10.22	9.73
7/14	1,085.33	478.94	11294.76	9.59	8.40
8/16	1,086.67	409.78	8876.83	8.95	7.07
9/18	1,088.00	340.62	6694.82	8.32	5.73
10/20	1,089.33	181.19	4748.73	7.69	4.40
11/22	1,090.67	106.24	3038.56	7.06	3.07
12/24	1,092.00	37.13	1564.31	6.43	1.73

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,077.33	22.503
2/4	1,078.67	32.644
3/6	1,080.00	30.871
4/8	1,081.33	29.084
5/10	1,082.67	27.279
6/12	1,084.00	25.449
7/14	1,085.33	23.583
8/16	1,086.67	21.662

Layer/ Course	Elevation (ft)	FSpo [7-66]
9/18	1,088.00	19.655
10/20	1,089.33	26.209
11/22	1,090.67	28.600
12/24	1,092.00	42.134

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,077.33	8464.54	0.00	1911.51	0.00
2/4	1,078.67	7144.19	0.00	1756.11	0.00
3/6	1,080.00	5935.73	0.00	1600.71	0.00
4/8	1,081.33	4839.16	0.00	1445.31	0.00
5/10	1,082.67	3854.47	0.00	1289.91	0.00
6/12	1,084.00	2981.68	0.00	1134.50	0.00
7/14	1,085.33	2220.78	0.00	979.10	0.00
8/16	1,086.67	1571.77	0.00	823.70	0.00
9/18	1,088.00	1034.64	0.00	668.30	0.00
10/20	1,089.33	609.41	0.00	512.90	0.00
11/22	1,090.67	296.07	0.00	357.50	0.00
12/24	1,092.00	94.61	0.00	202.09	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,077.33	0.00	0.00	10376.05	0.00
2/4	1,078.67	0.00	0.00	8900.30	0.00
3/6	1,080.00	0.00	0.00	7536.44	0.00
4/8	1,081.33	0.00	0.00	6284.46	0.00
5/10	1,082.67	0.00	0.00	5144.38	0.00
6/12	1,084.00	0.00	0.00	4116.19	0.00
7/14	1,085.33	0.00	0.00	3199.88	0.00
8/16	1,086.67	0.00	0.00	2395.47	0.00
9/18	1,088.00	0.00	0.00	1702.94	0.00
10/20	1,089.33	0.00	0.00	1122.31	0.00
11/22	1,090.67	0.00	0.00	653.56	0.00
12/24	1,092.00	0.00	0.00	296.71	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,077.33	16088.53	29167.96	2144.99	1.757
2/4	1,078.67	14774.97	26639.56	2037.07	1.889
3/6	1,080.00	13461.40	24111.17	1929.15	2.042
4/8	1,081.33	12147.83	21582.78	1821.23	2.223
5/10	1,082.67	10834.27	19054.39	1713.31	2.439
6/12	1,084.00	9520.70	16526.00	1605.39	2.703
7/14	1,085.33	8207.14	13997.61	1497.47	3.033
8/16	1,086.67	6893.57	11469.22	1389.55	3.458
9/18	1,088.00	5580.01	8940.82	1281.63	4.029
10/20	1,089.33	4266.44	6412.43	1173.71	4.847
11/22	1,090.67	2952.88	3884.04	1065.78	6.149
12/24	1,092.00	1639.31	1355.65	957.86	8.753

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,077.33	1366.79	2531.97	1.852	4.91
2/4	1,078.67	824.74	2477.97	3.005	4.91
3/6	1,080.00	755.58	2413.97	3.195	4.91

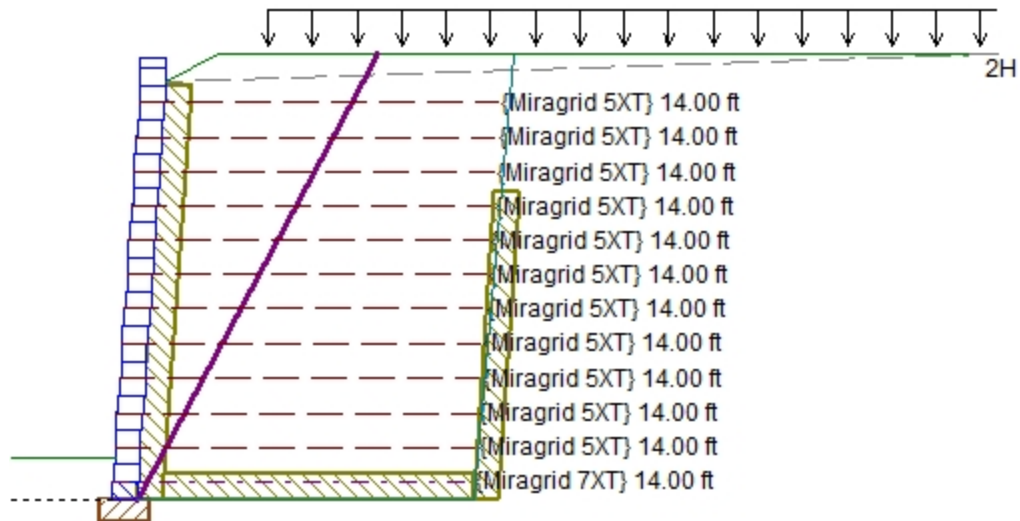
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
4/8	1,081.33	686.42	2349.98	3.424	4.91
5/10	1,082.67	617.26	2285.98	3.703	4.91
6/12	1,084.00	548.10	2183.45	3.984	4.91
7/14	1,085.33	478.94	2005.76	4.188	4.91
8/16	1,086.67	409.78	1828.06	4.461	4.91
9/18	1,088.00	340.62	1650.37	4.845	4.91
10/20	1,089.33	181.19	1472.67	8.128	4.91
11/22	1,090.67	106.24	1294.97	12.189	4.91
12/24	1,092.00	37.13	1117.28	30.093	4.91

Crest Toppling

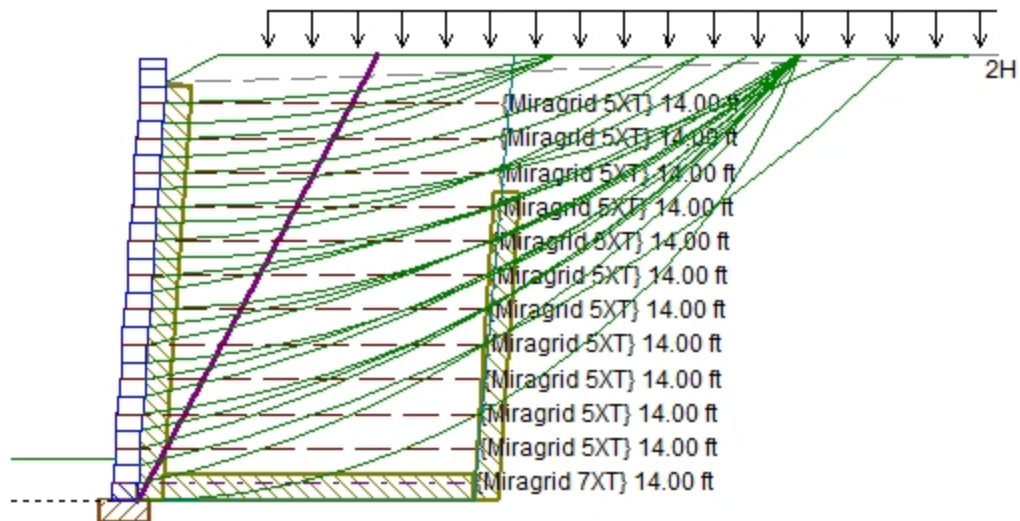
Height from top layer to grade	Hz	0.71 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2138.99 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overtopping moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 20 Details

Section 20 Cross-section



Section 20 Static ICS Cross-section



Section 20 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1078.27 ft
Base of Section		1076.67 ft
Design Height	H	16.16 ft
Embedment Depth	Hemb	1.60 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.9900	Pass
L	Min. Reinforcement Length	4.0000	14.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8662	Pass
La	Min. Anchorage Length	1.0000	5.7470	Pass
MinHemb	Minimum Embedment	12.0000	19.2008	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.37	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.29	Pass
FSsl	Base Sliding	1.50	1.74	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,077.33	2.79	41.15	1.57	2.49
2	1,078.67	2.84	35.47	1.59	2.95
3	1,080.00	2.62	32.58	1.64	2.78
4	1,081.33	2.81	38.20	1.64	3.06
5	1,082.67	2.66	38.33	1.59	2.62
6	1,084.00	2.80	41.27	1.57	2.45
7	1,085.33	2.75	41.07	1.65	2.53
8	1,086.67	2.72	35.33	1.64	2.97
9	1,088.00	2.55	38.43	1.60	2.33
10	1,089.33	2.64	35.57	1.63	2.87
11	1,090.67	1.85	22.44	1.65	1.54
12	1,092.00	1.75	26.54	1.58	1.66

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
6	6	2	1.57	Pass
8	6	4	1.64	Pass
9	8	3	1.71	Pass
4	6	6	1.76	Pass
1	6	1	1.77	Pass
6	6	5	1.80	Pass
6	6	8	1.87	Pass
8	6	7	1.92	Pass
9	6	10	2.02	Pass
3	6	9	2.08	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	17.18 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	13.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.61 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	9.23 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	16.16 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.61 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	13.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.48 ft	Eq. 7-4
Increase in height due to backslope	h	6.89 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	18.64 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	16.16 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.289	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.39 ft	Eq. 7-26
Horz. influence distance	dint	8.20 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	13.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	9843.03 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	2061.29 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	9843.03 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	2061.29 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	11904.32 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	5.73 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	8.59 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	14.40 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	14.60 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1519.70 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTDl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	30305.72 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1662.18 lb/ft	Eq. 7-31
Base sliding resistance	Rs	20760.20 lb/ft	Eq. 7-32
Base sliding	FSsl	1.744	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1519.70 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTDl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	30305.72 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1662.18 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	7.54 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	8.64 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.46 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	9.65 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	15.20 ft	Eq. 7-36A3
Resisting moment	Mr	243781.43 lb	Eq. 7-34
Driving moment	Mo	74083.34 lb	Eq. 7-38
Overturning	FSot	3.291	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	10.62 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.69 ft	Eq. 7-41
Applied bearing pressure	Qa	3225.79 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	43119.30 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.367	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,077.33	2509.38	1.33	15.50	901.96
2/3	1,078.67	1999.00	1.33	14.16	832.63
3/5	1,080.00	1999.00	1.33	12.83	763.31
4/7	1,081.33	1999.00	1.33	11.50	693.99
5/9	1,082.67	1999.00	1.33	10.16	624.67
6/11	1,084.00	1999.00	1.33	8.83	555.35
7/13	1,085.33	1999.00	1.33	7.50	486.03
8/15	1,086.67	1999.00	1.33	6.16	416.70
9/17	1,088.00	1999.00	1.33	4.83	347.38
10/19	1,089.33	1999.00	1.33	3.50	188.70
11/21	1,090.67	1999.00	1.33	2.16	112.46
12/23	1,092.00	1999.00	1.50	0.75	43.66

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,077.33	2.782	1.000	1.000
2/3	1,078.67	2.401	1.000	1.000
3/5	1,080.00	2.619	1.000	1.000
4/7	1,081.33	2.880	1.000	1.000
5/9	1,082.67	3.200	1.000	1.000
6/11	1,084.00	3.600	1.000	1.000
7/13	1,085.33	4.113	1.000	1.000
8/15	1,086.67	4.797	1.000	1.000
9/17	1,088.00	5.754	1.000	1.000
10/19	1,089.33	10.594	1.000	0.072
11/21	1,090.67	17.775	1.000	0.000
12/23	1,092.00	45.789	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,077.33	901.96	29385.95	12.68	16.52
2/3	1,078.67	832.63	25670.38	12.05	15.18
3/5	1,080.00	763.31	22190.74	11.42	13.85
4/7	1,081.33	693.99	18947.01	10.79	12.52
5/9	1,082.67	624.67	15939.20	10.16	11.18
6/11	1,084.00	555.35	13167.32	9.53	9.85
7/13	1,085.33	486.03	10631.36	8.90	8.52
8/15	1,086.67	416.70	8331.31	8.27	7.18
9/17	1,088.00	347.38	6267.19	7.64	5.85
10/19	1,089.33	188.70	4438.99	7.01	4.52
11/21	1,090.67	112.46	2846.71	6.38	3.18
12/23	1,092.00	43.66	1490.35	5.75	1.85

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,077.33	32.580
2/3	1,078.67	30.830
3/5	1,080.00	29.072
4/7	1,081.33	27.302
5/9	1,082.67	25.516
6/11	1,084.00	23.710
7/13	1,085.33	21.874
8/15	1,086.67	19.993

