Sanas
GRUPPO FS ITALIANE

Direzione Progettazione e Realizzazione Lavori

SS.4 - Variante dell'abitato di Monterotondo Scalo - 2°Stralcio

PROGETTO DEFINITIVO

COD. RM190

PROGETTAZIONE: ATI SINTAGMA - GDG - ICARIA

IL RESPONSABILE DELL'INTEGRAZIONE DELLE PRESTAZIONI SPECIALISTICHE:
Dott. Ing. Nando Granieri
Ordine degli Ingegneri della Prov. di Perugia n° A351

IL PROGETTISTA:
David Carlaccini
Ordine degli Ingegneri della Prov. di Terni n° A1245

IL GEOLOGO:
Dott. Geol. Giorgio Cerquiglini
Ordine dei Geologi della Regione Umbria n°108

Il R.U.P.
Dott. Ing.
Achille Devitofranceschi

IL COORDINATORE PER LA SICUREZZA IN FASE DI PROGETTAZIONE:
Dott. Ing. Filippo Pambianco
Ordine degli Ingegneri della Prov. di Perugia n° A1373

PROTOCOLLO	DATA

IL GRUPPO DI PROGETTAZIONE:

MANDATARIA: Sintagma

MANDANTI: GEOTECHNICAL DESIGN GROUP, ICARIA società di ingegneria

Dott.Ing.	N.Granieri	Dott. Ing.	D.Carlaccini	Dott. Ing.	V.Rotisciani
Dott.Arch.	N.Kamenicky	Dott. Ing.	S.Sacconi	Dott. Ing.	F.Macchioni
Dott.Ing.	V.Truffini	Dott. Ing.	F.Aloe	Geom.	C.Vischini
Dott.Arch.	A.Bracchini	Dott. Ing.	V.De Gori	Dott. Ing.	V.Piunno
Dott.Ing.	F.Durastanti	Dott. Ing.	C.Consorti	Dott. Ing.	G.Pulli
Dott.Ing.	E.Bartolocci	Geom.	M.Manzo	Geom.	C.Sugaroni
Dott.Geol.	G.Cerquiglini				
Geom.	S.Scopetta				
Dott.Ing.	L.Sbrenna				
Dott.Ing.	M.Briganti Botta				
Dott.Ing.	E.Sellari				
Dott.Ing.	L.Dinelli				
Dott.Ing.	L.Nani				
Dott.Ing.	F.Pambianco				
Dott. Agr.	F.Berti Nulli				

ORDINE DEGLI INGEGNERI DELLA PROVINCIA DI PERUGIA
Sezione A
DOTTORE INGEGNERE
NANDO GRANIERI
SETTORE CIVILE E AMBIENTALE
SETTORE INDUSTRIALE
SETTORE DELL'INFORMAZIONE

ORDINE degli INGEGNERI
INGEGNERE
David
CARLACCINI
civile e ambientale
A 1245
Provincia di TERNI

GEOTECNICA

Relazione geotecnica di calcolo - Allegato - Tabulati di calcolo

CODICE PROGETTO			NOME FILE	REVISIONE	SCALA:
PROGETTO	LIV. PROG.	N. PROG.			
DPRM0190	D	20	CODICE ELAB. T00GE00GETRE03	A	-

REV.	DESCRIZIONE	DATA	REDATTO	VERIFICATO	APPROVATO
A	Emissione	17/01/2021	S.Sacconi	D.Carlaccini	N.Granieri

INDICE

1 OUTPUT CODICE DI CALCOLO - VERIFICHE DI STABILITA'

1.1 ASSE 1 – SEZ.24 [PRG. 1+150] - SEZIONE TIPO 1

1.1.1 Configurazione rilevato di "precarica" – tensioni totali, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur PRECARICA_lato Monter_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	Rilevato_rid
Color			
Strength Type	Undrained	Undrained	Mohr-Coulomb
Unit Weight [kN/m3]	19	19	18
Cohesion [kPa]			0
Friction Angle [deg]			29.3
Cohesion Type	75	38	
Water Surface	None	None	Water Table
Hu Value			1
Ru Value	0	0	

Global Minimums

Method: bishop simplified

- FS: 1.389400
- Center: 41.973, 37.774
- Radius: 16.375
- Left Slip Surface Endpoint: 41.273, 21.415
- Right Slip Surface Endpoint: 56.036, 29.386
- Resisting Moment=6005.02 kN-m
- Driving Moment=4322.03 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1369
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.3894**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.458453	0.0244474	Aoc TT	75	0	53.9801	75	1.59971	0	1.59971

