DESIGN CALCULATIONS

For:	Ralph Rossi, P.E. Croton Riverside, LLC
By:	Robert C. Johnson, Jr., P.E. No. 101643 Submatrix LLC
Date:	September 25, 2024
Revised:	April 15, 2025 (Revision 2 Submittal)
Project:	Proposed Riverside Apartments Tensar Mesa® Retaining Wall System

Background

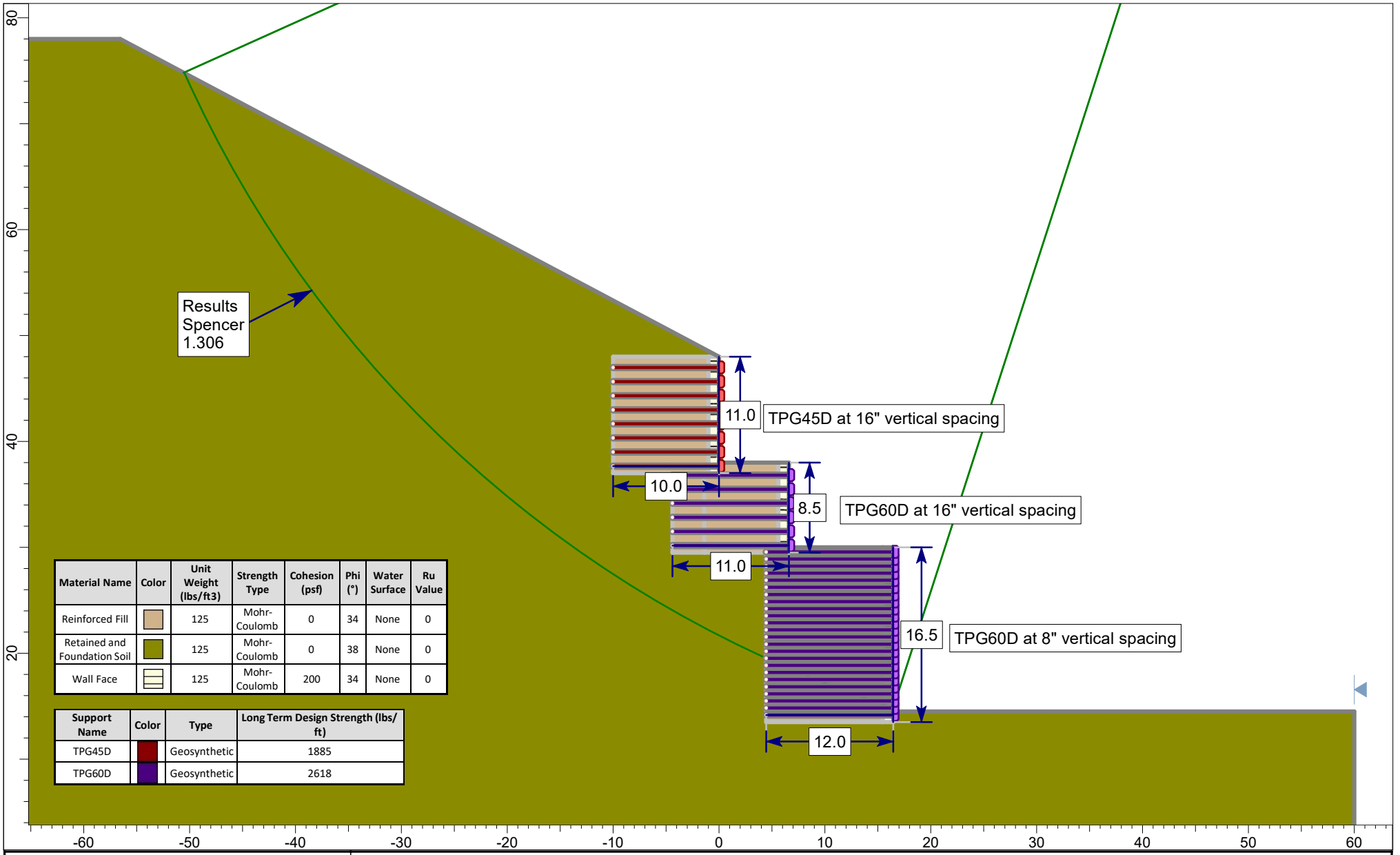
Per your request, the alignments of Walls 1 & 2 have been modified and Walls 5 & 6 have been added to the shop drawings. New calculations have been prepared for the added walls. Wall 1 has been extended beyond the shoring system, requiring a new calculation for the mechanically stabilized earth (MSE) portion. A compound stability analysis has been evaluated for the new tiered configuration formed by Walls 1, 2, and 5. All other previously submitted calculations are unchanged.

The accompanying mechanically stabilized earth (MSE) wall shop drawings detail the design criteria. **It is the Client's responsibility to ensure the Project Geotechnical Engineer reviews the assumptions and requirements defined in Sections 2 and 3 of the Design and Construction Requirements within the accompanying shop drawings.**

Calculation Index

4/15/2025

SEAL APPLIES TO ALL SHEETS WITHIN INDEX



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)	Water Surface	Ru Value
Reinforced Fill		125	Mohr-Coulomb	0	34	None	0
Retained and Foundation Soil		125	Mohr-Coulomb	0	38	None	0
Wall Face		125	Mohr-Coulomb	200	34	None	0

Support Name	Color	Type	Long Term Design Strength (lbs/ft)
TPG45D		Geosynthetic	1885
TPG60D		Geosynthetic	2618

submatrix®

SLIDEINTERPRET 9.034

Project	Proposed Riverside Apartments		
Analysis Description	Compound Stability Analysis - Walls 2, 1, and 5		
Drawn By	R. Johnson	*Company*	Submatrix LLC
Date	4/15/2025	*File Name*	Compound Stability.slmd

CONSULTING | DESIGN | ESTIMATING

NCMA DESIGN METHOD
Proposed Riverside Apartments

MSEW+: Update # 2024.01

PROJECT IDENTIFICATION

Title: Proposed Riverside Apartments
Project Number: 141140001
Client: Croton Riverside LLC
Designer: R. Johnson
Station Number: Wall 5 STA 1+00

Description:

Case 5; Design height = 10.67 ft.; 2H:1V backslope

Company's information:

Name: Submatrix LLC
Street: 303 Perimeter Center North
Suite 300
Atlanta, GA 30346
Telephone #: (770) 557-5015
Fax #:
E-Mail: robert@submatrix.co

File path and name: C:\Users\rjohn\OneDrive\Documents_Submatrix\Projects\P.....
.....4\Wall 5 Case 5.BENp

Original date and time of creating this file: April 2025

PROGRAM MODE:

ANALYSIS
of a SIMPLE STRUCTURE
using GEOGRID as reinforcing material.