Layer/ Course	Elevation (ft)	FSpo [7-66]
9/17	1,088.00	18.041
10/19	1,089.33	23.524
11/21	1,090.67	25.313
12/23	1,092.00	34.138

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,077.33	8583.49	0.00	1924.90	0.00
2/3	1,078.67	7253.50	0.00	1769.49	0.00
3/5	1,080.00	6035.40	0.00	1614.09	0.00
4/7	1,081.33	4929.19	0.00	1458.69	0.00
5/9	1,082.67	3934.87	0.00	1303.29	0.00
6/11	1,084.00	3052.44	0.00	1147.89	0.00
7/13	1,085.33	2281.91	0.00	992.49	0.00
8/15	1,086.67	1623.26	0.00	837.08	0.00
9/17	1,088.00	1076.50	0.00	681.68	0.00
10/19	1,089.33	641.63	0.00	526.28	0.00
11/21	1,090.67	318.65	0.00	370.88	0.00
12/23	1,092.00	107.56	0.00	215.48	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,077.33	0.00	0.00	10508.38	0.00
2/3	1,078.67	0.00	0.00	9022.99	0.00
3/5	1,080.00	0.00	0.00	7649.49	0.00
4/7	1,081.33	0.00	0.00	6387.88	0.00
5/9	1,082.67	0.00	0.00	5238.16	0.00
6/11	1,084.00	0.00	0.00	4200.33	0.00
7/13	1,085.33	0.00	0.00	3274.39	0.00
8/15	1,086.67	0.00	0.00	2460.34	0.00
9/17	1,088.00	0.00	0.00	1758.18	0.00
10/19	1,089.33	0.00	0.00	1167.91	0.00
11/21	1,090.67	0.00	0.00	689.53	0.00
12/23	1,092.00	0.00	0.00	323.04	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,077.33	15043.33	27293.69	2154.29	1.637
2/3	1,078.67	13823.28	24945.30	2046.37	1.759
3/5	1,080.00	12603.23	22596.91	1938.45	1.901
4/7	1,081.33	11383.18	20248.52	1830.52	2.069
5/9	1,082.67	10163.13	17900.13	1722.60	2.269
6/11	1,084.00	8943.08	15551.74	1614.68	2.514
7/13	1,085.33	7723.03	13203.34	1506.76	2.819
8/15	1,086.67	6502.98	10854.95	1398.84	3.212
9/17	1,088.00	5282.93	8506.56	1290.92	3.739
10/19	1,089.33	4062.87	6158.17	1183.00	4.492
11/21	1,090.67	2842.82	3809.78	1075.08	5.682
12/23	1,092.00	1622.77	1461.39	967.16	8.017

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,077.33	901.96	2538.57	2.815	4.75
2/3	1,078.67	832.63	2483.48	2.983	4.75
3/5	1,080.00	763.31	2419.48	3.170	4.75



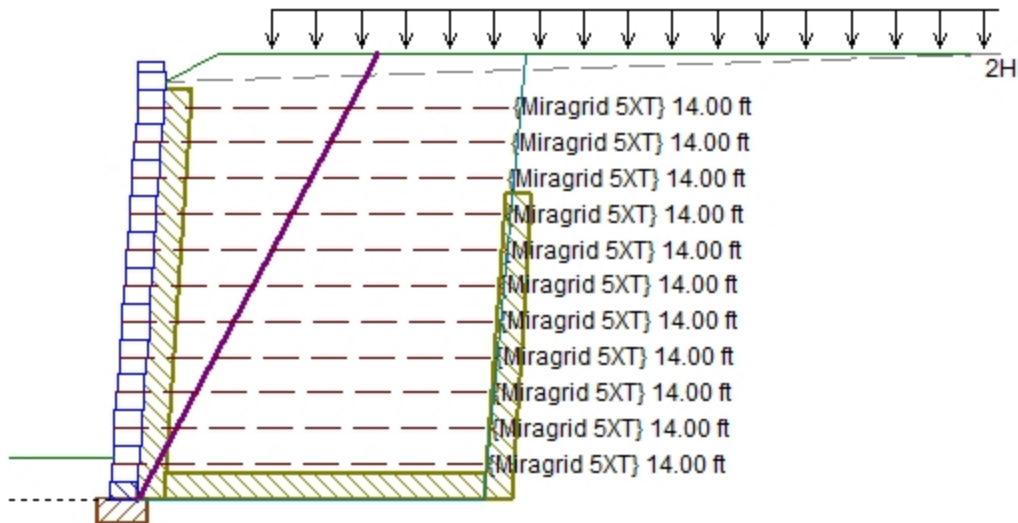
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinfmax (ft) [7-92]
4/7	1,081.33	693.99	2355.49	3.394	4.75
5/9	1,082.67	624.67	2291.49	3.668	4.75
6/11	1,084.00	555.35	2198.76	3.959	4.75
7/13	1,085.33	486.03	2021.06	4.158	4.75
8/15	1,086.67	416.70	1843.37	4.424	4.75
9/17	1,088.00	347.38	1665.67	4.795	4.75
10/19	1,089.33	188.70	1487.97	7.885	4.75
11/21	1,090.67	112.46	1310.28	11.651	4.75
12/23	1,092.00	43.66	1132.58	25.943	4.75

Crest Toppling

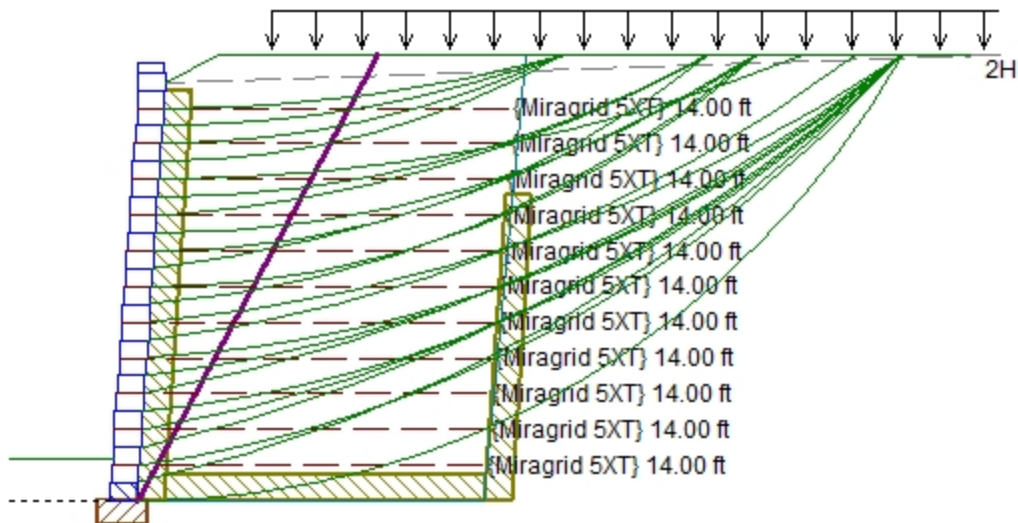
Height from top layer to grade	Hz	0.83 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	2061.29 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 21 Details

Section 21 Cross-section



Section 21 Static ICS Cross-section



Section 21 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1078.88 ft
Base of Section		1077.33 ft
Design Height	H	15.61 ft
Embedment Depth	Hemb	1.54 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.9800	Pass
L	Min. Reinforcement Length	4.0000	14.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8968	Pass
La	Min. Anchorage Length	1.0000	6.0623	Pass
MinHemb	Minimum Embedment	12.0000	18.5354	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.34	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.51	Pass
FSSl	Base Sliding	1.50	1.81	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSSl	FSto
1	1,078.67	2.75	41.07	1.65	2.53
2	1,080.00	2.80	41.27	1.57	2.45
3	1,081.33	2.72	35.33	1.64	2.97
4	1,082.67	2.64	35.57	1.63	2.87
5	1,084.00	2.55	38.43	1.60	2.33
6	1,085.33	2.84	35.47	1.59	2.95
7	1,086.67	2.79	41.15	1.57	2.49
8	1,088.00	2.62	32.58	1.64	2.78
9	1,089.33	2.66	38.33	1.59	2.62
10	1,090.67	2.81	38.20	1.64	3.06
11	1,092.00	1.82	24.71	1.60	1.62

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
1	8	1	1.63	Pass
5	8	3	1.65	Pass
8	8	2	1.71	Pass
7	8	5	1.74	Pass
10	8	4	1.80	Pass
10	8	7	1.87	Pass
4	8	6	1.93	Pass
3	8	9	2.02	Pass
6	8	8	2.07	Pass
6	8	11	2.20	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	16.63 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	13.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.73 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	8.68 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	15.61 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.73 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	13.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.48 ft	Eq. 7-4
Increase in height due to backslope	h	6.89 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	18.36 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	15.61 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.290	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.20 ft	Eq. 7-26
Horz. influence distance	dint	7.94 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	13.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	9114.94 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1983.59 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	9114.94 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1983.59 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	11098.54 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	5.54 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	8.32 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	14.39 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	14.58 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1519.70 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	29271.03 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1662.18 lb/ft	Eq. 7-31
Base sliding resistance	Rs	20088.26 lb/ft	Eq. 7-32
Base sliding	FSsl	1.810	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1519.70 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	29271.03 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1662.18 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	7.52 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	8.60 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.42 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	9.61 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	15.16 ft	Eq. 7-36A3
Resisting moment	Mr	235349.07 lb	Eq. 7-34
Driving moment	Mo	67021.84 lb	Eq. 7-38
Overturning	FSot	3.512	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	10.88 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.56 ft	Eq. 7-41
Applied bearing pressure	Qa	3051.73 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	43768.49 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	14.342	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,078.67	1999.00	2.00	14.61	1287.09
2/4	1,080.00	1999.00	1.33	12.94	771.20
3/6	1,081.33	1999.00	1.33	11.61	701.70
4/8	1,082.67	1999.00	1.33	10.28	632.21
5/10	1,084.00	1999.00	1.33	8.94	562.71
6/12	1,085.33	1999.00	1.33	7.61	493.22
7/14	1,086.67	1999.00	1.33	6.28	423.73
8/16	1,088.00	1999.00	1.33	4.94	354.23
9/18	1,089.33	1999.00	1.33	3.61	196.39
10/20	1,090.67	1999.00	1.33	2.28	118.72
11/22	1,092.00	1999.00	1.61	0.81	50.74

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,078.67	1.553	1.000	1.000
2/4	1,080.00	2.592	1.000	1.000
3/6	1,081.33	2.849	1.000	1.000
4/8	1,082.67	3.162	1.000	1.000
5/10	1,084.00	3.552	1.000	1.000
6/12	1,085.33	4.053	1.000	1.000
7/14	1,086.67	4.718	1.000	1.000
8/16	1,088.00	5.643	1.000	1.000
9/18	1,089.33	10.179	1.000	0.085
10/20	1,090.67	16.837	1.000	0.000
11/22	1,092.00	39.397	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,078.67	1287.09	26541.20	12.37	15.30
2/4	1,080.00	771.20	22992.42	11.74	13.96
3/6	1,081.33	701.70	19679.55	11.11	12.63
4/8	1,082.67	632.21	16602.61	10.48	11.30
5/10	1,084.00	562.71	13761.58	9.85	9.96
6/12	1,085.33	493.22	11156.48	9.22	8.63
7/14	1,086.67	423.73	8787.30	8.59	7.30
8/16	1,088.00	354.23	6654.04	7.95	5.96
9/18	1,089.33	196.39	4756.70	7.32	4.63
10/20	1,090.67	118.72	3095.28	6.69	3.30
11/22	1,092.00	50.74	1669.78	6.06	1.96

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,078.67	20.621
2/4	1,080.00	29.814
3/6	1,081.33	28.045
4/8	1,082.67	26.261
5/10	1,084.00	24.456
6/12	1,085.33	22.620
7/14	1,086.67	20.738
8/16	1,088.00	18.784
9/18	1,089.33	24.220
10/20	1,090.67	26.071
11/22	1,092.00	32.909