2	0.458453	0.0755816	Aoc TT	75	0	53.9801	75	0.203134	0	0.203134
3	0.601972	2.77288	Rilevato_rid	0	29.3	1.83702	2.55236	4.54826	0	4.54826
4	0.601972	6.79431	Rilevato_rid	0	29.3	4.43608	6.16349	10.9832	0	10.9832
5	0.601972	10.574	Rilevato_rid	0	29.3	6.8047	9.45445	16.8476	0	16.8476
6	0.601972	14.1097	Rilevato_rid	0	29.3	8.94991	12.435	22.1588	0	22.1588
7	0.601972	17.398	Rilevato_rid	0	29.3	10.8772	15.1128	26.9307	0	26.9307
8	0.601972	20.4342	Rilevato_rid	0	29.3	12.591	17.4939	31.1739	0	31.1739
9	0.601972	23.2126	Rilevato_rid	0	29.3	14.0944	19.5827	34.8959	0	34.8959
10	0.601972	25.7261	Rilevato_rid	0	29.3	15.3892	21.3818	38.1018	0	38.1018
11	0.601972	27.9659	Rilevato_rid	0	29.3	16.4765	22.8924	40.7937	0	40.7937
12	0.601972	29.9215	Rilevato_rid	0	29.3	17.3558	24.1141	42.9709	0	42.9709
13	0.601972	31.5804	Rilevato_rid	0	29.3	18.0258	25.0451	44.6299	0	44.6299
14	0.601972	32.9276	Rilevato_rid	0	29.3	18.4841	25.6818	45.7645	0	45.7645
15	0.601972	33.945	Rilevato_rid	0	29.3	18.7266	26.0188	46.3649	0	46.3649
16	0.601972	34.611	Rilevato_rid	0	29.3	18.7482	26.0488	46.4184	0	46.4184
17	0.601972	34.8993	Rilevato_rid	0	29.3	18.542	25.7623	45.9078	0	45.9078
18	0.601972	34.778	Rilevato_rid	0	29.3	18.0993	25.1472	44.8117	0	44.8117
19	0.601972	34.2074	Rilevato_rid	0	29.3	17.4094	24.1886	43.1036	0	43.1036
20	0.601972	33.1377	Rilevato_rid	0	29.3	16.4587	22.8677	40.7498	0	40.7498
21	0.601972	31.5051	Rilevato_rid	0	29.3	15.2308	21.1617	37.7096	0	37.7096
22	0.601972	29.0729	Rilevato_rid	0	29.3	13.6334	18.9422	33.7547	0	33.7547
23	0.601972	22.8582	Rilevato_rid	0	29.3	10.3496	14.3797	25.6244	0	25.6244
24	0.601972	14.5464	Rilevato_rid	0	29.3	6.31801	8.77825	15.6426	0	15.6426
25	0.601972	5.0679	Rilevato_rid	0	29.3	2.09126	2.90559	5.17771	0	5.17771

List Of Coordinates

Water Table

X	Y
10.9201	21.3737
110.92	21.3737

External Boundary

X	Y
79.739	21.4065
77.2691	23.0531
76.3244	23.683
67.7701	29.3859
65.6701	29.3859
64.3451	29.3859
56.1701	29.3859
54.0701	29.3859
46.9209	24.6197
45.8824	23.9274
45.0747	23.3889
44.0564	22.71
42.093	21.4011
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236

110.92	-8.34236
110.92	6.37373
110.92	21.4065

Material Boundary

X	Y
42.093	21.4011
47.6458	21.4019
76.0878	21.406
79.739	21.4065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
47.6458	21.4019
47.6476	20.5195
76.0878	20.3956
76.0878	21.406

1.1.2 Configurazione rilevato di progetto – lato Tevere - tensioni totali, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_FINALE_lato Tevere-STAT TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 26
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	Argine_rid	S-Gh rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	18	18	17	18	25
Cohesion [kPa]	12	0	0	0	12.5	0	
Friction Angle [deg]	23	23	24.8	29.3	40	29.3	
Cohesion Type							500

Water Surface	Water Table	Water Table	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	0	0	1	1	
Ru Value							0

Global Minimums

Method: bishop simplified

- FS: 2.829770
- Center: 71.195, 34.275
- Radius: 12.464
- Left Slip Surface Endpoint: 60.574, 27.753
- Right Slip Surface Endpoint: 78.559, 24.220
- Resisting Moment=10476.7 kN-m
- Driving Moment=3702.31 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2078
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.82977**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.721054	6.86635	Rilevato_rid	0	29.3	5.46776	15.4725	27.5716	0	27.5716
2	0.721054	19.0772	Rilevato_rid	0	29.3	8.41538	23.8136	42.4353	0	42.4353
3	0.721054	29.1139	Rilevato_rid	0	29.3	10.9814	31.0748	55.3748	0	55.3748
4	0.721054	37.5762	Rilevato_rid	0	29.3	13.2452	37.4809	66.7903	0	66.7903
5	0.721054	44.7848	Rilevato_rid	0	29.3	15.2524	43.1607	76.9115	0	76.9115
6	0.721054	50.9471	Rilevato_rid	0	29.3	16.4848	46.6481	86.2478	3.12189	83.1259
7	0.721054	56.2057	Rilevato_rid	0	29.3	17.3137	48.9938	94.5792	7.27338	87.3059
8	0.721054	60.8615	Rilevato_rid	0	29.3	13.6898	38.7389	79.8511	10.819	69.0321
9	0.721054	65.0481	Rilevato_rid	0	29.3	14.0717	39.8198	84.7739	13.8158	70.9581
10	0.721054	68.5645	Rilevato_rid	0	29.3	14.698	41.5921	90.4224	16.3062	74.1162
11	0.721054	68.0941	Rilevato_rid	0	29.3	14.3747	40.6772	90.8084	18.3224	72.486
12	0.721054	65.2048	Rilevato_rid	0	29.3	13.4806	38.1469	87.8653	19.8883	67.977
13	0.721054	62.3067	Rilevato_rid	0	29.3	12.6412	35.7718	84.766	21.0215	63.7445
14	0.721054	57.0104	Rilevato_rid	0	29.3	11.2108	31.7241	78.2658	21.734	56.5318
15	0.721054	51.1673	Rilevato_rid	0	29.3	9.67757	27.3853	70.8334	22.0333	48.8001
16	0.721054	45.8818	Rilevato_rid	0	29.3	8.34524	23.6151	64.004	21.9224	42.0816
17	0.6	47.1622	CLS	500	0	176.693	500	95.9282	0	95.9282
18	0.731015	28.3429	Argine_rid	0	24.8	6.49293	18.3735	39.7639	0	39.7639
19	0.731015	25.8497	Argine_rid	0	24.8	5.9836	16.9322	36.6445	0	36.6445
20	0.731015	23.4772	Argine_rid	0	24.8	5.49402	15.5468	33.6465	0	33.6465