SOIL DATA

REINFORCED SOIL

Unit weight, γ	125.0 lb/ft ³
Design value of internal angle of friction, ϕ	34.0 °

RETAINED SOIL

Unit weight, γ	125.0 lb/ft ³
Design value of internal angle of friction, ϕ	38.0 °

FOUNDATION SOIL (Considered as an equivalent uniform soil)

Equivalent unit weight, $\gamma_{equiv.}$	125.0 lb/ft ³
Equivalent internal angle of friction, $\phi_{equiv.}$	38.0 °
Equivalent cohesion, $c_{equiv.}$	0.0 lb/ft ²

Water table does not affect bearing capacity

LATERAL EARTH PRESSURE COEFFICIENTS

Ka (internal stability) = 0.4168
Inclination of internal slip plane, ψ = 47.95°.
Ka (external stability) = 0.3384

BEARING CAPACITY

Bearing capacity is controlled by general shear.
Bearing capacity factors (calculated by MSEW): Nc = 61.35   N γ= 78.02

SEISMICITY

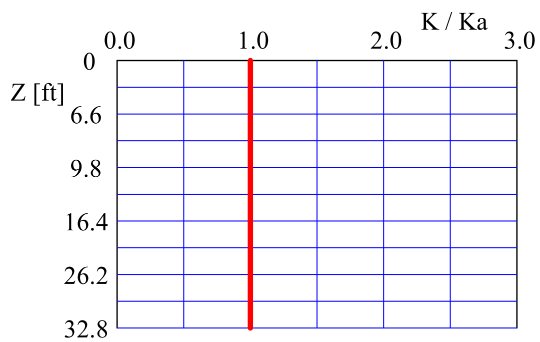
Not Applicable

INPUT DATA: Geogrids
(Analysis)

D A T A	Geogrid type #1	Geogrid type #2	Geogrid type #3	Geogrid type #4	Geogrid type #5
Tult [lb/ft]	3600.0	5000.0			
Durability reduction factor, RFd	1.15	1.15			
Installation-damage reduction factor, RFid	1.10	1.10			
Creep reduction factor, RFc	1.51	1.51	N/A	N/A	N/A
Fs-overall for strength	N/A	N/A			
Coverage ratio, Rc	1.000	1.000			
Cds = tan(ro) / tan(Phi.reinforced)	0.80	0.80			
Ci	0.80	0.80	N/A	N/A	N/A

Variation of Lateral Earth Pressure Coefficient With Depth

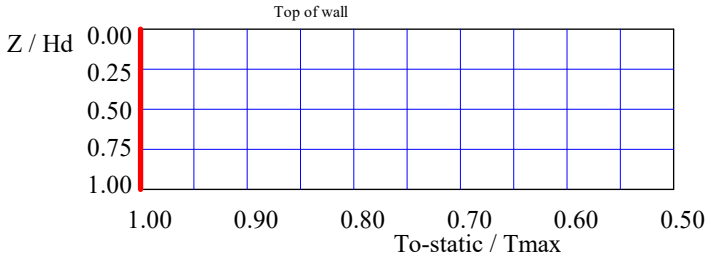
Z	K / Ka
0 ft	1.00
3.3 ft	1.00
6.6 ft	1.00
9.8 ft	1.00
13.1 ft	1.00
16.4 ft	1.00
19.7 ft	1.00



INPUT DATA: Facia and Connection (according to revised Demo 82) (Analysis)

FACIA type: Facing enabling frictional connection of reinforcement (e.g., modular concrete blocks, gabions)
Depth/height of block is 0.92/0.67 ft. Horizontal distance to Center of Gravity of block is: 0.41 ft.
Average unit weight of block is: γ_f = 82.00 lb/ft ^{3}

Z / Hd	To-static / Tmax
0.00	1.00
0.25	1.00
0.50	1.00
0.75	1.00
1.00	1.00



Peak Strength Criterion

Geogrid Type #1 Weight of blocks	(1) Tultconn (2)	Geogrid Type #2 Weight of blocks	Tultconn	Geogrid Type #3 Weight of blocks	Tultconn	Geogrid Type #4 Weight of blocks	Tultconn	Geogrid Type #5 Weight of blocks	Tultconn
0.0	1425.00	0.0	1462.00						
500.0	1607.00	500.0	1676.00	N/A		N/A		N/A	
1000.0	1789.00	1000.0	1889.00						
2000.0	2153.00	2000.0	2316.00						
2500.0	2334.00	2500.0	2529.00						

Service Strength Criterion @ 3/4"

Geogrid Type #1 Weight of blocks	(3) Tconn @ 3/4"	Geogrid Type #2 Weight of blocks	Tconn @ 3/4"	Geogrid Type #3 Weight of blocks	Tconn @ 3/4"	Geogrid Type #4 Weight of blocks	Tconn @ 3/4"	Geogrid Type #5 Weight of blocks	Tconn @ 3/4"
0.0	1425.00	0.0	1462.00						
500.0	1607.00	500.0	1676.00	N/A		N/A		N/A	
1000.0	1789.00	1000.0	1889.00						
2000.0	2153.00	2000.0	2316.00						
2500.0	2334.00	2500.0	2529.00						

Ultimate Strength Criterion

Weight of blocks	Vu (4)
0.0	260.00
100.0	637.00
500.0	1014.00
2000.0	1767.00
2500.0	2144.00

Service Strength Criterion

Weight of blocks	Vu' (5)
0.0	215.00
100.0	427.00
500.0	639.00
2000.0	1064.00
2500.0	1276.00

(1) (2) (3) (4) (5) Weight of blocks, Tultconn., Tconn@3/4", Vu and Vu' are in [lb/ft]

D A T A (for connection only)	Type #1	Type #2	Type #3	Type #4	Type #5
Product Name	TPG45D	TPG60D	N/A	N/A	N/A
Connection strength reduction factor, RFd	1.00	1.00	N/A	N/A	N/A
Creep reduction factor, RFc	1.00	1.00	N/A	N/A	N/A