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,078.67	7363.64	0.00	1782.88	0.00
2/4	1,080.00	6135.90	0.00	1627.48	0.00
3/6	1,081.33	5020.06	0.00	1472.07	0.00
4/8	1,082.67	4016.10	0.00	1316.67	0.00
5/10	1,084.00	3124.04	0.00	1161.27	0.00
6/12	1,085.33	2343.86	0.00	1005.87	0.00
7/14	1,086.67	1675.58	0.00	850.47	0.00
8/16	1,088.00	1119.18	0.00	695.07	0.00
9/18	1,089.33	674.68	0.00	539.66	0.00
10/20	1,090.67	342.06	0.00	384.26	0.00
11/22	1,092.00	121.34	0.00	228.86	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,078.67	0.00	0.00	9146.51	0.00
2/4	1,080.00	0.00	0.00	7763.38	0.00
3/6	1,081.33	0.00	0.00	6492.13	0.00
4/8	1,082.67	0.00	0.00	5332.78	0.00
5/10	1,084.00	0.00	0.00	4285.31	0.00
6/12	1,085.33	0.00	0.00	3349.73	0.00
7/14	1,086.67	0.00	0.00	2526.05	0.00
8/16	1,088.00	0.00	0.00	1814.25	0.00
9/18	1,089.33	0.00	0.00	1214.34	0.00
10/20	1,090.67	0.00	0.00	726.32	0.00
11/22	1,092.00	0.00	0.00	350.20	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,078.67	13928.35	25147.55	2055.66	1.748
2/4	1,080.00	12708.30	22799.16	1947.74	1.888
3/6	1,081.33	11488.25	20450.77	1839.82	2.053
4/8	1,082.67	10268.20	18102.38	1731.90	2.250
5/10	1,084.00	9048.15	15753.98	1623.98	2.490
6/12	1,085.33	7828.10	13405.59	1516.06	2.790
7/14	1,086.67	6608.05	11057.20	1408.14	3.173
8/16	1,088.00	5388.00	8708.81	1300.22	3.686
9/18	1,089.33	4167.95	6360.42	1192.29	4.414
10/20	1,090.67	2947.90	4012.03	1084.37	5.552
11/22	1,092.00	1727.85	1663.64	976.45	7.722

Connection Strength

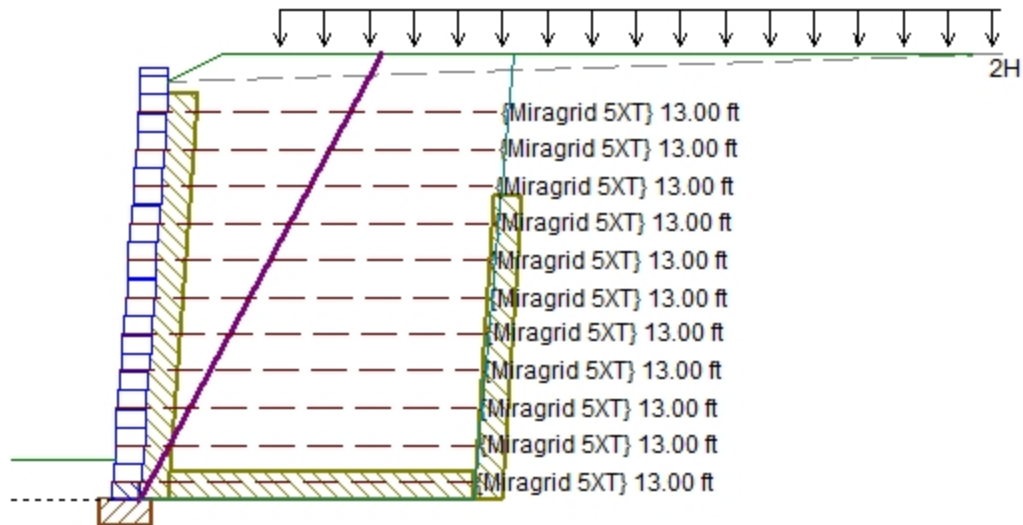
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FSCs [7-80]	hinflmax (ft) [7-92]
1/2	1,078.67	1287.09	2488.99	1.934	4.59
2/4	1,080.00	771.20	2424.99	3.144	4.59
3/6	1,081.33	701.70	2361.00	3.365	4.59
4/8	1,082.67	632.21	2297.00	3.633	4.59
5/10	1,084.00	562.71	2214.06	3.935	4.59
6/12	1,085.33	493.22	2036.37	4.129	4.59
7/14	1,086.67	423.73	1858.67	4.386	4.59
8/16	1,088.00	354.23	1680.97	4.745	4.59
9/18	1,089.33	196.39	1503.28	7.654	4.59
10/20	1,090.67	118.72	1325.58	11.165	4.59
11/22	1,092.00	50.74	1147.88	22.623	4.59

Crest Toppling

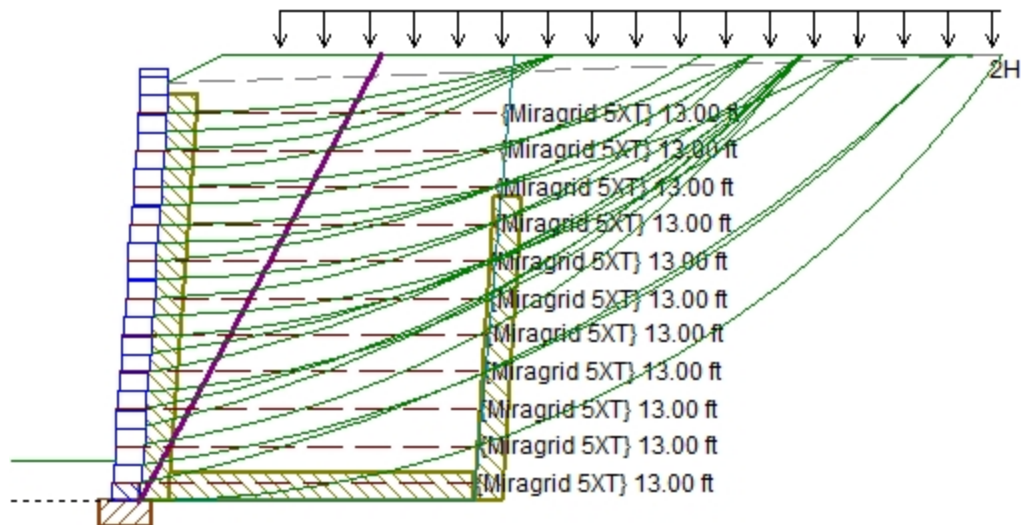
Height from top layer to grade	Hz	0.94 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1983.59 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 22 Details

Section 22 Cross-section



Section 22 Static ICS Cross-section



Section 22 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1079.49 ft
Base of Section		1078.00 ft
Design Height	H	15.06 ft
Embedment Depth	Hemb	1.49 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.9700	Pass
L	Min. Reinforcement Length	4.0000	13.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8632	Pass
La	Min. Anchorage Length	1.0000	5.3776	Pass
MinHemb	Minimum Embedment	12.0000	17.8701	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	13.18	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.25	Pass
FSsl	Base Sliding	1.50	1.74	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,078.67	2.62	32.58	1.59	2.62
2	1,080.00	2.79	41.15	1.64	2.78
3	1,081.33	2.66	38.33	1.62	2.35
4	1,082.67	2.94	29.76	1.64	3.06
5	1,084.00	2.81	38.20	1.57	2.97
6	1,085.33	2.84	35.33	1.64	2.45
7	1,086.67	2.80	41.07	1.57	2.53
8	1,088.00	2.75	41.27	1.65	2.87
9	1,089.33	2.72	35.47	1.60	2.49
10	1,090.67	2.55	38.43	1.59	2.95
11	1,092.00	2.64	35.57	1.63	2.33

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
8	9	2	1.56	Pass
4	6	4	1.67	Pass
1	10	1	1.73	Pass
5	9	3	1.74	Pass
6	6	6	1.77	Pass
8	6	5	1.82	Pass
8	6	8	1.90	Pass
3	6	7	1.97	Pass
2	6	10	2.05	Pass
5	6	9	2.12	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	16.08 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	12.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	3.87 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	8.13 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	15.06 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	3.87 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	12.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.45 ft	Eq. 7-4
Increase in height due to backslope	h	6.36 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	17.28 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	15.06 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.291	Eq. 7-43
Height above rein. area at int. failure plane	hint	5.02 ft	Eq. 7-26
Horz. influence distance	dint	7.68 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	12.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	8414.83 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1905.89 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	8414.83 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1905.89 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	10320.72 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	5.36 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	8.04 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	13.37 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	13.56 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1382.13 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	26203.32 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1524.61 lb/ft	Eq. 7-31
Base sliding resistance	Rs	18006.72 lb/ft	Eq. 7-32
Base sliding	FSsl	1.745	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1382.13 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	26203.32 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1524.61 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	7.00 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	8.07 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.39 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	9.08 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	14.12 ft	Eq. 7-36A3
Resisting moment	Mr	196587.40 lb	Eq. 7-34
Driving moment	Mo	60420.99 lb	Eq. 7-38
Overturning	FSot	3.254	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	9.82 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.59 ft	Eq. 7-41
Applied bearing pressure	Qa	3029.80 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	39930.30 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	13.179	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,078.67	1999.00	1.33	14.39	848.93
2/3	1,080.00	1999.00	1.33	13.06	779.25
3/5	1,081.33	1999.00	1.33	11.73	709.57
4/7	1,082.67	1999.00	1.33	10.39	639.89
5/9	1,084.00	1999.00	1.33	9.06	570.21
6/11	1,085.33	1999.00	1.33	7.73	500.53
7/13	1,086.67	1999.00	1.33	6.39	430.85
8/15	1,088.00	1999.00	1.33	5.06	361.17
9/17	1,089.33	1999.00	1.33	3.73	204.30
10/19	1,090.67	1999.00	1.33	2.39	125.04
11/21	1,092.00	1999.00	1.73	0.86	58.38

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,078.67	2.355	1.000	1.000
2/3	1,080.00	2.565	1.000	1.000
3/5	1,081.33	2.817	1.000	1.000
4/7	1,082.67	3.124	1.000	1.000
5/9	1,084.00	3.506	1.000	1.000
6/11	1,085.33	3.994	1.000	1.000
7/13	1,086.67	4.640	1.000	1.000
8/15	1,088.00	5.535	1.000	1.000
9/17	1,089.33	9.785	1.000	0.099
10/19	1,090.67	15.987	1.000	0.000
11/21	1,092.00	34.238	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,078.67	848.93	25260.34	11.68	15.41
2/3	1,080.00	779.25	21829.44	11.05	14.08
3/5	1,081.33	709.57	18634.47	10.42	12.75
4/7	1,082.67	639.89	15675.41	9.79	11.41
5/9	1,084.00	570.21	12952.28	9.16	10.08
6/11	1,085.33	500.53	10465.07	8.53	8.75
7/13	1,086.67	430.85	8213.78	7.90	7.41
8/15	1,088.00	361.17	6198.41	7.27	6.08
9/17	1,089.33	204.30	4418.96	6.64	4.75
10/19	1,090.67	125.04	2875.43	6.01	3.41
11/21	1,092.00	58.38	1567.82	5.38	2.08

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,078.67	29.756
2/3	1,080.00	28.013
3/5	1,081.33	26.262
4/7	1,082.67	24.497
5/9	1,084.00	22.715
6/11	1,085.33	20.908
7/13	1,086.67	19.064
8/15	1,088.00	17.162
9/17	1,089.33	21.630
10/19	1,090.67	22.996
11/21	1,092.00	26.853

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,078.67	7474.60	0.00	1796.26	0.00
2/3	1,080.00	6237.23	0.00	1640.86	0.00
3/5	1,081.33	5111.75	0.00	1485.46	0.00
4/7	1,082.67	4098.16	0.00	1330.06	0.00
5/9	1,084.00	3196.46	0.00	1174.65	0.00
6/11	1,085.33	2406.65	0.00	1019.25	0.00
7/13	1,086.67	1728.73	0.00	863.85	0.00
8/15	1,088.00	1162.70	0.00	708.45	0.00
9/17	1,089.33	708.56	0.00	553.05	0.00
10/19	1,090.67	366.30	0.00	397.65	0.00
11/21	1,092.00	135.94	0.00	242.24	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,078.67	0.00	0.00	9270.87	0.00
2/3	1,080.00	0.00	0.00	7878.09	0.00
3/5	1,081.33	0.00	0.00	6597.21	0.00
4/7	1,082.67	0.00	0.00	5428.22	0.00
5/9	1,084.00	0.00	0.00	4371.12	0.00
6/11	1,085.33	0.00	0.00	3425.90	0.00
7/13	1,086.67	0.00	0.00	2592.58	0.00
8/15	1,088.00	0.00	0.00	1871.15	0.00
9/17	1,089.33	0.00	0.00	1261.60	0.00
10/19	1,090.67	0.00	0.00	763.95	0.00
11/21	1,092.00	0.00	0.00	378.19	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,078.67	12952.51	23406.78	2064.96	1.620
2/3	1,080.00	11825.97	21238.39	1957.03	1.750
3/5	1,081.33	10699.43	19070.00	1849.11	1.902
4/7	1,082.67	9572.90	16901.61	1741.19	2.084
5/9	1,084.00	8446.36	14733.22	1633.27	2.306
6/11	1,085.33	7319.83	12564.82	1525.35	2.582
7/13	1,086.67	6193.29	10396.43	1417.43	2.936
8/15	1,088.00	5066.75	8228.04	1309.51	3.408
9/17	1,089.33	3940.22	6059.65	1201.59	4.076
10/19	1,090.67	2813.68	3891.26	1093.67	5.115
11/21	1,092.00	1687.15	1722.87	985.75	7.068