21	0.731015	20.4717	Argine_rid	0	24.8	4.84661	13.7148	29.6816	0	29.6816
22	0.731015	16.7951	Argine_rid	0	24.8	4.02637	11.3937	24.6583	0	24.6583
23	0.731015	12.3969	Argine_rid	0	24.8	3.01317	8.52658	18.4533	0	18.4533
24	0.731015	7.20939	Argine_rid	0	24.8	1.77952	5.03562	10.8981	0	10.8981
25	0.731015	1.49404	Argine_rid	0	24.8	0.375349	1.06215	2.2987	0	2.2987

List Of Coordinates

Water Table

X	Y
16.775	24.0637
121.553	24.0637

Line Load

X	Y
56.1701	27.6425
60.9201	27.7613
65.6701	27.6425

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
78.3069	24.0514
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912

52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2526
72.711	23.2526
72.8406	23.2526
72.8408	24.0525

Material Boundary

X	Y
72.111	23.2526
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666

72.711	23.2526

Material Boundary

X	Y
72.711	20.6666
92.236	20.6912

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912
52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.1.3 Configurazione rilevato "progetto" – lato Tevere - tensioni efficaci, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Tevere_STAT_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10

- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 26
- Orientation: Normal to boundary

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500
Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 2.300420
- Center: 75.142, 38.504
- Radius: 18.104
- Left Slip Surface Endpoint: 60.570, 27.761
- Right Slip Surface Endpoint: 81.094, 21.407
- Resisting Moment=19019.3 kN-m
- Driving Moment=8267.74 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1723
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.30042**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.862076	8.38289	Rilevato_rid	0	29.3	6.67461	15.3544	27.3611	0	27.3611
2	0.862076	23.9932	Rilevato_rid	0	29.3	10.3931	23.9086	42.6047	0	42.6047
3	0.862076	37.5309	Rilevato_rid	0	29.3	13.79	31.7228	56.5293	0	56.5293
4	0.862076	49.391	Rilevato_rid	0	29.3	16.8992	38.8753	69.2751	0	69.2751
5	0.862076	59.8397	Rilevato_rid	0	29.3	19.7482	45.4291	80.9537	0	80.9537
6	0.862076	69.0675	Rilevato_rid	0	29.3	21.8963	50.3707	89.7596	0	89.7596
7	0.862076	77.3965	Rilevato_rid	0	29.3	19.2258	44.2275	78.8126	0	78.8126
8	0.862076	84.8824	Rilevato_rid	0	29.3	21.4042	49.2386	87.7421	0	87.7421
9	0.862076	89.6116	Rilevato_rid	0	29.3	22.9164	52.7174	93.9412	0	93.9412
10	0.862076	87.0629	Rilevato_rid	0	29.3	22.5627	51.9038	92.4914	0	92.4914
11	0.862076	83.1874	Rilevato_rid	0	29.3	21.6001	49.6893	89.5805	1.03521	88.5453
12	0.862076	78.5726	Rilevato_rid	0	29.3	20.0724	46.175	85.7987	3.51577	82.2829
13	0.862076	73.2506	Rilevato_rid	0	29.3	18.4111	42.3532	81.0215	5.54913	75.4724
14	0.862076	67.2458	Rilevato_rid	0	29.3	16.6185	38.2295	75.275	7.1509	68.1241
15	0.862076	60.577	Rilevato_rid	0	29.3	14.6959	33.8067	68.5757	8.33286	60.2428
16	0.862076	53.2574	Rilevato_rid	0	29.3	12.6431	29.0844	60.9313	9.10344	51.8279
17	0.862076	45.2956	Rilevato_rid	0	29.3	10.4587	24.0595	52.3415	9.46801	42.8735
18	0.862076	36.6957	Rilevato_rid	0	29.3	8.14012	18.7257	42.7979	9.42908	33.3689
19	0.170451	7.33714	Aoc TE_rid	12	23	13.2991	30.5935	43.8035	0	43.8035
20	0.6	28.7207	CLS	500	0	217.352	500	64.915	0	64.915
21	0.847248	14.717	Aoc TE_rid	12	23	8.61071	19.8083	18.395	0	18.395
22	0.847248	12.1244	Aoc TE_rid	12	23	8.1072	18.65	15.6664	0	15.6664
23	0.847248	9.50529	Aoc TE_rid	12	23	7.59005	17.4603	12.8637	0	12.8637
24	0.847248	6.20122	Aoc TE_rid	12	23	6.9082	15.8918	9.16843	0	9.16843
25	0.847248	2.18763	Aoc TE_rid	12	23	6.05095	13.9197	4.5226	0	4.5226