INPUT DATA: Geometry and Surcharge loads (of a SIMPLE STRUCTURE)

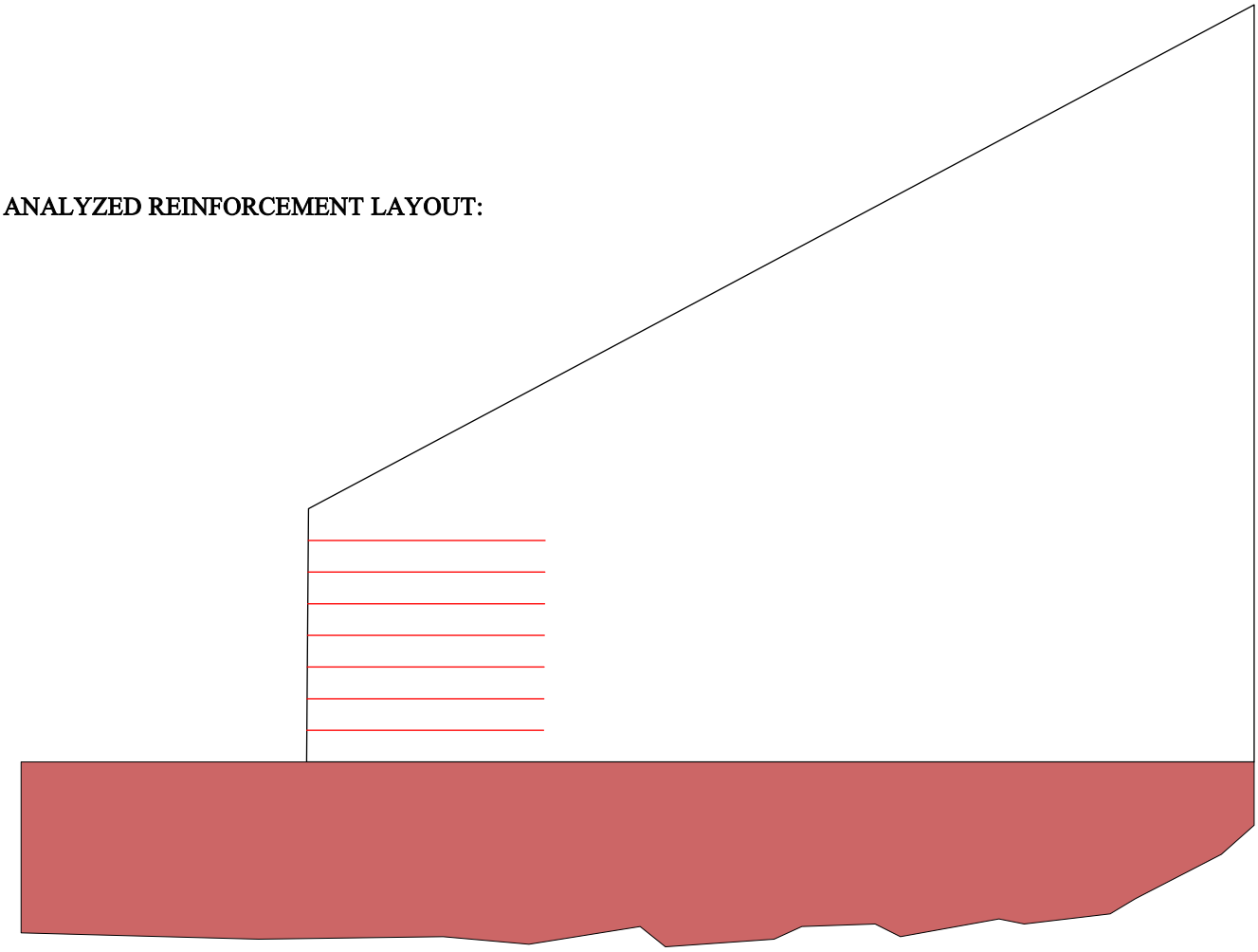
Design height, Hd 10.67 [ft] { Embedded depth is E = 0.00 ft, and height above top of finished bottom grade is H = 10.67 ft }

Soil in front of wall is Horizontal.

Batter, ω 0.5 [deg]
Backslope, β 28.0 [deg]
Backslope rise 30.0 [ft] Broken back equivalent angle, I = 28.00°

U N I F O R M S U R C H A R G E
Uniformly distributed dead load is 0.0 [lb/ft ²]

ANALYZED REINFORCEMENT LAYOUT:



SCALE:

0 2 4 6 8 10 [ft]

ANALYSIS: CALCULATED FACTORS (Static conditions)