Connection Strength

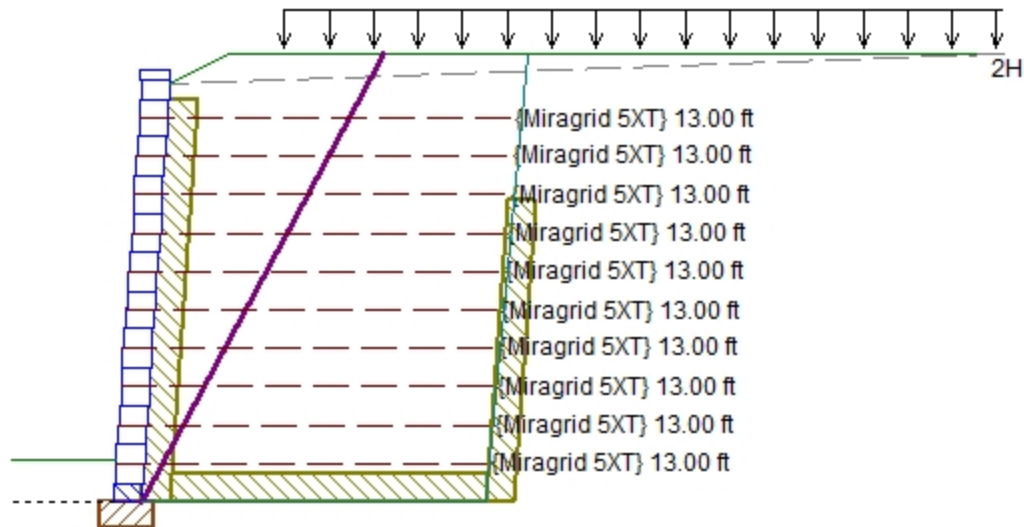
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,078.67	848.93	2494.50	2.938	4.43
2/3	1,080.00	779.25	2430.51	3.119	4.43
3/5	1,081.33	709.57	2366.51	3.335	4.43
4/7	1,082.67	639.89	2302.51	3.598	4.43
5/9	1,084.00	570.21	2229.37	3.910	4.43
6/11	1,085.33	500.53	2051.67	4.099	4.43
7/13	1,086.67	430.85	1873.97	4.349	4.43
8/15	1,088.00	361.17	1696.28	4.697	4.43
9/17	1,089.33	204.30	1518.58	7.433	4.43
10/19	1,090.67	125.04	1340.88	10.724	4.43
11/21	1,092.00	58.38	1163.19	19.923	4.43

Crest Toppling

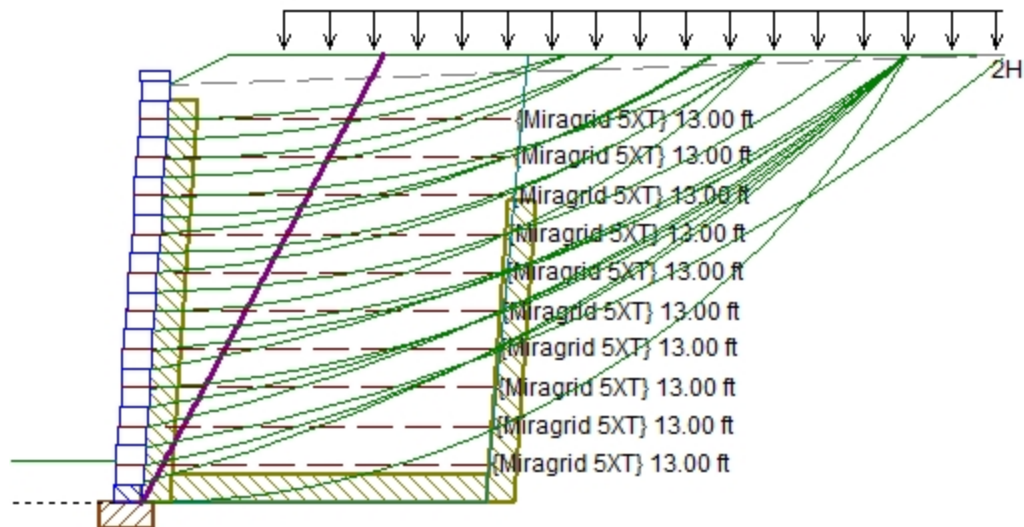
Height from top layer to grade	Hz	1.06 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1905.89 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqlV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 23 Details

Section 23 Cross-section



Section 23 Static ICS Cross-section



Section 23 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1080.10 ft
Base of Section		1078.67 ft
Design Height	H	14.51 ft
Embedment Depth	Hemb	1.43 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.9700	Pass
L	Min. Reinforcement Length	4.0000	13.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8961	Pass
La	Min. Anchorage Length	1.0000	5.6929	Pass
MinHemb	Minimum Embedment	12.0000	17.2047	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.22	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.49	Pass
FSsl	Base Sliding	1.50	1.82	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,080.00	2.75	41.27	1.65	2.87
2	1,081.33	2.80	41.07	1.57	2.53
3	1,082.67	2.72	35.47	1.60	2.49
4	1,084.00	2.64	35.57	1.63	2.33
5	1,085.33	2.55	38.43	1.59	2.95
6	1,086.67	2.84	35.33	1.64	2.45
7	1,088.00	2.79	41.15	1.64	2.78
8	1,089.33	2.62	32.58	1.59	2.62
9	1,090.67	2.66	38.33	1.62	2.35
10	1,092.00	2.81	38.20	1.57	2.97

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
1	8	1	1.61	Pass
7	8	3	1.65	Pass
10	8	2	1.72	Pass
10	8	5	1.76	Pass
8	10	4	1.84	Pass
3	8	7	1.90	Pass
6	8	6	1.95	Pass
5	8	9	2.06	Pass
10	8	8	2.13	Pass
1	5	11	2.23	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	15.53 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	12.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	4.02 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	7.58 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	14.51 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	4.02 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	12.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.45 ft	Eq. 7-4
Increase in height due to backslope	h	6.36 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	17.00 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	14.51 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.292	Eq. 7-43
Height above rein. area at int. failure plane	hint	4.83 ft	Eq. 7-26
Horz. influence distance	dint	7.42 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	12.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	7742.69 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1828.19 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	7742.69 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1828.19 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	9570.88 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	5.18 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	7.76 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	13.36 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	13.54 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1382.13 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	25243.12 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1524.61 lb/ft	Eq. 7-31
Base sliding resistance	Rs	17383.17 lb/ft	Eq. 7-32
Base sliding	FSsl	1.816	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1382.13 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	25243.12 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1524.61 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	6.98 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	8.03 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.35 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	9.04 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	14.08 ft	Eq. 7-36A3
Resisting moment	Mr	189317.05 lb	Eq. 7-34
Driving moment	Mo	54265.35 lb	Eq. 7-38
Overturning	FSot	3.489	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	10.09 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.45 ft	Eq. 7-41
Applied bearing pressure	Qa	2853.87 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	40588.07 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	14.222	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,080.00	1999.00	2.00	13.51	1207.44
2/4	1,081.33	1999.00	1.33	11.84	717.61
3/6	1,082.67	1999.00	1.33	10.51	647.73
4/8	1,084.00	1999.00	1.33	9.17	577.85
5/10	1,085.33	1999.00	1.33	7.84	507.98
6/12	1,086.67	1999.00	1.33	6.51	438.10
7/14	1,088.00	1999.00	1.33	5.17	368.22
8/16	1,089.33	1999.00	1.33	3.84	212.45
9/18	1,090.67	1999.00	1.33	2.51	131.42
10/20	1,092.00	1999.00	1.84	0.92	66.60

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,080.00	1.656	1.000	1.000
2/4	1,081.33	2.786	1.000	1.000
3/6	1,082.67	3.086	1.000	1.000
4/8	1,084.00	3.459	1.000	1.000
5/10	1,085.33	3.935	1.000	1.000
6/12	1,086.67	4.563	1.000	1.000
7/14	1,088.00	5.429	1.000	1.000
8/16	1,089.33	9.409	1.000	0.115
9/18	1,090.67	15.211	1.000	0.000
10/20	1,092.00	30.015	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,080.00	1207.44	22635.34	11.37	14.19
2/4	1,081.33	717.61	19371.22	10.74	12.86
3/6	1,082.67	647.73	16343.03	10.11	11.53
4/8	1,084.00	577.85	13550.75	9.48	10.19
5/10	1,085.33	507.98	10994.40	8.85	8.86
6/12	1,086.67	438.10	8673.97	8.22	7.53
7/14	1,088.00	368.22	6589.46	7.59	6.19
8/16	1,089.33	212.45	4740.87	6.95	4.86
9/18	1,090.67	131.42	3128.20	6.32	3.53
10/20	1,092.00	66.60	1751.46	5.69	2.19

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,080.00	18.747
2/4	1,081.33	26.994
3/6	1,082.67	25.231
4/8	1,084.00	23.450
5/10	1,085.33	21.643
6/12	1,086.67	19.799
7/14	1,088.00	17.895
8/16	1,089.33	22.316
9/18	1,090.67	23.804
10/20	1,092.00	26.298

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,080.00	6339.40	0.00	1654.24	0.00
2/4	1,081.33	5204.28	0.00	1498.84	0.00
3/6	1,082.67	4181.05	0.00	1343.44	0.00
4/8	1,084.00	3269.71	0.00	1188.04	0.00
5/10	1,085.33	2470.27	0.00	1032.64	0.00
6/12	1,086.67	1782.71	0.00	877.23	0.00
7/14	1,088.00	1207.04	0.00	721.83	0.00
8/16	1,089.33	743.26	0.00	566.43	0.00
9/18	1,090.67	391.38	0.00	411.03	0.00
10/20	1,092.00	151.38	0.00	255.63	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,080.00	0.00	0.00	7993.64	0.00
2/4	1,081.33	0.00	0.00	6703.12	0.00
3/6	1,082.67	0.00	0.00	5524.49	0.00
4/8	1,084.00	0.00	0.00	4457.75	0.00
5/10	1,085.33	0.00	0.00	3502.90	0.00
6/12	1,086.67	0.00	0.00	2659.94	0.00
7/14	1,088.00	0.00	0.00	1928.88	0.00
8/16	1,089.33	0.00	0.00	1309.70	0.00
9/18	1,090.67	0.00	0.00	802.41	0.00
10/20	1,092.00	0.00	0.00	407.01	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,080.00	11922.99	21425.14	1966.33	1.738
2/4	1,081.33	10796.45	19256.75	1858.41	1.888
3/6	1,082.67	9669.92	17088.35	1750.49	2.067
4/8	1,084.00	8543.38	14919.96	1642.57	2.285
5/10	1,085.33	7416.85	12751.57	1534.65	2.555
6/12	1,086.67	6290.31	10583.18	1426.72	2.901
7/14	1,088.00	5163.77	8414.79	1318.80	3.361
8/16	1,089.33	4037.24	6246.40	1210.88	4.007
9/18	1,090.67	2910.70	4078.01	1102.96	5.002
10/20	1,092.00	1784.17	1909.61	995.04	6.828

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,080.00	1207.44	2436.02	2.018	4.27
2/4	1,081.33	717.61	2372.02	3.305	4.27
3/6	1,082.67	647.73	2308.03	3.563	4.27
4/8	1,084.00	577.85	2244.03	3.883	4.27
5/10	1,085.33	507.98	2066.97	4.069	4.27
6/12	1,086.67	438.10	1889.28	4.312	4.27
7/14	1,088.00	368.22	1711.58	4.648	4.27
8/16	1,089.33	212.45	1533.88	7.220	4.27
9/18	1,090.67	131.42	1356.19	10.320	4.27
10/20	1,092.00	66.60	1178.49	17.695	4.27