List Of Coordinates

Water Table

X	Y
10.9201	21.3737
110.92	21.3737

Line Load

X	Y
65.6701	27.7613
56.1701	27.7613

External Boundary

X	Y
76.8378	21.4194

76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236
110.92	-8.34236
110.92	6.37373
110.92	21.4065
76.9878	21.4065

Material Boundary

X	Y
47.6476	21.358
76.0878	21.4178

Material Boundary

X	Y
76.2374	22.4067
76.2374	21.4181
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
45.6476	21.3538

45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
47.6476	21.5298

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298
47.6476	22.5296

1.1.4 Configurazione rilevato "progetto" – lato Monterotondo - tensioni efficaci, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Monter_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days

- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 26
- Orientation: Normal to boundary

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]			12.5	0	
Friction Angle [deg]			40	29.3	
Cohesion Type	50	27			500
Water Surface	None	None	Water Table	Water Table	None
Hu Value			1	1	
Ru Value	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.939310
- Center: 50.056, 32.078
- Radius: 16.199
- Left Slip Surface Endpoint: 37.812, 21.472
- Right Slip Surface Endpoint: 65.670, 27.761
- Resisting Moment=26433.4 kN-m
- Driving Moment=13630.3 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1418
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.93931**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	1.12057	12.2569	Aoc TT_rid	50	0	25.7824	50	37.819	0	37.819
2	1.12057	34.5957	Aoc TT_rid	50	0	25.7824	50	53.0594	0	53.0594
3	1.12057	53.0502	Aoc TT_rid	50	0	25.7824	50	65.8389	0	65.8389
4	1.12057	68.377	Aoc TT_rid	50	0	25.7824	50	76.4545	0	76.4545
5	1.12057	81.0601	Aoc TT_rid	50	0	25.7824	50	85.1289	0	85.1289
6	1.12057	91.4771	Aoc TT_rid	50	0	25.7824	50	92.0705	0	92.0705
7	1.12057	100.274	Aoc TT_rid	50	0	25.7824	50	97.7726	0	97.7726
8	1.12057	149.667	Aoc TT_rid	50	0	25.7824	50	139.849	0	139.849
9	1.12057	159.195	Aoc TT_rid	50	0	25.7824	50	146.452	0	146.452
10	1.12057	168.512	Aoc TT_rid	50	0	25.7824	50	152.935	0	152.935
11	1.12057	185.11	Aoc TT_rid	50	0	25.7824	50	165.953	0	165.953

12	1.12057	200.052	Aoc TT_rid	50	0	25.7824	50	177.503	0	177.503
13	1.12057	213.333	Aoc TT_rid	50	0	25.7824	50	187.558	0	187.558
14	1.12057	224.93	Aoc TT_rid	50	0	25.7824	50	196.066	0	196.066
15	1.12057	232.901	Aoc TT_rid	50	0	25.7824	50	201.268	0	201.268
16	1.12057	227.347	Aoc TT_rid	50	0	25.7824	50	194.291	0	194.291
17	1.12057	217.936	Aoc TT_rid	50	0	25.7824	50	199.776	0	199.776
18	1.12057	206.806	Aoc TT_rid	50	0	25.7824	50	197.395	0	197.395
19	1.12057	193.358	Aoc TT_rid	50	0	25.7824	50	182.698	0	182.698
20	1.12057	177.208	Aoc TT_rid	50	0	25.7824	50	165.146	0	165.146
21	1.12057	157.839	Aoc TT_rid	50	0	25.7824	50	144.054	0	144.054
22	1.08126	130.831	Rilevato_rid	0	29.3	31.7538	61.5804	113.017	3.28229	109.735
23	1.08126	105.614	Rilevato_rid	0	29.3	25.8787	50.1868	89.432	0	89.432
24	1.08126	73.4796	Rilevato_rid	0	29.3	18.1296	35.1589	62.6523	0	62.6523
25	1.08126	27.6435	Rilevato_rid	0	29.3	8.48183	16.4489	29.3116	0	29.3116

List Of Coordinates

Water Table

X	Y
10.9201	21.3737
110.92	21.3737

Line Load

X	Y
65.6701	27.7613
56.1701	27.7613

External Boundary

X	Y
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236
110.92	-8.34236
110.92	6.37373

110.92	21.4065
76.9878	21.4065

Material Boundary

X	Y
47.6476	21.358
76.0878	21.4178

Material Boundary

X	Y
76.2374	22.4067
76.2374	21.4181
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
47.6476	21.5298

