

## Analysis of Redi Rock wall

### Input data

#### Project

Date : 1/25/2008

#### Blocks

No.	Description	Height h [in]	Width w [in]	Unit weight $\gamma$ [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

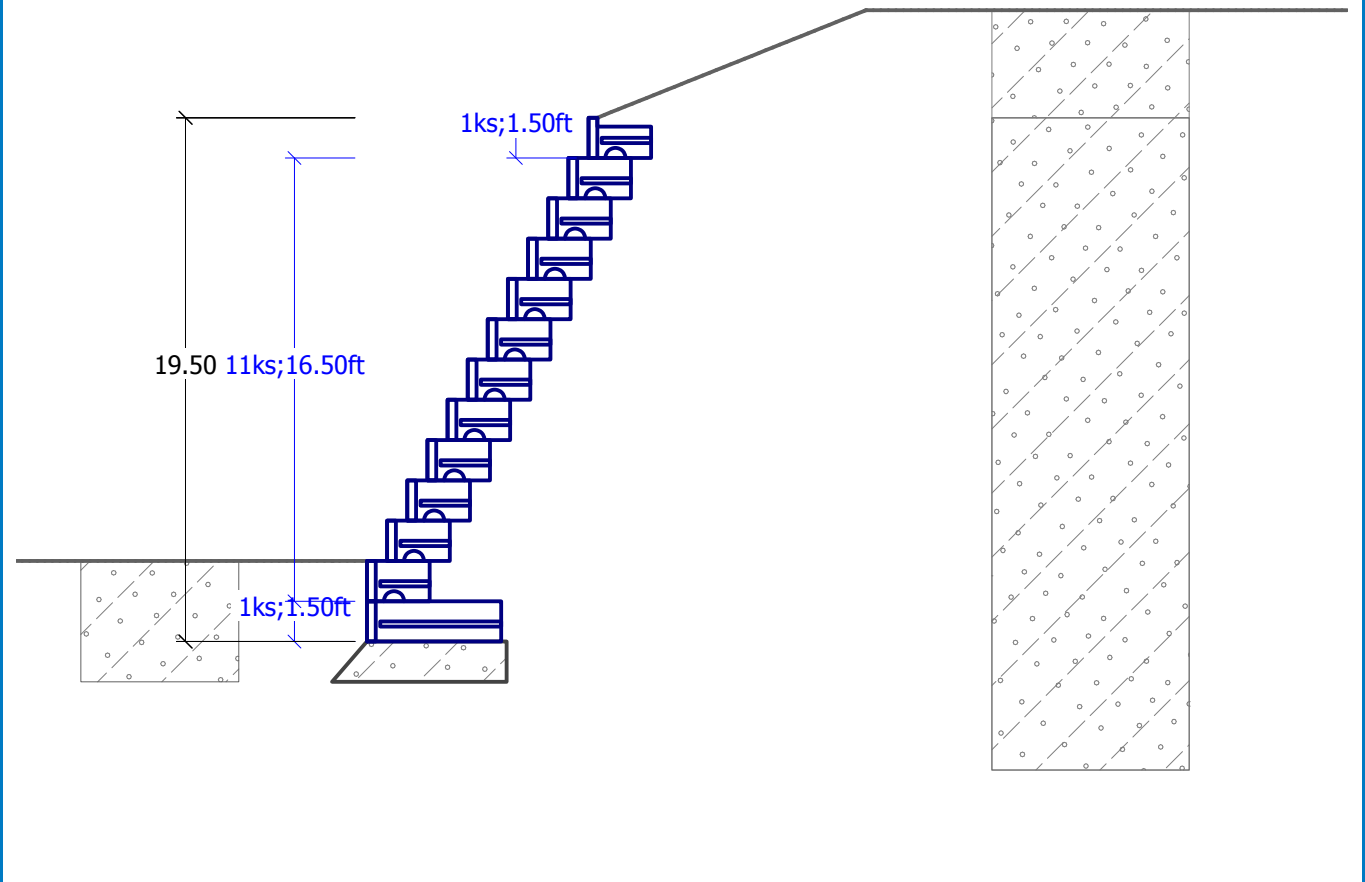
No.	Description	Shear cap. F [kip/ft]	Max. shear cap. $F_{max}$ [kip/ft]	Friction f [°]	Cohesion c [ksf]
1	Block 28	1.6950	9.0000	75.00	0.0000
2	Block 41	1.6950	9.0000	75.00	0.0000
3	Block 60	1.6950	9.0000	75.00	0.0000
4	Top block 28	1.6950	9.0000	75.00	0.0000
5	Top block 24	1.6950	9.0000	75.00	0.0000