Crest Toppling

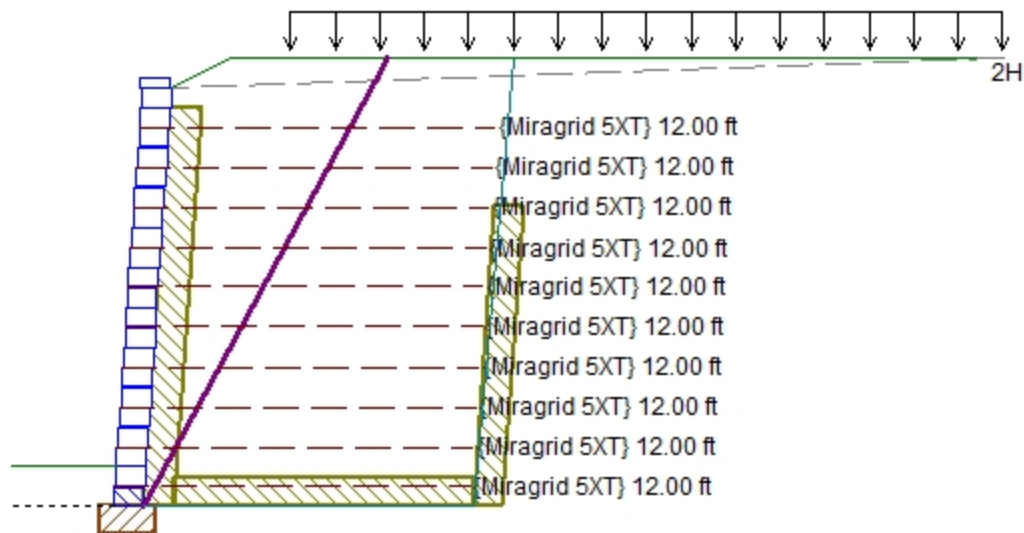
Height from top layer to grade	Hz	1.17 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1828.19 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86



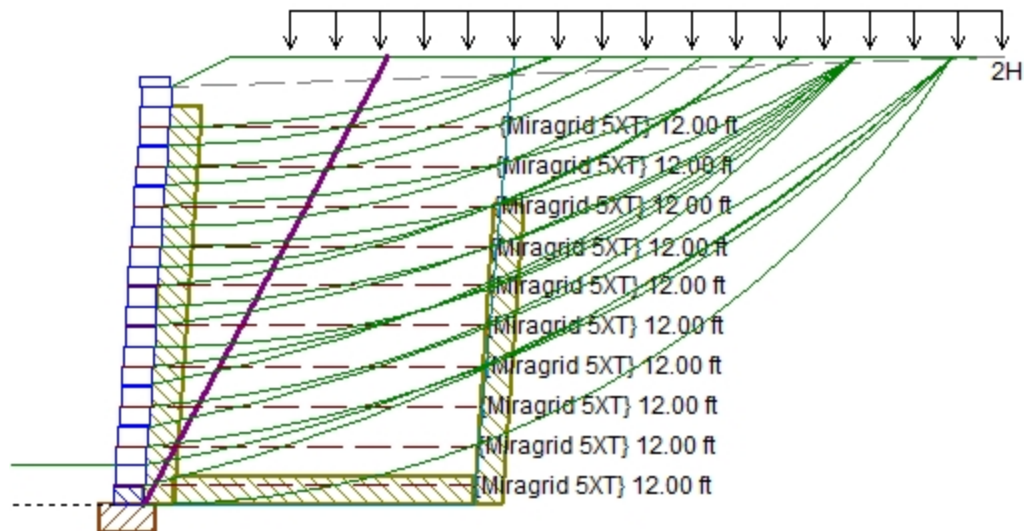
Vert. force from live load surcharge	Pq/V	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

Section 24 Details

Section 24 Cross-section



Section 24 Static ICS Cross-section



Section 24 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1080.71 ft
Base of Section		1079.33 ft
Design Height	H	13.94 ft
Embedment Depth	Hemb	1.38 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.9700	Pass
L	Min. Reinforcement Length	4.0000	12.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8608	Pass
La	Min. Anchorage Length	1.0000	5.0082	Pass
MinHemb	Minimum Embedment	12.0000	16.5354	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	12.98	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.21	Pass
FSSl	Base Sliding	1.50	1.74	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSSl	FSto
1	1,080.00	2.66	38.33	1.62	2.97
2	1,081.33	2.62	32.58	1.59	2.35
3	1,082.67	2.79	38.20	1.57	2.51
4	1,084.00	3.07	26.94	1.60	3.06
5	1,085.33	2.94	29.76	1.64	2.62
6	1,086.67	2.81	41.15	1.60	2.49
7	1,088.00	2.72	35.47	1.57	2.53
8	1,089.33	2.80	41.27	1.65	2.87
9	1,090.67	2.75	41.07	1.63	2.33
10	1,092.00	2.84	35.33	1.64	2.78

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
10	9	2	1.58	Pass
4	9	4	1.68	Pass
1	9	1	1.71	Pass
7	9	3	1.75	Pass
3	7	6	1.77	Pass
10	9	5	1.86	Pass
4	7	8	1.91	Pass
8	7	7	2.00	Pass
7	7	10	2.10	Pass
1	7	9	2.18	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	14.96 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	11.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	4.18 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	7.01 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	13.94 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	4.18 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	11.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.41 ft	Eq. 7-4
Increase in height due to backslope	h	5.84 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	15.91 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	13.94 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.293	Eq. 7-43
Height above rein. area at int. failure plane	hint	4.65 ft	Eq. 7-26
Horz. influence distance	dint	7.15 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	11.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	7098.53 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1750.49 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	7098.53 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1750.49 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	8849.02 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	4.99 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	7.48 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	12.35 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	12.52 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1244.56 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	22375.74 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1387.03 lb/ft	Eq. 7-31
Base sliding resistance	Rs	15431.72 lb/ft	Eq. 7-32
Base sliding	FSsl	1.744	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1244.56 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	22375.74 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1387.03 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	6.46 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	7.49 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.31 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	8.50 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	13.05 ft	Eq. 7-36A3
Resisting moment	Mr	155735.11 lb	Eq. 7-34
Driving moment	Mo	48492.71 lb	Eq. 7-38
Overturning	FSot	3.212	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	9.03 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.49 ft	Eq. 7-41
Applied bearing pressure	Qa	2829.84 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	36738.64 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	12.983	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,080.00	1999.00	1.33	13.27	795.17
2/3	1,081.33	1999.00	1.33	11.94	725.08
3/5	1,082.67	1999.00	1.33	10.61	654.99
4/7	1,084.00	1999.00	1.33	9.27	584.90
5/9	1,085.33	1999.00	1.33	7.94	514.81
6/11	1,086.67	1999.00	1.33	6.61	444.72
7/13	1,088.00	1999.00	1.33	5.27	374.63
8/15	1,089.33	1999.00	1.33	3.94	304.53
9/17	1,090.67	1999.00	1.33	2.61	137.66
10/19	1,092.00	1999.00	1.94	0.97	74.29

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,080.00	2.514	1.000	1.000
2/3	1,081.33	2.757	1.000	1.000
3/5	1,082.67	3.052	1.000	1.000
4/7	1,084.00	3.418	1.000	1.000
5/9	1,085.33	3.883	1.000	1.000
6/11	1,086.67	4.495	1.000	1.000
7/13	1,088.00	5.336	1.000	1.000
8/15	1,089.33	6.564	1.000	1.000
9/17	1,090.67	14.521	1.000	0.006
10/19	1,092.00	26.908	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,080.00	795.17	21422.72	10.68	14.29
2/3	1,081.33	725.08	18277.78	10.05	12.96
3/5	1,082.67	654.99	15368.75	9.42	11.63
4/7	1,084.00	584.90	12695.65	8.79	10.29
5/9	1,085.33	514.81	10258.46	8.16	8.96
6/11	1,086.67	444.72	8057.20	7.53	7.63
7/13	1,088.00	374.63	6091.85	6.90	6.29
8/15	1,089.33	304.53	4362.43	6.27	4.96
9/17	1,090.67	137.66	2868.93	5.64	3.63
10/19	1,092.00	74.29	1611.35	5.01	2.29

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,080.00	26.941
2/3	1,081.33	25.208
3/5	1,082.67	23.464
4/7	1,084.00	21.706
5/9	1,085.33	19.927
6/11	1,086.67	18.118
7/13	1,088.00	16.261
8/15	1,089.33	14.325
9/17	1,090.67	20.841
10/19	1,092.00	21.690

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,080.00	6429.39	0.00	1665.94	0.00
2/3	1,081.33	5285.85	0.00	1510.54	0.00
3/5	1,082.67	4254.20	0.00	1355.14	0.00
4/7	1,084.00	3334.44	0.00	1199.74	0.00
5/9	1,085.33	2526.57	0.00	1044.34	0.00
6/11	1,086.67	1830.58	0.00	888.94	0.00
7/13	1,088.00	1246.49	0.00	733.53	0.00
8/15	1,089.33	774.29	0.00	578.13	0.00
9/17	1,090.67	413.98	0.00	422.73	0.00
10/19	1,092.00	165.55	0.00	267.33	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,080.00	0.00	0.00	8095.34	0.00
2/3	1,081.33	0.00	0.00	6796.39	0.00
3/5	1,082.67	0.00	0.00	5609.34	0.00
4/7	1,084.00	0.00	0.00	4534.18	0.00
5/9	1,085.33	0.00	0.00	3570.90	0.00
6/11	1,086.67	0.00	0.00	2719.52	0.00
7/13	1,088.00	0.00	0.00	1980.03	0.00
8/15	1,089.33	0.00	0.00	1352.42	0.00
9/17	1,090.67	0.00	0.00	836.71	0.00
10/19	1,092.00	0.00	0.00	432.88	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,080.00	11005.31	19796.33	1974.45	1.603
2/3	1,081.33	9972.29	17807.94	1866.53	1.742
3/5	1,082.67	8939.27	15819.55	1758.61	1.907
4/7	1,084.00	7906.25	13831.16	1650.69	2.108
5/9	1,085.33	6873.23	11842.77	1542.77	2.357
6/11	1,086.67	5840.21	9854.38	1434.85	2.675
7/13	1,088.00	4807.19	7865.99	1326.93	3.098
8/15	1,089.33	3774.16	5877.59	1219.01	3.692
9/17	1,090.67	2741.14	3889.20	1111.09	4.604
10/19	1,092.00	1708.12	1900.81	1003.17	6.263

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,080.00	795.17	2440.84	3.070	4.10
2/3	1,081.33	725.08	2376.84	3.278	4.10
3/5	1,082.67	654.99	2312.84	3.531	4.10
4/7	1,084.00	584.90	2248.85	3.845	4.10
5/9	1,085.33	514.81	2080.35	4.041	4.10
6/11	1,086.67	444.72	1902.66	4.278	4.10
7/13	1,088.00	374.63	1724.96	4.604	4.10
8/15	1,089.33	304.53	1547.26	5.081	4.10
9/17	1,090.67	137.66	1369.57	9.949	4.10
10/19	1,092.00	74.29	1191.87	16.044	4.10

Crest Toppling

Height from top layer to grade	Hz	1.27 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1750.49 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86

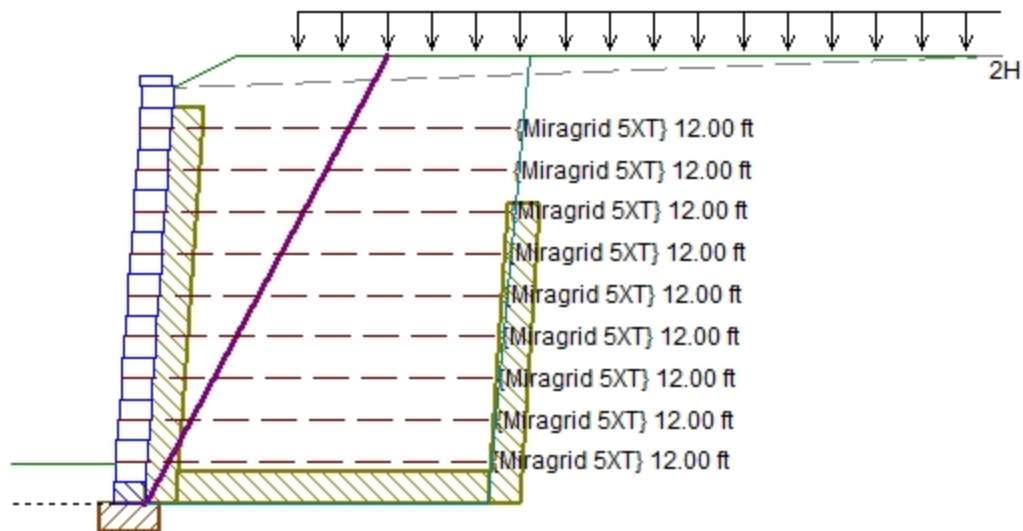


Vert. force from live load surcharge	Pq/V	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