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298
47.6476	22.5296

1.1.5 Configurazione rilevato "progetto" – lato Monterotondo - tensioni efficaci, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Monter_STAT_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 26
- Orientation: Normal to boundary

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500
Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 1.784220
- Center: 46.559, 32.535
- Radius: 13.038
- Left Slip Surface Endpoint: 39.709, 21.440
- Right Slip Surface Endpoint: 58.692, 27.761
- Resisting Moment=10300.4 kN-m
- Driving Moment=5773.02 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1638
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.78422**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.742005	2.91077	Aoc TE_rid	12	23	8.86721	15.8211	9.00182	0	9.00182
2	0.742005	8.2996	Aoc TE_rid	12	23	10.6256	18.9583	16.3927	0	16.3927
3	0.742005	12.8618	Aoc TE_rid	12	23	12.0373	21.4771	22.3268	0	22.3268
4	0.742005	16.6652	Aoc TE_rid	12	23	13.1483	23.4595	26.997	0	26.997
5	0.742005	19.7614	Aoc TE_rid	12	23	13.9924	24.9655	30.5448	0	30.5448
6	0.742005	22.2026	Aoc TE_rid	12	23	14.5991	26.048	33.0951	0	33.0951
7	0.742005	24.0706	Aoc TE_rid	12	23	15.005	26.7722	34.801	0	34.801
8	0.742005	25.3641	Aoc TE_rid	12	23	15.2164	27.1494	35.6898	0	35.6898
9	0.742005	52.4833	Aoc TE_rid	12	23	23.7888	42.4444	71.7226	0	71.7226
10	0.742005	58.2979	Aoc TE_rid	12	23	25.3252	45.1857	78.1806	0	78.1806
11	0.742005	57.0038	Aoc TE_rid	12	23	24.5791	43.8545	75.0446	0	75.0446
12	0.742005	58.3075	Aoc TE_rid	12	23	24.6566	43.9928	75.3703	0	75.3703
13	0.742005	63.24	Aoc TE_rid	12	23	25.8381	46.1008	80.3363	0	80.3363
14	0.742005	67.5434	Aoc TE_rid	12	23	26.7857	47.7915	84.3195	0	84.3195
15	0.742005	71.1928	Aoc TE_rid	12	23	27.4955	49.0581	87.3034	0	87.3034
16	0.742005	74.1542	Aoc TE_rid	12	23	27.9606	49.8878	89.2581	0	89.2581
17	0.790083	81.5247	Rilevato_rid	0	29.3	26.5121	47.3034	91.0702	6.77655	84.2937
18	0.790083	83.4035	Rilevato_rid	0	29.3	27.5882	49.2235	90.6206	2.90535	87.7152
19	0.790083	84.2738	Rilevato_rid	0	29.3	27.9529	49.8741	88.8746	0	88.8746
20	0.790083	81.1967	Rilevato_rid	0	29.3	26.1851	46.72	83.254	0	83.254
21	0.790083	71.913	Rilevato_rid	0	29.3	22.4521	40.0595	71.3851	0	71.3851
22	0.790083	60.9208	Rilevato_rid	0	29.3	19.4821	34.7603	61.9422	0	61.9422
23	0.790083	48.0159	Rilevato_rid	0	29.3	19.6078	34.9846	62.3419	0	62.3419
24	0.790083	32.2803	Rilevato_rid	0	29.3	14.1247	25.2015	44.9086	0	44.9086
25	0.790083	11.7737	Rilevato_rid	0	29.3	7.75482	13.8363	24.656	0	24.656

List Of Coordinates

Water Table

X	Y
10.9201	21.3737
110.92	21.3737

Line Load

X	Y
65.6701	27.7613
56.1701	27.7613

External Boundary

X	Y
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236
110.92	-8.34236
110.92	6.37373
110.92	21.4065
76.9878	21.4065

Material Boundary

X	Y
47.6476	21.358
76.0878	21.4178

Material Boundary

X	Y
76.2374	22.4067
76.2374	21.4181
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065

76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
47.6476	21.5298

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298
47.6476	22.5296

1.1.6 Configurazione rilevato "progetto" – lato Tevere - tensioni totali, cond. sismiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Tevere_SISM_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10

- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- Seismic Load Coefficient (Horizontal): 0.08
- Seismic Load Coefficient (Vertical): 0.04
- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	GABBIONI	Rilevato	CLS
Color					
Strength Type	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]			12.5	0	
Friction Angle [deg]			40	35	
Cohesion Type	75	38			500
Water Surface	None	None	Water Table	Water Table	None
Hu Value			1	0	
Ru Value	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.638530
- Center: 94.593, 27.811
- Radius: 40.515
- Left Slip Surface Endpoint: 54.078, 27.811
- Right Slip Surface Endpoint: 134.598, 21.407
- Resisting Moment=224040 kN-m
- Driving Moment=136732 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1441
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.63853**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.667217	43.876	Rilevato	0	35	5.13641	8.41617	12.0195	0	12.0195
2	2.73448	590.305	Aoc TT	75	0	45.7727	75	80.8167	0	80.8167
3	2.73448	956.508	Aoc TT	75	0	45.7727	75	288.957	0	288.957
4	3.43787	1526.02	Anc1 z=15-20 TT	38	0	23.1915	38	441.809	0	441.809
5	3.43787	1797.87	Anc1 z=15-20 TT	38	0	23.1915	38	526.679	0	526.679
6	3.43787	1966.95	Anc1 z=15-20 TT	38	0	23.1915	38	575.846	0	575.846
7	3.43787	2001.12	Anc1 z=15-20 TT	38	0	23.1915	38	590.002	0	590.002
8	3.43787	2024.51	Anc1 z=15-20 TT	38	0	23.1915	38	600.185	0	600.185
9	3.43787	2024.52	Anc1 z=15-20 TT	38	0	23.1915	38	602.849	0	602.849
10	3.43787	2105.93	Anc1 z=15-20 TT	38	0	23.1915	38	629.848	0	629.848
11	3.43787	2165.28	Anc1 z=15-20 TT	38	0	23.1915	38	649.988	0	649.988
12	3.43787	2204.1	Anc1 z=15-20 TT	38	0	23.1915	38	663.79	0	663.79
13	3.43787	2223.3	Anc1 z=15-20 TT	38	0	23.1915	38	671.589	0	671.589
14	3.43787	2223.3	Anc1 z=15-20 TT	38	0	23.1915	38	673.562	0	673.562
15	3.43787	2204.1	Anc1 z=15-20 TT	38	0	23.1915	38	669.747	0	669.747
16	3.43787	2165.28	Anc1 z=15-20 TT	38	0	23.1915	38	660.065	0	660.065
17	3.43787	2105.93	Anc1 z=15-20 TT	38	0	23.1915	38	644.29	0	644.29
18	3.43787	2024.52	Anc1 z=15-20 TT	38	0	23.1915	38	622.038	0	622.038
19	3.43787	1918.74	Anc1 z=15-20 TT	38	0	23.1915	38	592.699	0	592.699
20	3.43787	1785.02	Anc1 z=15-20 TT	38	0	23.1915	38	555.354	0	555.354
21	3.43787	1617.76	Anc1 z=15-20 TT	38	0	23.1915	38	508.578	0	508.578
22	3.43787	1407.51	Anc1 z=15-20 TT	38	0	23.1915	38	450.034	0	450.034
23	3.43787	1136.03	Anc1 z=15-20 TT	38	0	23.1915	38	375.495	0	375.495
24	2.81338	660.079	Aoc TT	75	0	45.7727	75	331.351	0	331.351
25	2.81338	258.296	Aoc TT	75	0	45.7727	75	252.715	0	252.715

List Of Coordinates

Water Table

X	Y
-14.5899	21.3737
134.615	21.3737

Line Load

X	Y
56.1701	27.7613
65.6701	27.7613

External Boundary

X	Y
-14.5899	21.9148
-14.5899	6.37373
-14.5899	-13.3686
134.615	-13.3686
134.615	6.37373
134.615	21.4065
110.92	21.4065
76.9878	21.4065
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
76.0878	21.4178
76.2374	21.4181
76.2374	22.4067

Material Boundary

X	Y

46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
47.6476	22.5296
47.6476	21.5298
47.6476	21.358

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
-14.5899	6.37373
134.615	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298