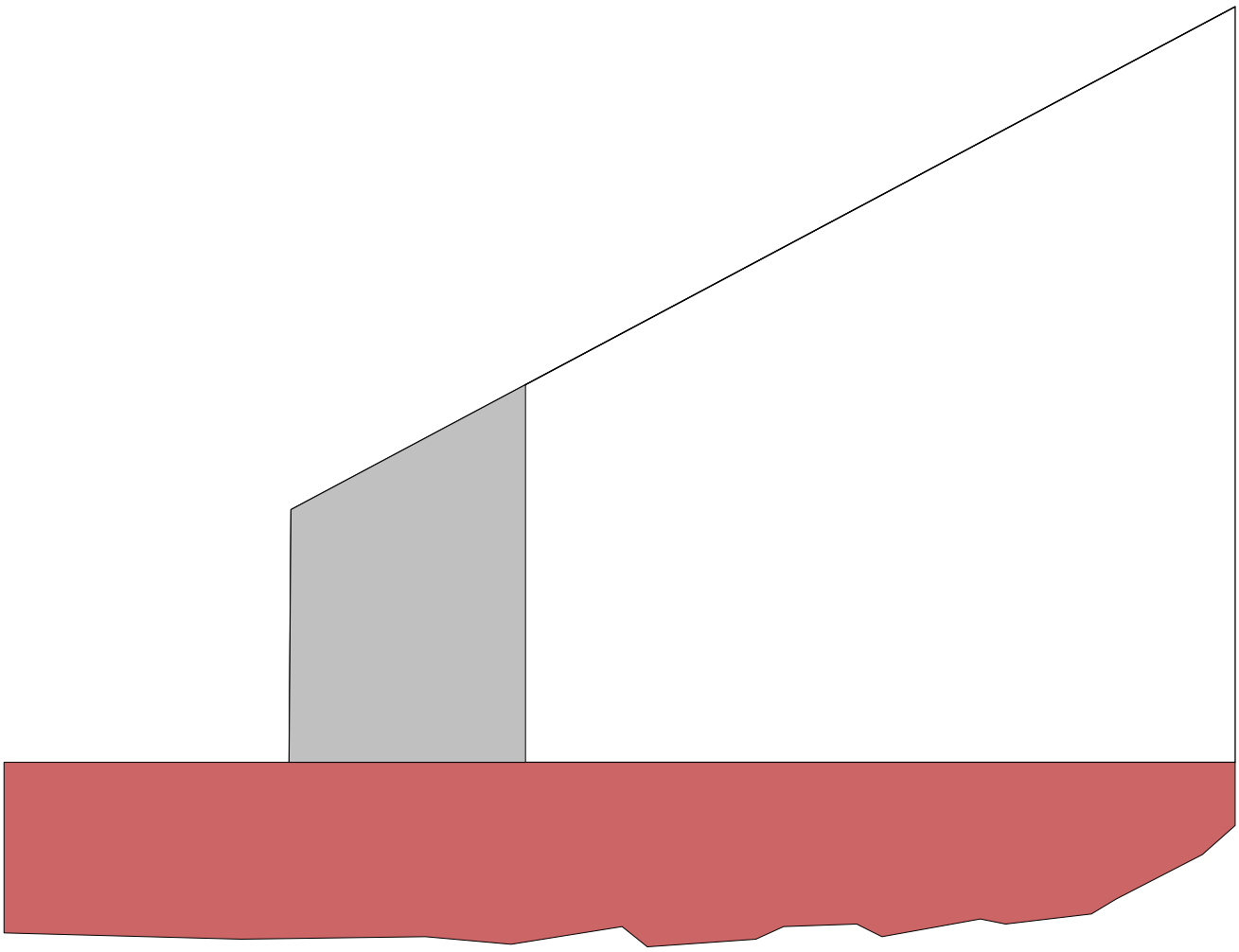
Bearing capacity, Fs = 21.06, Meyerhof stress = 1905 lb/ft².

Foundation Interface: Direct sliding, Fs = 2.490, Eccentricity, e/L = 0.0886, Fs-overturning = 3.93

GEOGRID				CONNECTION							
#	Elevation [ft]	Length [ft]	Type #	Fs @ 3/4" [service criterion]	Fs-peak [failure criterion]	Fs-overall [geogrid strength]	Geogrid strength Fs	Pullout resistance Fs	Direct sliding Fs	Eccentricity e/L	Product name
1	1.33	10.00	1	1.50	1.50	1.68	1.680	11.419	2.345	0.0648	TPG45D
2	2.66	10.00	1	2.56	2.56	2.93	2.929	15.489	2.559	0.0417	TPG45D
3	4.00	10.00	1	2.88	2.88	3.38	3.381	13.331	2.816	0.0188	TPG45D
4	5.33	10.00	1	3.34	3.34	4.01	4.010	11.146	3.103	-0.0043	TPG45D
5	6.66	10.00	1	3.98	3.98	4.88	4.884	8.727	3.447	-0.0290	TPG45D
6	8.00	10.00	1	4.99	4.99	6.28	6.283	6.046	3.866	-0.0582	TPG45D
7	9.33	10.00	1	5.06	5.06	6.52	6.522	2.053	4.360	-0.0984	TPG45D

BEARING CAPACITY for GIVEN LAYOUT

	STATIC	SEISMIC	UNITS
(Water table does not affect bearing capacity)			
Ultimate bearing capacity, q-ult	40120	N/A	[lb/ft ²]
Meyerhof stress, σ_V	1904.7	N/A	[lb/ft ²]
Eccentricity, e	0.89	N/A	[ft]
Eccentricity, e/L	0.089	N/A	
Fs calculated	21.06	N/A	
Base length	10.00	N/A	[ft]



SCALE:

0 2 4 6 8 10 [ft]

DIRECT SLIDING for GIVEN LAYOUT (for GEOGRID reinforcements)

Along reinforced and foundation soils interface: Fs-static = 2.490

#	Geogrid Elevation [ft]	Geogrid Length [ft]	Fs Static	Fs Seismic	Geogrid Type #	Product name
1	1.33	10.00	2.345	N/A	1	TPG45D
2	2.66	10.00	2.559	N/A	1	TPG45D
3	4.00	10.00	2.816	N/A	1	TPG45D
4	5.33	10.00	3.103	N/A	1	TPG45D
5	6.66	10.00	3.447	N/A	1	TPG45D
6	8.00	10.00	3.866	N/A	1	TPG45D
7	9.33	10.00	4.360	N/A	1	TPG45D

ECCENTRICITY for GIVEN LAYOUT

At interface with foundation: e/L static = 0.0886; Overturning: Fs-static = 3.93

#	Geogrid Elevation [ft]	Geogrid Length [ft]	e / L Static	e / L Seismic	Geogrid Type #	Product name
1	1.33	10.00	0.0648	N/A	1	TPG45D
2	2.66	10.00	0.0417	N/A	1	TPG45D
3	4.00	10.00	0.0188	N/A	1	TPG45D
4	5.33	10.00	-0.0043	N/A	1	TPG45D
5	6.66	10.00	-0.0290	N/A	1	TPG45D
6	8.00	10.00	-0.0582	N/A	1	TPG45D
7	9.33	10.00	-0.0984	N/A	1	TPG45D

Version MSEW+ Version MSEW+

RESULTS for STRENGTH

Live Load included in calculating Tmax

#	Geogrid Elevation [ft]	LTDS [lb/ft]	Tmax [lb/ft]	Tmd [lb/ft]	Specified minimum Fs-overall Static	Actual calculated Fs-overall Static	Specified minimum Fs-overall seismic	Actual calculated Fs-overall seismic	Product name
1	1.33	1884.7	1121.8	N/A	N/A	1.680	N/A	N/A	TPG45D
2	2.66	1884.7	643.5	N/A	N/A	2.929	N/A	N/A	TPG45D
3	4.00	1884.7	557.5	N/A	N/A	3.381	N/A	N/A	TPG45D
4	5.33	1884.7	469.9	N/A	N/A	4.010	N/A	N/A	TPG45D
5	6.66	1884.7	385.9	N/A	N/A	4.884	N/A	N/A	TPG45D
6	8.00	1884.7	299.9	N/A	N/A	6.283	N/A	N/A	TPG45D
7	9.33	1884.7	289.0	N/A	N/A	6.522	N/A	N/A	TPG45D