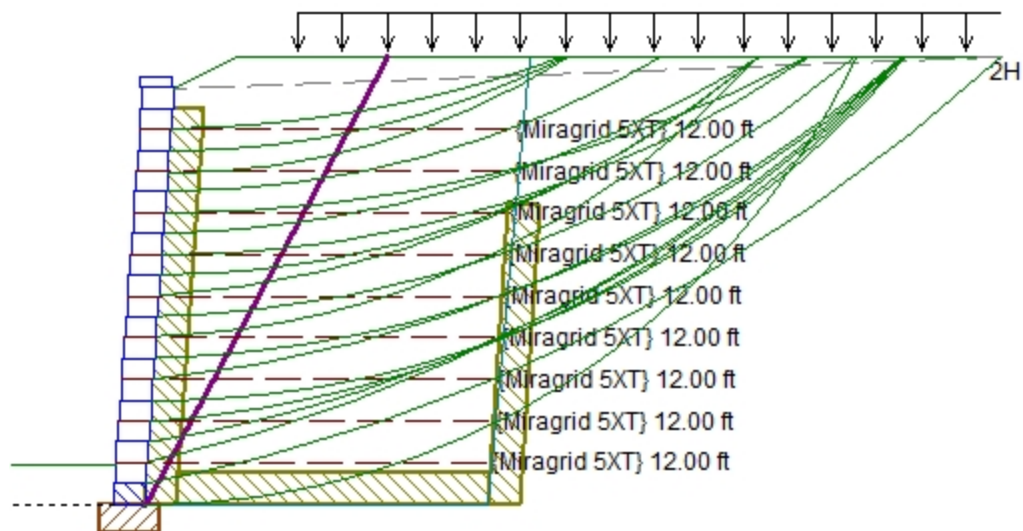


Section 25 Details

Section 25 Cross-section



Section 25 Static ICS Cross-section



Section 25 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1093.67 ft
Bottom Grade		1081.25 ft
Base of Section		1080.00 ft
Design Height	H	13.32 ft
Embedment Depth	Hemb	1.25 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.3300	Pass
L	Min. Reinforcement Length	4.0000	12.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.9011	Pass
La	Min. Anchorage Length	1.0000	5.3235	Pass
MinHemb	Minimum Embedment	12.0000	14.9567	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	14.03	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	3.46	Pass
FSSl	Base Sliding	1.50	1.81	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FSCs	FSpO	FSSl	FSto
1	1,081.33	2.75	41.07	1.63	2.33
2	1,082.67	2.80	41.27	1.65	2.87
3	1,084.00	2.72	35.47	1.57	2.53
4	1,085.33	2.64	35.57	1.59	2.95
5	1,086.67	2.55	38.43	1.64	2.45
6	1,088.00	2.84	35.33	1.64	2.78
7	1,089.33	2.79	38.20	1.57	2.51
8	1,090.67	2.62	32.58	1.59	2.35
9	1,092.00	2.66	38.33	1.62	2.97

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
1	7	1	1.63	Pass
9	8	3	1.67	Pass
8	10	2	1.76	Pass
3	8	5	1.78	Pass
6	8	4	1.86	Pass
5	8	7	1.92	Pass
1	8	6	2.00	Pass
2	5	9	2.11	Pass
2	8	8	2.19	Pass
4	5	11	2.33	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	14.34 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	11.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	4.38 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	6.39 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	13.32 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	4.38 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	11.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.41 ft	Eq. 7-4
Increase in height due to backslope	h	5.84 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	15.60 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	13.32 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.294	Eq. 7-43
Height above rein. area at int. failure plane	hint	4.44 ft	Eq. 7-26
Horz. influence distance	dint	6.85 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	11.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	6482.33 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1672.79 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	6482.33 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1672.79 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	8155.12 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	4.78 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	7.17 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	12.33 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	12.50 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1244.56 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	21374.72 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1387.03 lb/ft	Eq. 7-31
Base sliding resistance	Rs	14781.65 lb/ft	Eq. 7-32
Base sliding	FSsl	1.813	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1244.56 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	21374.72 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1387.03 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	6.44 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	7.44 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.26 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	8.45 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	13.00 ft	Eq. 7-36A3
Resisting moment	Mr	148737.81 lb	Eq. 7-34
Driving moment	Mo	42969.37 lb	Eq. 7-38
Overturning	FSot	3.461	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	9.29 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.35 ft	Eq. 7-41
Applied bearing pressure	Qa	2640.69 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	37046.20 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	14.029	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,081.33	1999.00	2.00	12.32	1120.95
2/4	1,082.67	1999.00	1.33	10.65	659.40
3/6	1,084.00	1999.00	1.33	9.32	589.08
4/8	1,085.33	1999.00	1.33	7.98	518.76
5/10	1,086.67	1999.00	1.33	6.65	448.44
6/12	1,088.00	1999.00	1.33	5.32	378.12
7/14	1,089.33	1999.00	1.33	3.98	307.80
8/16	1,090.67	1999.00	1.33	2.65	140.78
9/18	1,092.00	1999.00	1.98	0.99	77.87

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,081.33	1.783	1.000	1.000
2/4	1,082.67	3.032	1.000	1.000
3/6	1,084.00	3.393	1.000	1.000
4/8	1,085.33	3.853	1.000	1.000
5/10	1,086.67	4.458	1.000	1.000
6/12	1,088.00	5.287	1.000	1.000
7/14	1,089.33	6.495	1.000	1.000
8/16	1,090.67	14.200	1.000	0.010
9/18	1,092.00	25.671	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,081.33	1120.95	18913.59	10.37	13.00
2/4	1,082.67	659.40	15941.78	9.74	11.67
3/6	1,084.00	589.08	13205.90	9.11	10.34
4/8	1,085.33	518.76	10705.93	8.48	9.00
5/10	1,086.67	448.44	8441.88	7.85	7.67
6/12	1,088.00	378.12	6413.76	7.22	6.34
7/14	1,089.33	307.80	4621.55	6.59	5.00
8/16	1,090.67	140.78	3065.27	5.95	3.67
9/18	1,092.00	77.87	1744.91	5.32	2.34

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,081.33	16.873
2/4	1,082.67	24.176
3/6	1,084.00	22.418
4/8	1,085.33	20.638
5/10	1,086.67	18.825
6/12	1,088.00	16.962
7/14	1,089.33	15.015
8/16	1,090.67	21.774
9/18	1,092.00	22.408

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,081.33	5320.97	0.00	1515.55	0.00
2/4	1,082.67	4285.71	0.00	1360.15	0.00
3/6	1,084.00	3362.34	0.00	1204.75	0.00

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
4/8	1,085.33	2550.86	0.00	1049.35	0.00
5/10	1,086.67	1851.27	0.00	893.95	0.00
6/12	1,088.00	1263.57	0.00	738.54	0.00
7/14	1,089.33	787.77	0.00	583.14	0.00
8/16	1,090.67	423.85	0.00	427.74	0.00
9/18	1,092.00	171.82	0.00	272.34	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,081.33	0.00	0.00	6836.52	0.00
2/4	1,082.67	0.00	0.00	5645.86	0.00
3/6	1,084.00	0.00	0.00	4567.09	0.00
4/8	1,085.33	0.00	0.00	3600.21	0.00
5/10	1,086.67	0.00	0.00	2745.22	0.00
6/12	1,088.00	0.00	0.00	2002.12	0.00
7/14	1,089.33	0.00	0.00	1370.91	0.00
8/16	1,090.67	0.00	0.00	851.59	0.00
9/18	1,092.00	0.00	0.00	444.15	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,081.33	10005.59	17872.04	1870.01	1.737
2/4	1,082.67	8972.57	15883.65	1762.09	1.901
3/6	1,084.00	7939.55	13895.25	1654.17	2.101
4/8	1,085.33	6906.53	11906.86	1546.25	2.348
5/10	1,086.67	5873.50	9918.47	1438.33	2.663
6/12	1,088.00	4840.48	7930.08	1330.41	3.082
7/14	1,089.33	3807.46	5941.69	1222.49	3.669
8/16	1,090.67	2774.44	3953.30	1114.57	4.567
9/18	1,092.00	1741.42	1964.91	1006.65	6.187

Connection Strength

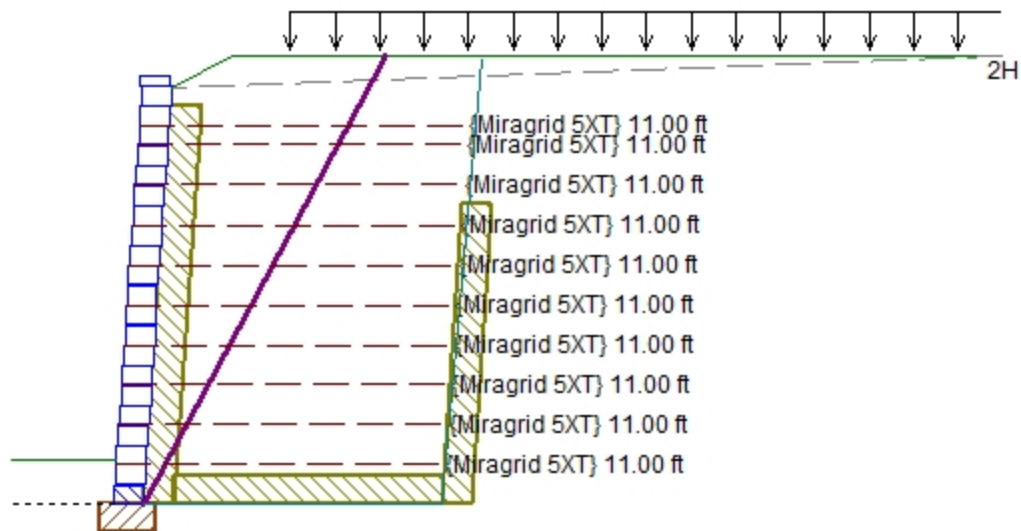
Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,081.33	1120.95	2378.90	2.122	3.92
2/4	1,082.67	659.40	2314.91	3.511	3.92
3/6	1,084.00	589.08	2250.91	3.821	3.92
4/8	1,085.33	518.76	2086.08	4.021	3.92
5/10	1,086.67	448.44	1908.38	4.256	3.92
6/12	1,088.00	378.12	1730.69	4.577	3.92
7/14	1,089.33	307.80	1552.99	5.046	3.92
8/16	1,090.67	140.78	1375.29	9.769	3.92
9/18	1,092.00	77.87	1197.60	15.380	3.92

Crest Toppling

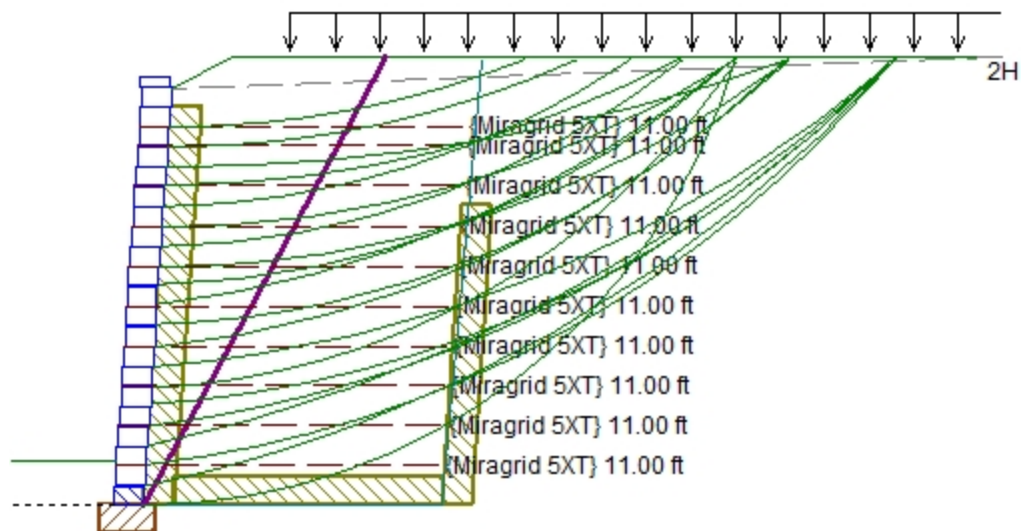
Height from top layer to grade	H _z	1.32 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1672.79 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86
Vert. force from live load surcharge	PqIV	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X _w	0.53 ft	Eq. 7-90
Resisting moment	M _r	0.00 lb	Eq. 7-89
Overturning moment	M _o	0.00 lb	Eq. 7-91
Crest toppling	FS _{ct}	0.000	Eq. 7-88