1.1.7 Configurazione rilevato "progetto" – lato Monterotondo - tensioni totali, cond. sismiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Monter_SISM_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- Seismic Load Coefficient (Horizontal): 0.08
- Seismic Load Coefficient (Vertical): 0.04
- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	GABBIONI	Rilevato	CLS
Color					
Strength Type	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]			12.5	0	
Friction Angle [deg]			40	35	
Cohesion Type	75	38			500
Water Surface	None	None	Water Table	Water Table	None
Hu Value			1	0	
Ru Value	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.276560
- Center: 35.581, 50.903
- Radius: 30.987
- Left Slip Surface Endpoint: 45.648, 21.597
- Right Slip Surface Endpoint: 56.188, 27.761
- Left Slope Intercept: 45.648 22.530
- Right Slope Intercept: 56.188 27.761
- Resisting Moment=6163.67 kN-m
- Driving Moment=4828.33 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1804
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.27656**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.4	5.86347	GABBIONI	12.5	40	16.1069	20.5615	9.60729	0	9.60729
2	0.4	9.98729	GABBIONI	12.5	40	21.6578	27.6475	18.0521	0	18.0521
3	0.4	10.6687	GABBIONI	12.5	40	22.4107	28.6086	19.1974	0	19.1974
4	0.4	9.60696	GABBIONI	12.5	40	20.7858	26.5343	16.7254	0	16.7254
5	0.4	8.50145	GABBIONI	12.5	40	19.1261	24.4156	14.2005	0	14.2005
6	0.427018	9.35798	Rilevato	0	35	10.1143	12.9115	18.4396	0	18.4396
7	0.427018	10.0999	Rilevato	0	35	10.83	13.8252	19.7445	0	19.7445
8	0.427018	10.7822	Rilevato	0	35	11.4693	14.6412	20.9098	0	20.9098
9	0.427018	11.4036	Rilevato	0	35	12.032	15.3596	21.9357	0	21.9357
10	0.427018	11.9627	Rilevato	0	35	12.5183	15.9804	22.8225	0	22.8225
11	0.427018	12.4582	Rilevato	0	35	12.9282	16.5036	23.5696	0	23.5696
12	0.427018	12.8884	Rilevato	0	35	13.2613	16.9289	24.1769	0	24.1769
13	0.427018	13.2518	Rilevato	0	35	13.5177	17.2561	24.6442	0	24.6442
14	0.427018	13.5465	Rilevato	0	35	13.697	17.4851	24.9713	0	24.9713
15	0.427018	13.7705	Rilevato	0	35	13.799	17.6153	25.1573	0	25.1573
16	0.427018	13.922	Rilevato	0	35	13.8234	17.6464	25.2017	0	25.2017
17	0.427018	13.9985	Rilevato	0	35	13.7697	17.5779	25.1038	0	25.1038
18	0.427018	13.9977	Rilevato	0	35	13.6376	17.4092	24.8629	0	24.8629
19	0.427018	13.9171	Rilevato	0	35	13.4265	17.1397	24.478	0	24.478
20	0.427018	13.7536	Rilevato	0	35	13.1358	16.7686	23.948	0	23.948
21	0.427018	12.4607	Rilevato	0	35	11.7782	15.0356	21.473	0	21.473
22	0.427018	9.8578	Rilevato	0	35	9.21915	11.7688	16.8076	0	16.8076
23	0.427018	7.16029	Rilevato	0	35	6.62323	8.45495	12.0749	0	12.0749
24	0.427018	4.36595	Rilevato	0	35	3.99293	5.09721	7.27957	0	7.27957
25	0.427018	1.47046	Rilevato	0	35	1.51584	1.93506	2.76355	0	2.76355

List Of Coordinates

Water Table

X	Y
-14.5899	21.3737
134.615	21.3737

Line Load

X	Y
56.1701	27.7613
65.6701	27.7613

External Boundary

X	Y
-14.5899	21.9148
-14.5899	6.37373
-14.5899	-13.3686
134.615	-13.3686
134.615	6.37373
134.615	21.4065
110.92	21.4065
76.9878	21.4065
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
76.0878	21.4178
76.2374	21.4181
76.2374	22.4067

Material Boundary

X	Y

46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
47.6476	22.5296
47.6476	21.5298
47.6476	21.358

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
-14.5899	6.37373
134.615	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298

1.1.8 Configurazione rilevato "progetto" Post piena – lato Tevere - tensioni totali, cond. stat.

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Monter_SISM_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- Seismic Load Coefficient (Horizontal): 0.08
- Seismic Load Coefficient (Vertical): 0.04
- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	GABBIONI	Rilevato	CLS
Color					
Strength Type	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]			12.5	0	
Friction Angle [deg]			40	35	
Cohesion Type	75	38			500
Water Surface	None	None	Water Table	Water Table	None
Hu Value			1	0	
Ru Value	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.276560
- Center: 35.581, 50.903
- Radius: 30.987
- Left Slip Surface Endpoint: 45.648, 21.597
- Right Slip Surface Endpoint: 56.188, 27.761
- Left Slope Intercept: 45.648 22.530
- Right Slope Intercept: 56.188 27.761
- Resisting Moment=6163.67 kN-m
- Driving Moment=4828.33 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1804
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.27656**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.4	5.86347	GABBIONI	12.5	40	16.1069	20.5615	9.60729	0	9.60729
2	0.4	9.98729	GABBIONI	12.5	40	21.6578	27.6475	18.0521	0	18.0521

3	0.4	10.6687	GABBIONI	12.5	40	22.4107	28.6086	19.1974	0	19.1974
4	0.4	9.60696	GABBIONI	12.5	40	20.7858	26.5343	16.7254	0	16.7254
5	0.4	8.50145	GABBIONI	12.5	40	19.1261	24.4156	14.2005	0	14.2005
6	0.427018	9.35798	Rilevato	0	35	10.1143	12.9115	18.4396	0	18.4396
7	0.427018	10.0999	Rilevato	0	35	10.83	13.8252	19.7445	0	19.7445
8	0.427018	10.7822	Rilevato	0	35	11.4693	14.6412	20.9098	0	20.9098
9	0.427018	11.4036	Rilevato	0	35	12.032	15.3596	21.9357	0	21.9357
10	0.427018	11.9627	Rilevato	0	35	12.5183	15.9804	22.8225	0	22.8225
11	0.427018	12.4582	Rilevato	0	35	12.9282	16.5036	23.5696	0	23.5696
12	0.427018	12.8884	Rilevato	0	35	13.2613	16.9289	24.1769	0	24.1769
13	0.427018	13.2518	Rilevato	0	35	13.5177	17.2561	24.6442	0	24.6442
14	0.427018	13.5465	Rilevato	0	35	13.697	17.4851	24.9713	0	24.9713
15	0.427018	13.7705	Rilevato	0	35	13.799	17.6153	25.1573	0	25.1573
16	0.427018	13.922	Rilevato	0	35	13.8234	17.6464	25.2017	0	25.2017
17	0.427018	13.9985	Rilevato	0	35	13.7697	17.5779	25.1038	0	25.1038
18	0.427018	13.9977	Rilevato	0	35	13.6376	17.4092	24.8629	0	24.8629
19	0.427018	13.9171	Rilevato	0	35	13.4265	17.1397	24.478	0	24.478
20	0.427018	13.7536	Rilevato	0	35	13.1358	16.7686	23.948	0	23.948
21	0.427018	12.4607	Rilevato	0	35	11.7782	15.0356	21.473	0	21.473
22	0.427018	9.8578	Rilevato	0	35	9.21915	11.7688	16.8076	0	16.8076
23	0.427018	7.16029	Rilevato	0	35	6.62323	8.45495	12.0749	0	12.0749
24	0.427018	4.36595	Rilevato	0	35	3.99293	5.09721	7.27957	0	7.27957
25	0.427018	1.47046	Rilevato	0	35	1.51584	1.93506	2.76355	0	2.76355

