

Analysis of Redi Rock wall

Input data

Project

Date : 1/25/2008

Blocks

No.	Description	Height h [in]	Width w [in]	Unit weight γ [kcf]
1	Block 28	18.00	28.00	0.1300
2	Block 41	18.00	41.00	0.1300
3	Block 60	18.00	60.00	0.1300
4	Top block 28	18.00	28.00	0.1300
5	Top block 24	18.00	24.00	0.1300

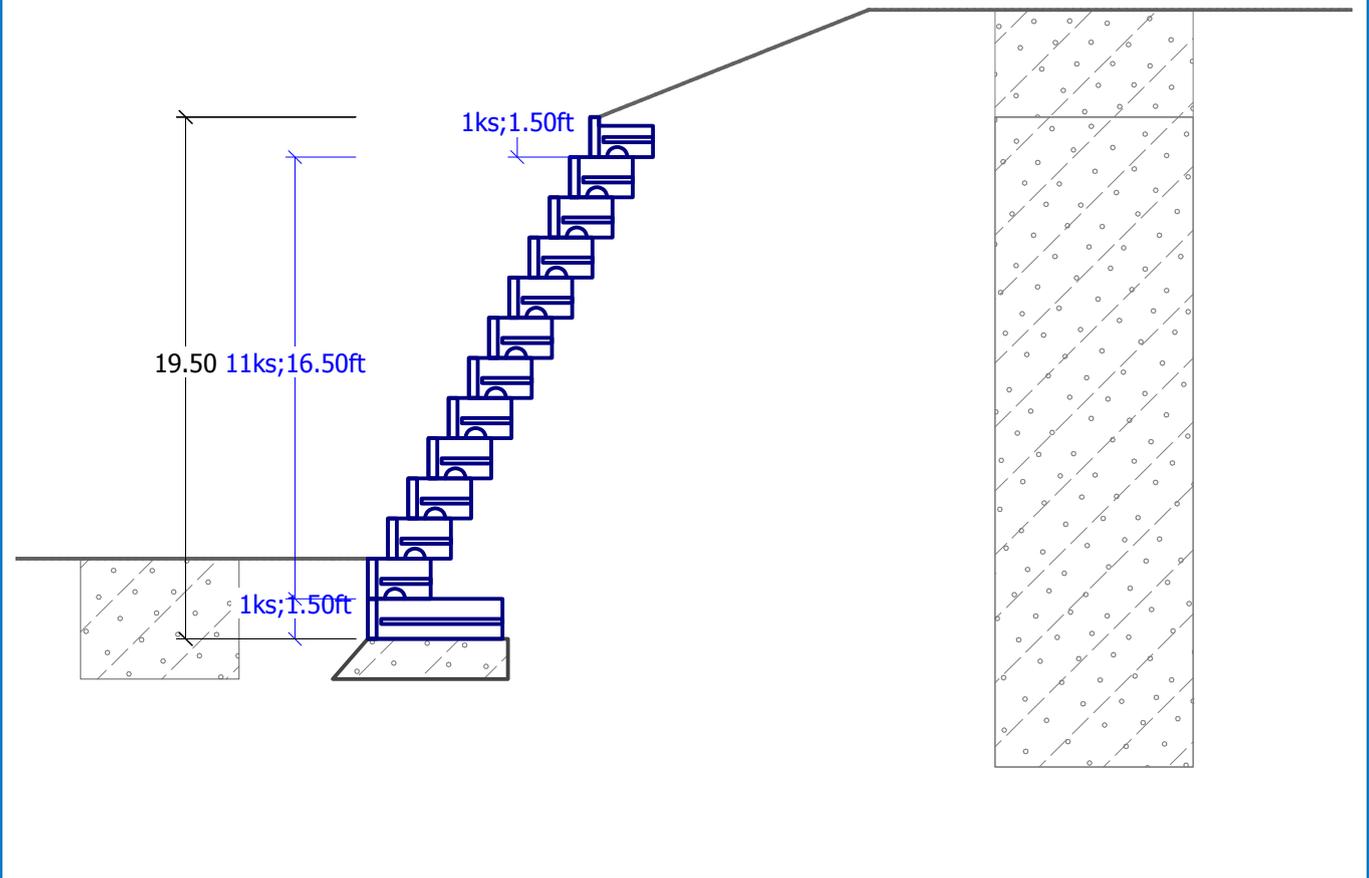
No.	Description	Shear cap. F [kip/ft]	Max. shear cap. F_{max} [kip/ft]	Friction f [°]	Cohesion c [ksf]
1	Block 28	1.6950	9.0000	75.00	0.0000
2	Block 41	1.6950	9.0000	75.00	0.0000
3	Block 60	1.6950	9.0000	75.00	0.0000
4	Top block 28	1.6950	9.0000	75.00	0.0000
5	Top block 24	1.6950	9.0000	75.00	0.0000