RESULTS for PULLOUT

Live Load included in calculating Tmax

#	Geogrid Elevation [ft]	Coverage Ratio	Tmax [lb/ft]	Tmd [lb/ft]	Le [ft]	La [ft]	Avail.Static Pullout, Pr [lb/ft]	Specified Static Fs	Actual Static Fs	Avail.Seism. Pullout, Pr [lb/ft]	Specified seismic Fs	Actual seismic Fs
1	1.33	1.000	1121.8	N/A	7.89	1.19	12810.2	N/A	11.419	N/A	N/A	N/A
2	2.66	1.000	643.5	N/A	6.70	2.38	9966.3	N/A	15.489	N/A	N/A	N/A
3	4.00	1.000	557.5	N/A	5.51	3.58	7432.1	N/A	13.331	N/A	N/A	N/A
4	5.33	1.000	469.9	N/A	4.32	4.77	5238.0	N/A	11.146	N/A	N/A	N/A
5	6.66	1.000	385.9	N/A	3.13	5.96	3367.9	N/A	8.727	N/A	N/A	N/A
6	8.00	1.000	299.9	N/A	1.93	7.15	1813.5	N/A	6.046	N/A	N/A	N/A
7	9.33	1.000	289.0	N/A	0.74	8.34	593.1	N/A	2.053	N/A	N/A	N/A

RESULTS for CONNECTION (static conditions)

Live Load included in calculating Tmax

#	Geogrid Elevation [ft]	Connection force, To [lb/ft]	FS - Bulging Peak	FS - Bulging Deformation	Available connection strength, Tcl-failure criterion [lb/ft]	Available connection strength, Tcs-service criterion [lb/ft]	Available Geogrid strength, Tavailable [lb/ft]	Fs-overall connection peak Specified	Fs-overall connection peak Actual	Fs-overall connection service Specified	Fs-overall connection service Actual	Fs-overall Geogrid strength Specified	Fs-overall Geogrid strength Actual	Product name
1	1.33	1122	0.00	0.00	1681	1681	1885	N/A	1.50	N/A	1.50	N/A	1.68	TPG45D
2	2.66	643	0.00	0.00	1644	1644	1885	N/A	2.56	N/A	2.56	N/A	2.93	TPG45D
3	4.00	558	0.00	0.00	1608	1608	1885	N/A	2.88	N/A	2.88	N/A	3.38	TPG45D
4	5.33	470	0.00	0.00	1571	1571	1885	N/A	3.34	N/A	3.34	N/A	4.01	TPG45D
5	6.66	386	0.00	0.00	1535	1535	1885	N/A	3.98	N/A	3.98	N/A	4.88	TPG45D
6	8.00	300	0.00	0.00	1498	1498	1885	N/A	4.99	N/A	4.99	N/A	6.28	TPG45D
7	9.33	289	5.93	3.98	1462	1462	1885	N/A	5.06	N/A	5.06	N/A	6.52	TPG45D

CONSULTING | DESIGN | ESTIMATING

NCMA DESIGN METHOD
Proposed Riverside Apartments

MSEW+: Update # 2024.01

PROJECT IDENTIFICATION

Title: Proposed Riverside Apartments
Project Number: 141140001
Client: Croton Riverside LLC
Designer: R. Johnson
Station Number: Wall 6 STA 1+22

Description:

Case 6; Design height = 14.0 ft.; Horizontal backslope; 100 psf maintenance live load

Company's information:

Name: Submatrix LLC
Street: 303 Perimeter Center North
Suite 300
Atlanta, GA 30346
Telephone #: (770) 557-5015
Fax #:
E-Mail: robert@submatrix.co

File path and name: C:\Users\rjohn\OneDrive\Documents_Submatrix\Projects\P.....
.....4\Wall 6 Case 6.BENp

Original date and time of creating this file: April 2015

PROGRAM MODE: ANALYSIS
of a SIMPLE STRUCTURE
using GEOGRID as reinforcing material.

SOIL DATA

REINFORCED SOIL

Unit weight, γ — 125.0 lb/ft ³
Design value of internal angle of friction, ϕ — 34.0 °

RETAINED SOIL

Unit weight, γ — 125.0 lb/ft ³
Design value of internal angle of friction, ϕ — 38.0 °

FOUNDATION SOIL (Considered as an equivalent uniform soil)

Equivalent unit weight, $\gamma_{equiv.}$ — 125.0 lb/ft ³
Equivalent internal angle of friction, $\phi_{equiv.}$ — 38.0 °
Equivalent cohesion, $c_{equiv.}$ — 0.0 lb/ft ²

Water table does not affect bearing capacity

LATERAL EARTH PRESSURE COEFFICIENTS

Ka (internal stability) = 0.2511
Inclination of internal slip plane, ψ = 58.19°.
Ka (external stability) = 0.2178

BEARING CAPACITY

Bearing capacity is controlled by general shear.
Bearing capacity factors (calculated by MSEW): Nc = 61.35 $N\gamma$= 78.02

SEISMICITY

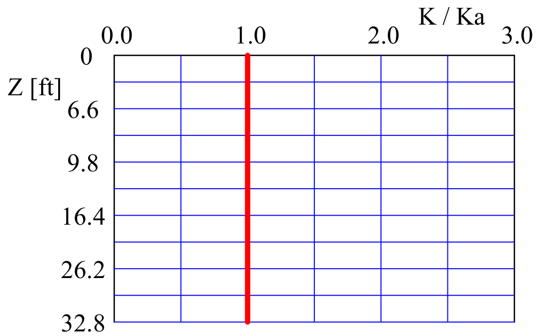
Not Applicable

INPUT DATA: Geogrids
(Analysis)

D A T A	Geogrid type #1	Geogrid type #2	Geogrid type #3	Geogrid type #4	Geogrid type #5
Tult [lb/ft]	3600.0	5000.0			
Durability reduction factor, RFd	1.15	1.15			
Installation-damage reduction factor, RFid	1.10	1.10			
Creep reduction factor, RFc	1.51	1.51	N/A	N/A	N/A
Fs-overall for strength	N/A	N/A			
Coverage ratio, Rc	1.000	1.000			
Cds = tan(ro) / tan(Phi.reinforced)	0.80	0.80			
Ci	0.80	0.80	N/A	N/A	N/A