Section 26 Details

Section 26 Cross-section



Section 26 Static ICS Cross-section



Section 26 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1081.48 ft
Base of Section		1080.00 ft
Design Height	H	13.90 ft
Embedment Depth	Hemb	1.48 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	11.8700	Pass
L	Min. Reinforcement Length	4.0000	11.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.7912	Pass
La	Min. Anchorage Length	1.0000	4.0082	Pass
MinHemb	Minimum Embedment	12.0000	17.7047	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	2.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	10.70	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	2.71	Pass
FSsl	Base Sliding	1.50	1.59	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,081.33	2.66	38.33	1.62	2.97
2	1,082.67	2.62	32.58	1.59	2.35
3	1,084.00	2.79	38.20	1.57	2.51
4	1,085.33	3.07	26.94	1.60	3.06
5	1,086.67	2.94	29.76	1.64	2.62
6	1,088.00	2.81	41.15	1.60	2.49
7	1,089.33	2.72	35.47	1.57	2.53
8	1,090.67	2.80	41.27	1.65	2.87
9	1,092.00	2.75	41.07	1.63	2.33
10	1,092.67	2.84	35.33	1.64	2.78

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
4	8	3	1.54	Pass
1	5	1	1.56	Pass
7	8	2	1.62	Pass
5	8	5	1.64	Pass
9	8	4	1.72	Pass
2	5	7	1.76	Pass
3	8	6	1.85	Pass
5	6	9	1.89	Pass
4	8	8	2.01	Pass
6	5	11	2.09	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	14.92 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	10.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	4.19 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	6.97 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	13.90 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	4.19 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	10.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.37 ft	Eq. 7-4
Increase in height due to backslope	h	5.31 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	15.10 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	13.90 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.293	Eq. 7-43
Height above rein. area at int. failure plane	hint	4.63 ft	Eq. 7-26
Horz. influence distance	dint	7.13 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	10.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	7098.53 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1750.49 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	7098.53 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1750.49 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	8849.02 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	4.97 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	7.46 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	11.35 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	11.52 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1106.99 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	20437.72 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1249.46 lb/ft	Eq. 7-31
Base sliding resistance	Rs	14083.82 lb/ft	Eq. 7-32
Base sliding	FSsl	1.592	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1106.99 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	20437.72 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1249.46 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	5.96 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	6.98 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.31 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	8.00 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	12.04 ft	Eq. 7-36A3
Resisting moment	Mr	131230.64 lb	Eq. 7-34
Driving moment	Mo	48369.35 lb	Eq. 7-38
Overturning	FSot	2.713	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	7.64 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.68 ft	Eq. 7-41
Applied bearing pressure	Qa	3038.25 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	32502.03 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	10.698	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/2	1,081.33	1999.00	2.00	12.90	1163.46
2/4	1,082.67	1999.00	1.33	11.24	688.03
3/6	1,084.00	1999.00	1.33	9.90	617.94
4/8	1,085.33	1999.00	1.33	8.57	547.85
5/10	1,086.67	1999.00	1.33	7.24	477.75
6/12	1,088.00	1999.00	1.33	5.90	407.66
7/14	1,089.33	1999.00	1.33	4.57	337.57
8/16	1,090.67	1999.00	1.33	3.24	176.13
9/18	1,092.00	1999.00	1.00	2.07	81.61
10/19	1,092.67	1999.00	1.57	0.78	48.58

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/2	1,081.33	1.718	1.000	1.000
2/4	1,082.67	2.905	1.000	1.000
3/6	1,084.00	3.235	1.000	1.000
4/8	1,085.33	3.649	1.000	1.000
5/10	1,086.67	4.184	1.000	1.000
6/12	1,088.00	4.904	1.000	1.000
7/14	1,089.33	5.922	1.000	1.000
8/16	1,090.67	11.349	1.000	0.062
9/18	1,092.00	24.496	1.000	0.000
10/19	1,092.67	41.146	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/2	1,081.33	1163.46	17859.26	9.37	13.59
2/4	1,082.67	688.03	15022.67	8.74	12.26
3/6	1,084.00	617.94	12422.00	8.11	10.92
4/8	1,085.33	547.85	10057.25	7.48	9.59
5/10	1,086.67	477.75	7928.42	6.85	8.26
6/12	1,088.00	407.66	6035.51	6.22	6.92
7/14	1,089.33	337.57	4378.53	5.59	5.59
8/16	1,090.67	176.13	2957.46	4.95	4.26
9/18	1,092.00	81.61	1772.32	4.32	2.92
10/19	1,092.67	48.58	1268.22	4.01	2.26

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/2	1,081.33	15.350
2/4	1,082.67	21.834
3/6	1,084.00	20.102
4/8	1,085.33	18.358
5/10	1,086.67	16.595
6/12	1,088.00	14.805
7/14	1,089.33	12.971
8/16	1,090.67	16.791
9/18	1,092.00	21.718
10/19	1,092.67	26.104

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/2	1,081.33	5811.04	0.00	1583.81	0.00
2/4	1,082.67	4726.64	0.00	1428.41	0.00
3/6	1,084.00	3754.13	0.00	1273.00	0.00
4/8	1,085.33	2893.50	0.00	1117.60	0.00
5/10	1,086.67	2144.77	0.00	962.20	0.00
6/12	1,088.00	1507.93	0.00	806.80	0.00
7/14	1,089.33	982.97	0.00	651.40	0.00
8/16	1,090.67	569.91	0.00	496.00	0.00
9/18	1,092.00	268.73	0.00	340.59	0.00
10/19	1,092.67	160.11	0.00	262.89	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/2	1,081.33	0.00	0.00	7394.85	0.00
2/4	1,082.67	0.00	0.00	6155.05	0.00
3/6	1,084.00	0.00	0.00	5027.13	0.00
4/8	1,085.33	0.00	0.00	4011.11	0.00
5/10	1,086.67	0.00	0.00	3106.97	0.00
6/12	1,088.00	0.00	0.00	2314.72	0.00
7/14	1,089.33	0.00	0.00	1634.37	0.00
8/16	1,090.67	0.00	0.00	1065.90	0.00
9/18	1,092.00	0.00	0.00	609.33	0.00
10/19	1,092.67	0.00	0.00	423.00	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/2	1,081.33	9506.24	17048.45	1917.41	1.545
2/4	1,082.67	8566.74	15240.06	1809.49	1.686
3/6	1,084.00	7627.23	13431.67	1701.57	1.856
4/8	1,085.33	6687.72	11623.28	1593.65	2.065
5/10	1,086.67	5748.22	9814.88	1485.73	2.328
6/12	1,088.00	4808.71	8006.49	1377.81	2.673
7/14	1,089.33	3869.20	6198.10	1269.89	3.144
8/16	1,090.67	2929.70	4389.71	1161.97	3.839
9/18	1,092.00	1990.19	2581.32	1054.05	4.996
10/19	1,092.67	1520.44	1677.12	1000.09	5.959

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/2	1,081.33	1163.46	2407.01	2.069	4.09
2/4	1,082.67	688.03	2343.02	3.405	4.09
3/6	1,084.00	617.94	2279.02	3.688	4.09
4/8	1,085.33	547.85	2164.13	3.950	4.09
5/10	1,086.67	477.75	1986.43	4.158	4.09
6/12	1,088.00	407.66	1808.74	4.437	4.09
7/14	1,089.33	337.57	1631.04	4.832	4.09
8/16	1,090.67	176.13	1453.34	8.251	4.09
9/18	1,092.00	81.61	1275.65	15.632	4.09
10/19	1,092.67	48.58	1186.80	24.428	4.09

Crest Toppling

Height from top layer to grade	Hz	1.24 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1750.49 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86

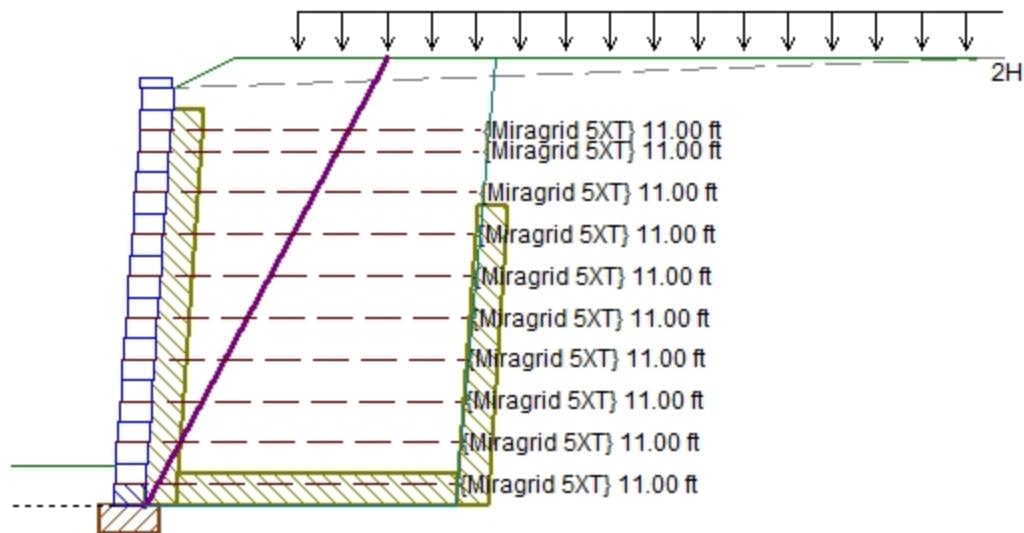


Vert. force from live load surcharge	Pq/V	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

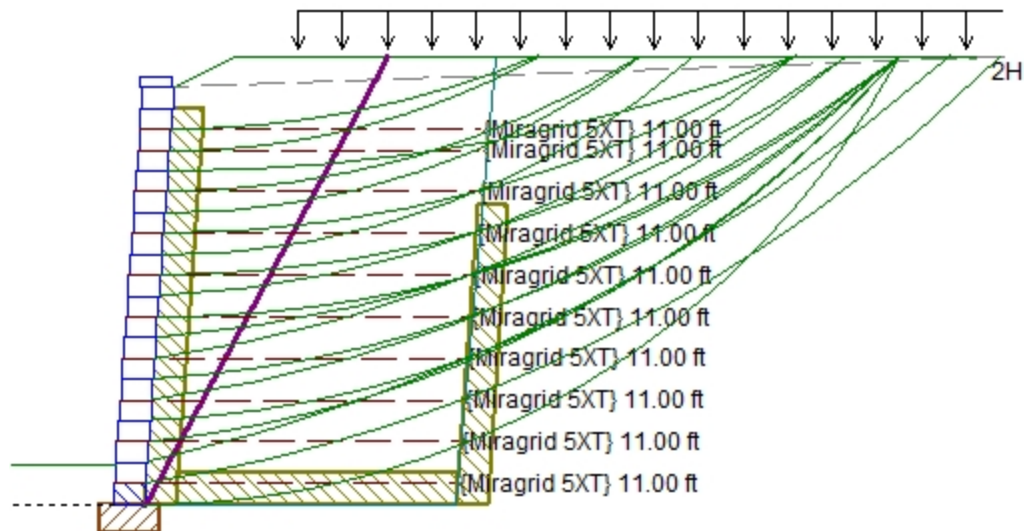


Section 27 Details

Section 27 Cross-section



Section 27 Static ICS Cross-section



Section 27 Cross-section Details

Upper Slope Angle	β	27.00 °
Crest Offset		2.00 ft
Live Load	ql	250 lb/ft ²
Live Offset	qlofs	4.00 ft
Dead Load	qd	0 lb/ft ²
Dead Offset	qdofs	0.00 ft
Top of Section		1094.33 ft
Bottom Grade		1081.93 ft
Base of Section		1080.67 ft
Design Height	H	13.33 ft
Embedment Depth	Hemb	1.27 ft

* Embedment is included in Bearing Capacity

Empirical Checks

Check	Description	Min. Requirement	Result	Status
Hemb	Minimum Embedment %	10.0000	10.5000	Pass
L	Min. Reinforcement Length	4.0000	11.0000	Pass
L/H Ratio	Min. L/H Ratio	0.7000	0.8250	Pass
La	Min. Anchorage Length	1.0000	4.3235	Pass
MinHemb	Minimum Embedment	12.0000	15.2047	Pass
Rs	Max. Reinforcement Separation	0.0000	1.3333	Pass
RsBottom	Max. multiple of Hu at bottom	0.0000	1.0000	Pass
RsTop	Max. multiple of Hu at top	0.0000	2.0000	Pass

External Checks**Static**

Check	Description	Min. Requirement	Result	Status
FSbc	Bearing Capacity	2.00	11.56	Pass
FSct	Crest Toppling	1.50	-0.01	Fail
FSot	Overturning	2.00	2.92	Pass
FSsl	Base Sliding	1.50	1.66	Pass