Setbacks

No.	Setback s [in]
1	0.00
2	1.25
3	9.00
4	16.25

Geometry

No. group	Description	Count	Setback s [in]
1	Block 60	1	0.00
2	Top block 28	11	9.00
3	Top block 28	1	1.25



Base

Geometry

Upper setback $a_1 = 0.00$ ft

Lower setback $a_2 = 1.30$ ft

Height $h = 1.50$ ft

Width $b = 6.50$ ft

Material

Soil creating foundation - Backfill

Soil bearing capacity $R_d = 8.3542$ ksf

Soil parameters

Backfill

Unit weight : $\gamma = 0.1273$ kcf

Stress-state : effective

Angle of intern. friction : $\varphi_{ef} = 40.00^\circ$

Cohesion of soil : $c_{ef} = 0.0000$ ksf

Angle of friction struc.-soil : $\delta = 25.00^\circ$

Saturated unit weight : $\gamma_{sat} = 0.1273$ kcf

Foundation pad

Unit weight : $\gamma = 0.1273$ kcf

Stress-state : effective

Angle of intern. friction : $\varphi_{ef} = 40.00^\circ$



Cohesion of soil : $c_{ef} = 0.0000$ ksf
Angle of friction struc.-soil : $\delta = 25.00^\circ$
Saturated unit weight : $\gamma_{sat} = 0.1273$ kcf

Geological profile and assigned soils

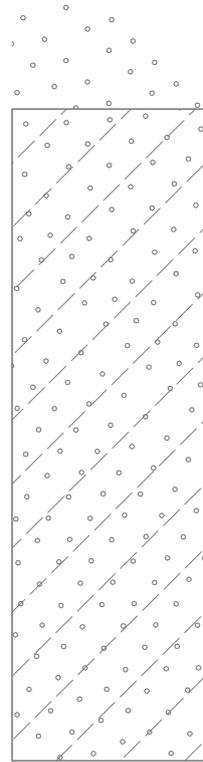
No.	Layer [ft]	Assigned soil	Pattern
1	-	Backfill	

Terrain profile

Terrain behind construction has the slope 1: 2.50 (slope angle is 21.80 °).
Embankment height is 4.00 ft, embankment length is 10.00 ft.

Name : Terrain

Stage : 1



Safety factor for slip = 1.50
 Safety factor for overturning = 1.50
 Factor of safety for bearing capacity = 1.50

Hinge height concept is considered in analysis.

MRF (concrete found. - soil)

$\mu = 0.90$

MRF (block - soil found.)