Variation of Lateral Earth Pressure Coefficient With Depth

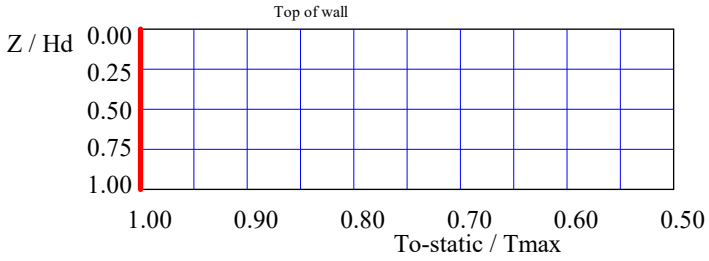
Z	K / Ka
0 ft	1.00
3.3 ft	1.00
6.6 ft	1.00
9.8 ft	1.00
13.1 ft	1.00
16.4 ft	1.00
19.7 ft	1.00



INPUT DATA: Facia and Connection (according to revised Demo 82) (Analysis)

FACIA type: Facing enabling frictional connection of reinforcement (e.g., modular concrete blocks, gabions)
Depth/height of block is 0.92/0.67 ft. Horizontal distance to Center of Gravity of block is: 0.41 ft.
Average unit weight of block is: γ_f = 82.00 lb/ft ^{3}

Z / Hd	To-static / Tmax
0.00	1.00
0.25	1.00
0.50	1.00
0.75	1.00
1.00	1.00



Peak Strength Criterion

Geogrid Type #1 Weight of blocks	(1) Tultconn	(2) Geogrid Type #2 Weight of blocks	Tultconn	Geogrid Type #3 Weight of blocks	Tultconn	Geogrid Type #4 Weight of blocks	Tultconn	Geogrid Type #5 Weight of blocks	Tultconn
0.0	1425.00	0.0	1462.00						
500.0	1607.00	500.0	1676.00	N/A		N/A		N/A	
1000.0	1789.00	1000.0	1889.00						
2000.0	2153.00	2000.0	2316.00						
2500.0	2334.00	2500.0	2529.00						

Service Strength Criterion @ 3/4"

Geogrid Type #1 Weight of blocks	(3) Tconn @ 3/4"	Geogrid Type #2 Weight of blocks	Tconn @ 3/4"	Geogrid Type #3 Weight of blocks	Tconn @ 3/4"	Geogrid Type #4 Weight of blocks	Tconn @ 3/4"	Geogrid Type #5 Weight of blocks	Tconn @ 3/4"
0.0	1425.00	0.0	1462.00						
500.0	1607.00	500.0	1676.00	N/A		N/A		N/A	
1000.0	1789.00	1000.0	1889.00						
2000.0	2153.00	2000.0	2316.00						
2500.0	2334.00	2500.0	2529.00						

Ultimate Strength Criterion

Weight of blocks	Vu (4)
0.0	260.00
100.0	637.00
500.0	1014.00
2000.0	1767.00
2500.0	2144.00

Service Strength Criterion

Weight of blocks	Vu' (5)
0.0	215.00
100.0	427.00
500.0	639.00
2000.0	1064.00
2500.0	1276.00

(1) (2) (3) (4) (5) Weight of blocks, Tultconn., Tconn@3/4", Vu and Vu' are in [lb/ft]

D A T A (for connection only)	Type #1	Type #2	Type #3	Type #4	Type #5
Product Name	TPG45D	TPG60D	N/A	N/A	N/A
Connection strength reduction factor, RFd	1.00	1.00	N/A	N/A	N/A
Creep reduction factor, RFc	1.00	1.00	N/A	N/A	N/A

INPUT DATA: Geometry and Surcharge loads (of a SIMPLE STRUCTURE)

Design height, Hd 14.00 [ft] { Embedded depth is E = 0.00 ft, and height above top of finished bottom grade is H = 14.00 ft }

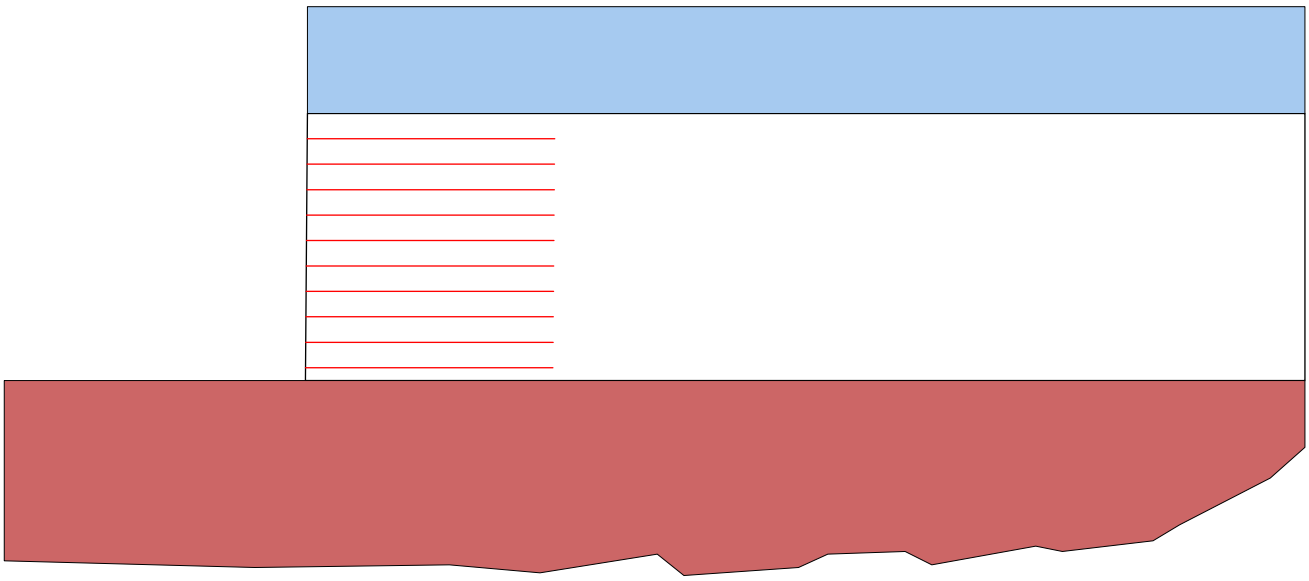
Soil in front of wall is Horizontal.