Internal and Local Checks**Static**

Layer	Elevation (ft)	FScs	FSpO	FSsl	FSto
1	1,081.33	2.84	35.33	1.64	2.78
2	1,082.67	2.75	41.07	1.63	2.33
3	1,084.00	2.80	41.27	1.64	2.45
4	1,085.33	3.15	24.28	1.54	2.61
5	1,086.67	2.64	35.57	1.59	2.95
6	1,088.00	2.55	38.43	1.65	2.51
7	1,089.33	2.72	38.20	1.62	3.06
8	1,090.67	2.79	32.58	1.59	2.97
9	1,092.00	2.62	38.33	1.57	2.35
10	1,092.67	2.66	26.94	1.60	2.53

Internal Compound Stability**10 Lowest Static**

Radius Point	Entry Point	Exit Point	Result	Status
6	10	2	1.54	Pass
4	8	4	1.62	Pass
1	8	1	1.71	Pass
10	9	3	1.73	Pass
6	8	6	1.74	Pass
2	8	5	1.81	Pass
7	7	8	1.89	Pass
3	8	7	1.96	Pass
1	8	10	2.04	Pass
5	8	9	2.17	Pass

Static Calculations**General Equations**

Increase in height due to backslope	hs	1.02 ft	Eq. 7-7
Width of rein. layer for internal sliding	L"s	0.07 ft	Eq. 7-8
Equivalent slope at back of rein. zone	β_{ext}	0.00 °	Eq. 7-9
Height of back of wall for ext. stability	Hext	14.35 ft	Eq. 7-10
Horizontal width of rein. zone at backslope	L β	10.12 ft	Eq. 7-11
Slope for internal analysis	β_{int}	4.37 °	Eq. 7-46
Elevation of influence of live load	Eqlinfl	6.40 ft	Eq. 7-93
Elevation of influence of dead load	Eqdinfl	13.33 ft	Eq. 7-94
External interface friction angle	δ_e	0.00 °	Eq. 7-2
Internal interface friction angle	δ_i	4.37 °	Eq. 7-44
External failure plane	α_e	55.00 °	Eq. 5-5
Internal failure plane	α_i	61.50 °	Eq. 7-50
Width of reinforced zone	L'	10.05 ft	Eq. 7-3
Increase in width of reinforced zone due to β	L"	0.37 ft	Eq. 7-4
Increase in height due to backslope	h	5.31 ft	Eq. 7-5
Increase in height due to backslope at L β	hmax	14.81 ft	Eq. 7-6
Maximum height of slope influence	hmaxint	13.33 ft	Eq. 7-45
External active earth pressure	Kaext	0.466	Eq. 7-1
Internal active earth pressure	Kaint	0.294	Eq. 7-43
Height above rein. area at int. failure plane	hint	4.44 ft	Eq. 7-26
Horz. influence distance	dint	6.86 ft	Eq. 7-27
Distance dead load applied for broken back	L β qd	10.12 ft	Eq. 7-29
Earth pressure from soil weight	Ps	6482.33 lb/ft	Eq. 7-12
Force of uniform surcharge	Pq	1672.79 lb/ft	Eq. 7-13
Horz. component of Ps	PsH	6482.33 lb/ft	Eq. 7-14
Horz. force of dead load surcharge	PqdH	0.00 lb/ft	Eq. 7-15
Horz. force of live load surcharge	PqlH	1672.79 lb/ft	Eq. 7-16
Horz. component of active earth force	PaH	8155.12 lb/ft	Eq. 7-17
Resisting moment arm for PsH	Ys	4.78 ft	Eq. 7-18
Resisting moment arm for PqH	Yq	7.18 ft	Eq. 7-19
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-20
Vert. force of dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-21
Vert. force of live load surcharge	PqlV	0.00 lb/ft	Eq. 7-22
Vert. component of active earth force	PaV	0.00 lb/ft	Eq. 7-23
Resisting moment arm for PsV	Xs	11.33 ft	Eq. 7-24
Resisting moment arm for PqV	Xq	11.50 ft	Eq. 7-25

Base Sliding

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1106.99 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	19599.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1249.46 lb/ft	Eq. 7-31
Base sliding resistance	Rs	13539.79 lb/ft	Eq. 7-32
Base sliding	FSsl	1.660	Eq. 7-33

Overturning

Weight of soil above wall	Wr β 1	137.57 lb/ft	Eq. 7-31A1
Weight of soil above wall	Wr β 2	1106.99 lb/ft	Eq. 7-31A2
Weight of soil above wall	Wr β 3	4.90 lb/ft	Eq. 7-31A3
Dead load over reinforced zone	WGTdl	0.00 lb/ft	Eq.
Weight of reinforced mass	Wri	19599.99 lb/ft	Eq. 7-30
Weight of soil above wall	Wr β	1249.46 lb/ft	Eq. 7-31
Resisting moment arm for rein. zone	Xri	5.94 ft	Eq. 7-35
Resisting moment arm for surcharge	Xq β	6.94 ft	Eq. 7-37
Resisting moment arm in top slope	Xr β 1	3.27 ft	Eq. 7-36A1
Resisting moment arm in top slope	Xr β 2	7.96 ft	Eq. 7-36A2
Resisting moment arm in top slope	Xr β 3	12.00 ft	Eq. 7-36A3
Resisting moment	Mr	125795.13 lb	Eq. 7-34
Driving moment	Mo	43016.57 lb	Eq. 7-38
Overturning	FSot	2.924	Eq. 7-39

Bearing Capacity

Equivalent bearing area	B	7.94 ft	Eq. 7-40
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Eccentricity of bearing force	e	1.53 ft	Eq. 7-41
Applied bearing pressure	Qa	2818.31 lb/ft ²	Eq. 7-42
Ultimate bearing pressure	Qult	32568.76 lb/ft ²	Eq. 12-10
Bearing capacity	FSbc	11.556	Eq. 12-11

Tensile Overstress

Layer/ Course	Elevation (ft)	LTDS (lb/ft) [2-3]	Acn (ft) [7-54..57]	Dn (ft) [7-58..60]	Fgn (lb/ft) [7-61]
1/1	1,081.33	1999.00	1.33	12.67	765.71
2/3	1,082.67	1999.00	1.33	11.33	695.39
3/5	1,084.00	1999.00	1.33	10.00	625.07
4/7	1,085.33	1999.00	1.33	8.67	554.75
5/9	1,086.67	1999.00	1.33	7.33	484.43
6/11	1,088.00	1999.00	1.33	6.00	414.11
7/13	1,089.33	1999.00	1.33	4.67	343.79
8/15	1,090.67	1999.00	1.33	3.33	183.08
9/17	1,092.00	1999.00	1.00	2.17	85.70
10/18	1,092.67	1999.00	1.67	0.83	54.94

Layer/ Course	Elevation (ft)	FSto [7-62]	qdfn []	qlfn []
1/1	1,081.33	2.611	1.000	1.000
2/3	1,082.67	2.875	1.000	1.000
3/5	1,084.00	3.198	1.000	1.000
4/7	1,085.33	3.603	1.000	1.000
5/9	1,086.67	4.126	1.000	1.000
6/11	1,088.00	4.827	1.000	1.000
7/13	1,089.33	5.815	1.000	1.000
8/15	1,090.67	10.919	1.000	0.075
9/17	1,092.00	23.325	1.000	0.000
10/18	1,092.67	36.386	1.000	0.000

Pullout

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	ACn (lb/ft) [7-63]	La (ft) [7-64]	dn (ft) [7-65]
1/1	1,081.33	765.71	18591.85	9.68	13.69
2/3	1,082.67	695.39	15687.71	9.05	12.35
3/5	1,084.00	625.07	13019.50	8.42	11.02
4/7	1,085.33	554.75	10587.21	7.79	9.69
5/9	1,086.67	484.43	8390.84	7.16	8.35
6/11	1,088.00	414.11	6430.39	6.53	7.02
7/13	1,089.33	343.79	4705.86	5.90	5.69
8/15	1,090.67	183.08	3217.25	5.27	4.35
9/17	1,092.00	85.70	1964.57	4.64	3.02
10/18	1,092.67	54.94	1426.69	4.32	2.35

Layer/ Course	Elevation (ft)	FSpO [7-66]
1/1	1,081.33	24.280
2/3	1,082.67	22.560
3/5	1,084.00	20.829
4/7	1,085.33	19.085
5/9	1,086.67	17.321
6/11	1,088.00	15.528
7/13	1,089.33	13.688
8/15	1,090.67	17.573
9/17	1,092.00	22.923
10/18	1,092.67	25.969

Internal Sliding

Layer/ Course	Elevation (ft)	PsH (lb/ft) [7-67]	PqdH (lb/ft) [7-68]	PqIH (lb/ft) [7-69]	PsV (lb/ft) [7-70]
1/1	1,081.33	5894.11	0.00	1595.09	0.00
2/3	1,082.67	4801.59	0.00	1439.69	0.00
3/5	1,084.00	3820.95	0.00	1284.28	0.00
4/7	1,085.33	2952.21	0.00	1128.88	0.00
5/9	1,086.67	2195.35	0.00	973.48	0.00
6/11	1,088.00	1550.39	0.00	818.08	0.00
7/13	1,089.33	1017.31	0.00	662.68	0.00
8/15	1,090.67	596.13	0.00	507.28	0.00
9/17	1,092.00	286.83	0.00	351.87	0.00
10/18	1,092.67	174.14	0.00	274.17	0.00

Layer/ Course	Elevation (ft)	PqdV (lb/ft) [7-71]	PqIV (lb/ft) [7-72]	PaH (lb/ft) [7-73]	PaV (lb/ft) [7-74]
1/1	1,081.33	0.00	0.00	7489.20	0.00
2/3	1,082.67	0.00	0.00	6241.27	0.00
3/5	1,084.00	0.00	0.00	5105.24	0.00
4/7	1,085.33	0.00	0.00	4081.09	0.00
5/9	1,086.67	0.00	0.00	3168.83	0.00
6/11	1,088.00	0.00	0.00	2368.47	0.00
7/13	1,089.33	0.00	0.00	1679.99	0.00
8/15	1,090.67	0.00	0.00	1103.40	0.00
9/17	1,092.00	0.00	0.00	638.70	0.00
10/18	1,092.67	0.00	0.00	448.31	0.00

Layer/ Course	Elevation (ft)	R's (lb/ft) [7-75]	W'ri (lb/ft) [7-76]	Vu (lb/ft) [7-77]	FSsl [7-78]
1/1	1,081.33	9574.44	17179.72	1925.25	1.536
2/3	1,082.67	8634.93	15371.33	1817.33	1.675
3/5	1,084.00	7695.43	13562.93	1709.41	1.842
4/7	1,085.33	6755.92	11754.54	1601.49	2.048
5/9	1,086.67	5816.41	9946.15	1493.56	2.307
6/11	1,088.00	4876.91	8137.76	1385.64	2.644
7/13	1,089.33	3937.40	6329.37	1277.72	3.104
8/15	1,090.67	2997.89	4520.98	1169.80	3.777
9/17	1,092.00	2058.39	2712.59	1061.88	4.885
10/18	1,092.67	1588.63	1808.39	1007.92	5.792

Connection Strength

Layer/ Course	Elevation (ft)	Fgn (lb/ft) [7-61]	Tconn (lb/ft) [7-79]	FScs [7-80]	hinflmax (ft) [7-92]
1/1	1,081.33	765.71	2411.66	3.150	3.92
2/3	1,082.67	695.39	2347.66	3.376	3.92
3/5	1,084.00	625.07	2283.67	3.653	3.92
4/7	1,085.33	554.75	2177.03	3.924	3.92
5/9	1,086.67	484.43	1999.33	4.127	3.92
6/11	1,088.00	414.11	1821.63	4.399	3.92
7/13	1,089.33	343.79	1643.94	4.782	3.92
8/15	1,090.67	183.08	1466.24	8.009	3.92
9/17	1,092.00	85.70	1288.54	15.035	3.92
10/18	1,092.67	54.94	1199.70	21.837	3.92

Crest Toppling

Height from top layer to grade	Hz	1.33 ft	Eq.
Horz. component of Ps	PsH	0.00 lb/ft	Eq. 7-83
Uniform surcharge	PqH	1672.79 lb/ft	Eq. 7-84
Vert. component of Ps	PsV	0.00 lb/ft	Eq. 7-85
Vert. force from dead load surcharge	PqdV	0.00 lb/ft	Eq. 7-86



Vert. force from live load surcharge	Pq/V	0.00 lb/ft	Eq. 7-87
Resisting moment arm	X w	0.53 ft	Eq. 7-90
Resisting moment	Mr	0.00 lb	Eq. 7-89
Overturning moment	Mo	0.00 lb	Eq. 7-91
Crest toppling	FSct	0.000	Eq. 7-88