$\mu = 0.90$

Verification No. 1

Forces acting on construction

Name	F _{hor} [kip/ft]	App.Pt. Z [ft]	F _{vert} [kip/ft]	App.Pt. X [ft]	Design coefficient
Weight - wall	0.0000	-5.44	5.4012	4.21	1.000
FF resistance	-2.2741	-1.50	0.0006	1.30	1.000
Weight - earth wedge	0.0000	-1.70	0.0077	6.37	1.000
Weight - earth wedge	0.0000	-4.12	0.5682	5.04	1.000
Weight - earth wedge	0.0000	-21.03	0.1624	10.96	1.000
Active pressure	4.8360	-5.25	4.3457	5.99	1.000

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 53.5051$ kipft

Overturning moment $M_{ovr} = 21.9796$ kipft

Safety factor = 2.43 > 1.50

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 8.7986$ kip/ft

Active horizontal force $H_{act} = 2.5618$ kip/ft

Safety factor = 3.43 > 1.50

Wall for slip is SATISFACTORY

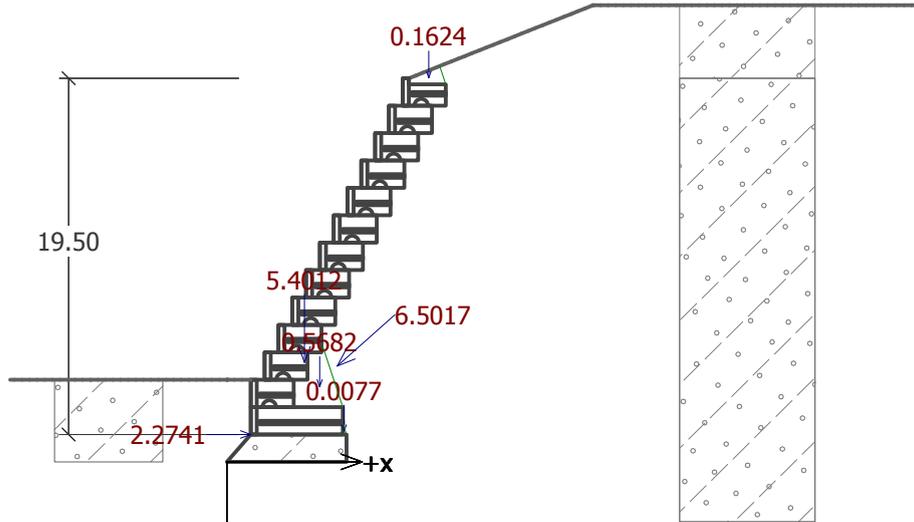
Forces acting at the centre of footing bottom

Overall moment $M = 2.5532$ kipft/ft

Normal force $N = 10.4857$ kip/ft

Shear force $Q = 2.5618$ kip/ft

Overall check - WALL is SATISFACTORY



Bearing capacity of foundation soil

Forces acting at the centre of the footing bottom

Number	Moment [kipft/ft]	Norm. force [kip/ft]	Shear Force [kip/ft]	Eccentricity [ft]	Stress [ksf]
1	2.5532	10.4857	2.5618	0.24	1.7438

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [kip/ft]	App.Pt. Z [ft]	F_{vert} [kip/ft]	App.Pt. X [ft]	Design coefficient
Weight - wall	0.0000	-5.34	4.1600	3.20	1.000
FF resistance	-1.0111	-1.00	0.0000	0.00	1.000
Weight - earth wedge	0.0000	-2.62	0.5682	3.74	1.000
Weight - earth wedge	0.0000	-19.53	0.1624	9.66	1.000
Active pressure	3.9188	-4.79	3.4692	4.58	1.000

Block No. 1 verification

Check for overturning stability:

Resisting moment $M_{res} = 32.8885$ kipft/ft

Overturning moment $M_{Ovr} = 17.7603$ kipft/ft

Safety factor = 1.85 > 1.50

Joint for overturning stability is SATISFACTORY

Check for slip:

Resisting horizontal force $H_{res} = 6.3132$ kip/ft

Active horiz. force $H_{act} = 2.9077$ kip/ft

Safety factor = 2.17 > 1.50

Joint for verification is SATISFACTORY

Verification of bearing capacity of soil:

Maximum stress $\sigma = 2.3098$ ksf

Bearing capacity of footing material $R_d = 8.3542$ ksf

Safety factor = $3.62 > 1.50$

Footing bearing capacity is SATISFACTORY