Batter, ω 0.5 [deg]
Backslope, β 0.0 [deg]
Backslope rise 0.0 [ft] Broken back equivalent angle, I = 0.00°

U N I F O R M S U R C H A R G E

Uniformly distributed dead load is 0.0 [lb/ft ²], and live load is 100.0 [lb/ft ²]

ANALYZED REINFORCEMENT LAYOUT:



SCALE:

0 2 4 6 8 10 [ft]

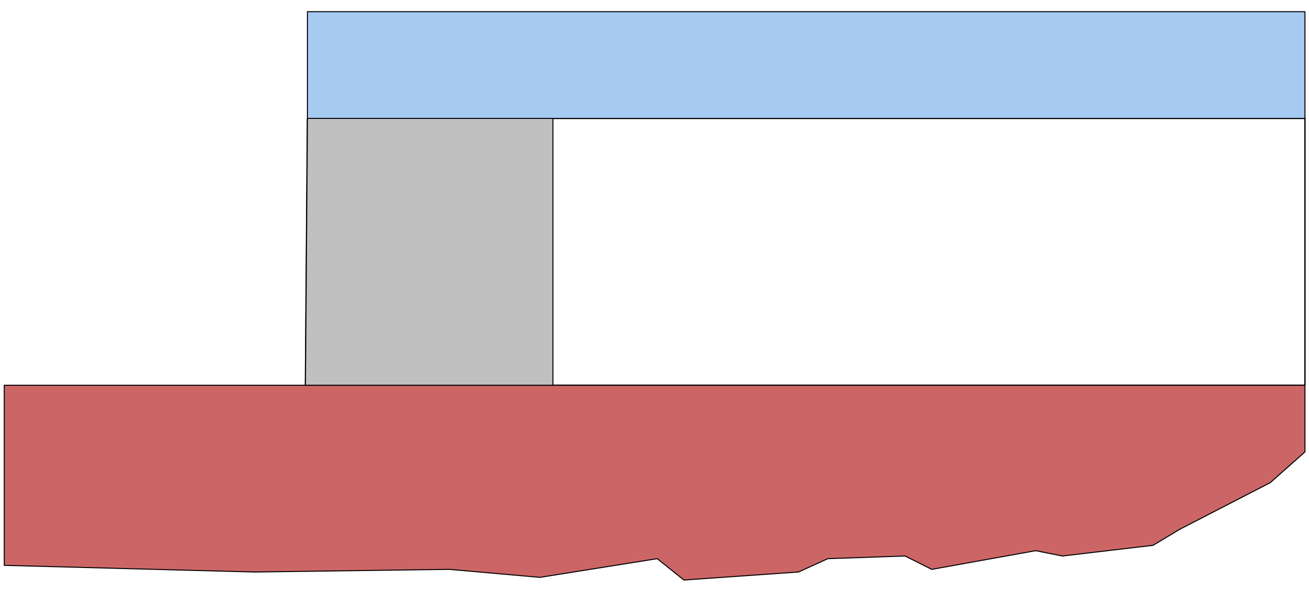
ANALYSIS: CALCULATED FACTORS (Static conditions)

Bearing capacity, Fs = 32.06, Meyerhof stress = 1887 lb/ft².
Foundation Interface: Direct sliding, Fs = 6.043, Eccentricity, e/L = 0.0265, Fs-overturning = 12.24

GEOGRID				CONNECTION							
#	Elevation [ft]	Length [ft]	Type #	Fs @ 3/4" [service criterion]	Fs-peak [failure criterion]	Fs-overall [geogrid strength]	Geogrid strength Fs	Pullout resistance Fs	Direct sliding Fs	Eccentricity e/L	Product name
1	0.67	13.00	1	3.26	3.26	3.44	3.438	38.288	5.373	0.0231	TPG45D
2	2.00	13.00	1	3.53	3.53	3.80	3.797	35.396	5.939	0.0167	TPG45D
3	3.34	13.00	1	3.86	3.86	4.24	4.239	32.459	6.646	0.0110	TPG45D
4	4.67	13.00	1	4.29	4.29	4.81	4.814	29.651	7.537	0.0059	TPG45D
5	6.00	13.00	1	4.82	4.82	5.52	5.523	26.578	8.706	0.0016	TPG45D
6	7.34	13.00	1	5.55	5.55	6.51	6.511	23.546	10.323	-0.0022	TPG45D
7	8.67	13.00	1	6.63	6.63	7.96	7.956	20.556	12.563	-0.0053	TPG45D
8	10.00	13.00	1	8.25	8.25	10.13	10.127	17.265	16.080	-0.0077	TPG45D
9	11.34	13.00	1	11.15	11.15	14.03	14.032	13.722	22.552	-0.0096	TPG45D
10	12.67	13.00	1	14.03	14.03	18.09	18.088	7.443	38.925	-0.0107	TPG45D

BEARING CAPACITY for GIVEN LAYOUT

	STATIC	SEISMIC	UNITS
(Water table does not affect bearing capacity)			
Ultimate bearing capacity, q-ult	60493	N/A	[lb/ft ²]
Meyerhof stress, σ_V	1886.9	N/A	[lb/ft ²]
Eccentricity, e	0.30	N/A	[ft]
Eccentricity, e/L	0.023	N/A	
Fs calculated	32.06	N/A	
Base length	13.00	N/A	[ft]



SCALE:

0 2 4 6 8 10 [ft]

DIRECT SLIDING for GIVEN LAYOUT (for GEOGRID reinforcements)

Along reinforced and foundation soils interface: Fs-static = 6.043

#	Geogrid Elevation [ft]	Geogrid Length [ft]	Fs Static	Fs Seismic	Geogrid Type #	Product name
1	0.67	13.00	5.373	N/A	1	TPG45D
2	2.00	13.00	5.939	N/A	1	TPG45D
3	3.34	13.00	6.646	N/A	1	TPG45D
4	4.67	13.00	7.537	N/A	1	TPG45D
5	6.00	13.00	8.706	N/A	1	TPG45D
6	7.34	13.00	10.323	N/A	1	TPG45D
7	8.67	13.00	12.563	N/A	1	TPG45D
8	10.00	13.00	16.080	N/A	1	TPG45D
9	11.34	13.00	22.552	N/A	1	TPG45D
10	12.67	13.00	38.925	N/A	1	TPG45D