#### 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 :  $\varphi_{ef} = 40.00^\circ$

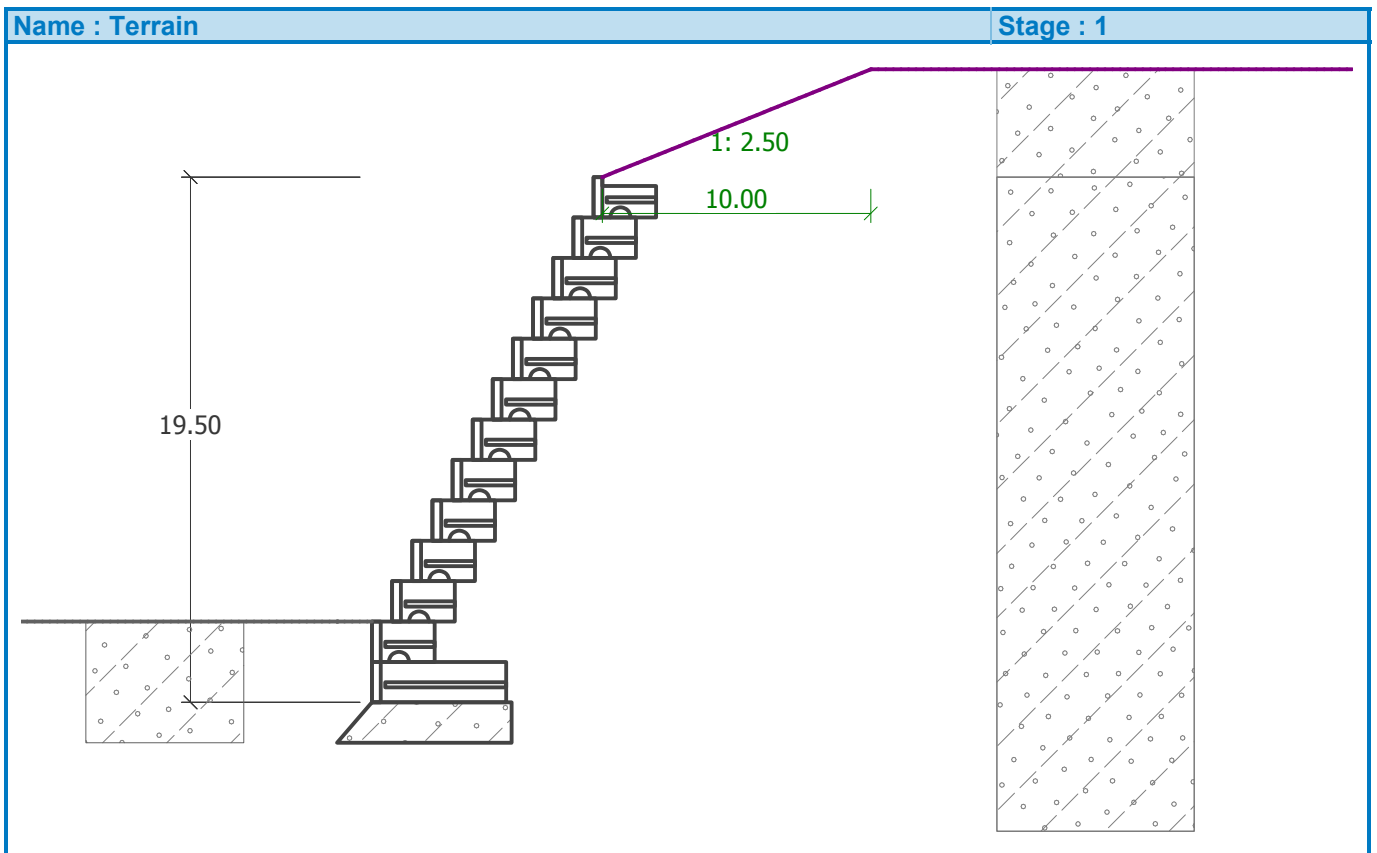
Cohesion of soil :  $c_{ef} = 0.0000$  ksf  
 Angle of friction struc.-soil :  $\delta = 25.00^\circ$   
 Saturated unit weight :  $\gamma_{sat} = 0.1273$  kcf

**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.



**Water influence**

Ground water table is located below the structure.

**Resistance on front face of the structure**

Resistance on front face of the structure: 1/3 pass., 2/3 at rest  
 Soil on front face of the structure - Backfill  
 Soil thickness in front of structure  $h = 4.50$  ft  
 Angle of friction struc.-soil  $\delta = 0.00^\circ$   
 Terrain in front of structure is flat.

**Analysis settings**

Active earth pressure calculation - Coulomb (CSN 730037)  
 Passive earth pressure calculation - Caquot-Kerisel (CSN 730037)  
 Analysis carried out according to classical theory (safety factor)

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 <sub>hor</sub> [kip/ft]	App.Pt. Z [ft]	F <sub>vert</sub> [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**

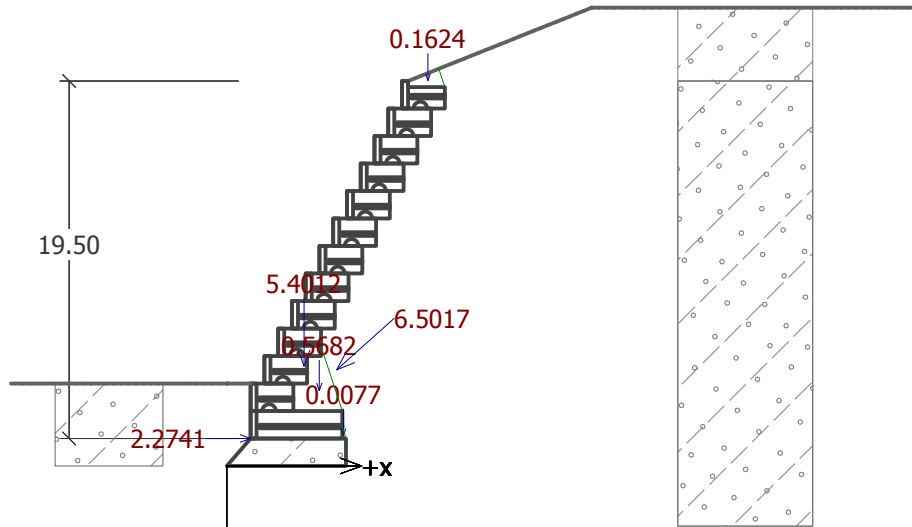
#### Forces acting at the centre of footing bottom

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**