ECCENTRICITY for GIVEN LAYOUT

At interface with foundation: e/L static = 0.0265; Overturning: Fs-static = 12.24

#	Geogrid Elevation [ft]	Geogrid Length [ft]	e / L Static	e / L Seismic	Geogrid Type #	Product name
1	0.67	13.00	0.0231	N/A	1	TPG45D
2	2.00	13.00	0.0167	N/A	1	TPG45D
3	3.34	13.00	0.0110	N/A	1	TPG45D
4	4.67	13.00	0.0059	N/A	1	TPG45D
5	6.00	13.00	0.0016	N/A	1	TPG45D
6	7.34	13.00	-0.0022	N/A	1	TPG45D
7	8.67	13.00	-0.0053	N/A	1	TPG45D
8	10.00	13.00	-0.0077	N/A	1	TPG45D
9	11.34	13.00	-0.0096	N/A	1	TPG45D
10	12.67	13.00	-0.0107	N/A	1	TPG45D

RESULTS for STRENGTH

Live Load included in calculating Tmax

#	Geogrid Elevation [ft]	LTDS [lb/ft]	Tmax [lb/ft]	Tmd [lb/ft]	Specified minimum Fs-overall Static	Actual calculated Fs-overall Static	Specified minimum Fs-overall seismic	Actual calculated Fs-overall seismic	Product name
1	0.67	1884.7	548.2	N/A	N/A	3.438	N/A	N/A	TPG45D
2	2.00	1884.7	496.4	N/A	N/A	3.797	N/A	N/A	TPG45D
3	3.34	1884.7	444.6	N/A	N/A	4.239	N/A	N/A	TPG45D
4	4.67	1884.7	391.5	N/A	N/A	4.814	N/A	N/A	TPG45D
5	6.00	1884.7	341.3	N/A	N/A	5.523	N/A	N/A	TPG45D
6	7.34	1884.7	289.5	N/A	N/A	6.511	N/A	N/A	TPG45D
7	8.67	1884.7	236.9	N/A	N/A	7.956	N/A	N/A	TPG45D
8	10.00	1884.7	186.1	N/A	N/A	10.127	N/A	N/A	TPG45D
9	11.34	1884.7	134.3	N/A	N/A	14.032	N/A	N/A	TPG45D
10	12.67	1884.7	104.2	N/A	N/A	18.088	N/A	N/A	TPG45D

RESULTS for PULLOUT

Live Load included in calculating Tmax

NOTE: Live load is not included in calculating the overburden pressure used to assess pullout resistance.

#	Geogrid Elevation [ft]	Coverage Ratio	Tmax [lb/ft]	Tmd [lb/ft]	Le (see NOTE)	La [ft]	Avail.Static Pullout, Pr [lb/ft]	Specified Static Fs	Actual Static Fs	Avail.Seism. Pullout, Pr [lb/ft]	Specified seismic Fs	Actual seismic Fs
1	0.67	1.000	548.2	N/A	11.67	0.41	20989.9	N/A	38.288	N/A	N/A	N/A
2	2.00	1.000	496.4	N/A	10.86	1.23	17571.3	N/A	35.396	N/A	N/A	N/A
3	3.34	1.000	444.6	N/A	10.04	2.05	14432.6	N/A	32.459	N/A	N/A	N/A
4	4.67	1.000	391.5	N/A	9.22	2.86	11607.7	N/A	29.651	N/A	N/A	N/A
5	6.00	1.000	341.3	N/A	8.41	3.68	9070.1	N/A	26.578	N/A	N/A	N/A
6	7.34	1.000	289.5	N/A	7.59	4.50	6815.8	N/A	23.546	N/A	N/A	N/A
7	8.67	1.000	236.9	N/A	6.77	5.31	4869.6	N/A	20.556	N/A	N/A	N/A
8	10.00	1.000	186.1	N/A	5.96	6.13	3213.0	N/A	17.265	N/A	N/A	N/A
9	11.34	1.000	134.3	N/A	5.14	6.95	1843.1	N/A	13.722	N/A	N/A	N/A
10	12.67	1.000	104.2	N/A	4.32	7.76	775.5	N/A	7.443	N/A	N/A	N/A

RESULTS for CONNECTION (static conditions)

Live Load included in calculating Tmax

#	Geogrid Elevation [ft]	Connection force, To [lb/ft]	FS - Bulging Peak	FS - Bulging Deformation	Available connection strength, Tcl-failure criterion [lb/ft]	Available connection strength, Tcs-service criterion [lb/ft]	Available Geogrid strength, Tavailable [lb/ft]	Fs-overall connection peak Specified	Fs-overall connection peak Actual	Fs-overall connection service Specified	Fs-overall connection service Actual	Fs-overall Geogrid strength Specified	Fs-overall Geogrid strength Actual	Product name
1	0.67	548	4.75	2.93	1790	1790	1885	N/A	3.26	N/A	3.26	N/A	3.44	TPG45D
2	2.00	496	5.01	3.10	1753	1753	1885	N/A	3.53	N/A	3.53	N/A	3.80	TPG45D
3	3.34	445	5.42	3.37	1717	1717	1885	N/A	3.86	N/A	3.86	N/A	4.24	TPG45D
4	4.67	391	5.89	3.68	1680	1680	1885	N/A	4.29	N/A	4.29	N/A	4.81	TPG45D
5	6.00	341	6.46	4.05	1644	1644	1885	N/A	4.82	N/A	4.82	N/A	5.52	TPG45D
6	7.34	289	7.36	4.64	1607	1607	1885	N/A	5.55	N/A	5.55	N/A	6.51	TPG45D
7	8.67	237	8.22	5.23	1571	1571	1885	N/A	6.63	N/A	6.63	N/A	7.96	TPG45D
8	10.00	186	9.50	6.14	1534	1534	1885	N/A	8.25	N/A	8.25	N/A	10.13	TPG45D
9	11.34	134	12.10	7.94	1498	1498	1885	N/A	11.15	N/A	11.15	N/A	14.03	TPG45D
10	12.67	104	11.25	7.54	1461	1461	1885	N/A	14.03	N/A	14.03	N/A	18.09	TPG45D