List Of Coordinates

Water Table

X	Y
-14.5899	21.3737
134.615	21.3737

Line Load

X	Y
56.1701	27.7613
65.6701	27.7613

External Boundary

X	Y
-14.5899	21.9148
-14.5899	6.37373
-14.5899	-13.3686
134.615	-13.3686
134.615	6.37373
134.615	21.4065
110.92	21.4065
76.9878	21.4065
76.8378	21.4194
76.8378	22.4062

76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
76.0878	21.4178
76.2374	21.4181
76.2374	22.4067

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
47.6476	22.5296
47.6476	21.5298
47.6476	21.358

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
-14.5899	6.37373
134.615	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298

1.1.9 Configurazione rilevato "progetto" Post piena – lato Tevere - tensioni efficaci, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Tevere_STAT POST PIENA_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500

Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 2.170980
- Center: 74.899, 38.326
- Radius: 17.867
- Left Slip Surface Endpoint: 60.490, 27.761
- Right Slip Surface Endpoint: 80.640, 21.407
- Resisting Moment=15772.9 kN-m
- Driving Moment=7265.34 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1760
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.17098**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.820948	7.6613	Rilevato_rid	0	29.3	4.15716	9.02512	16.0826	0	16.0826
2	0.820948	21.9557	Rilevato_rid	0	29.3	7.80827	16.9516	30.2073	0	30.2073
3	0.820948	34.4022	Rilevato_rid	0	29.3	11.1678	24.245	43.2041	0	43.2041
4	0.820948	45.348	Rilevato_rid	0	29.3	14.2618	30.962	55.1737	0	55.1737
5	0.820948	55.0289	Rilevato_rid	0	29.3	17.1123	37.1504	66.2013	0	66.2013
6	0.820948	63.6134	Rilevato_rid	0	29.3	18.9881	41.2227	76.8561	3.39813	73.458
7	0.820948	71.2952	Rilevato_rid	0	29.3	18.4186	39.9865	79.7072	8.45218	71.255
8	0.820948	78.307	Rilevato_rid	0	29.3	18.7862	40.7845	85.6017	12.9246	72.6771
9	0.820948	84.461	Rilevato_rid	0	29.3	19.8836	43.167	93.7872	16.8646	76.9226
10	0.820948	84.9363	Rilevato_rid	0	29.3	19.4872	42.3064	95.7001	20.3109	75.3892
11	0.820948	81.6874	Rilevato_rid	0	29.3	18.0969	39.2881	93.305	23.2945	70.0105
12	0.820948	77.7787	Rilevato_rid	0	29.3	16.5705	35.9742	89.9453	25.8401	64.1052
13	0.820948	73.2398	Rilevato_rid	0	29.3	14.9116	32.3728	85.6549	27.9673	57.6876
14	0.820948	68.0941	Rilevato_rid	0	29.3	13.1228	28.4893	80.459	29.6916	50.7674
15	0.820948	62.3597	Rilevato_rid	0	29.3	11.2051	24.326	74.3737	31.0252	43.3485
16	0.820948	56.0503	Rilevato_rid	0	29.3	9.15844	19.8828	67.4078	31.977	35.4308
17	0.820948	49.1751	Rilevato_rid	0	29.3	7.59597	16.4907	59.5329	30.1468	29.3861
18	0.820948	41.7399	Rilevato_rid	0	29.3	6.40411	13.9032	50.8283	26.0531	24.7752
19	0.820948	33.7465	Rilevato_rid	0	29.3	5.43943	11.8089	41.344	20.3008	21.0432
20	0.170451	7.09468	Aoc TE_rid	12	23	13.8594	30.0884	42.6137	0	42.6137

21	0.6	27.5124	CLS	500	0	230.311	500	67.3367	0	67.3367
22	0.945527	14.5612	Aoc TE_rid	12	23	8.77429	19.0488	16.6059	0	16.6059
23	0.945527	11.1181	Aoc TE_rid	12	23	8.13272	17.656	13.3246	0	13.3246
24	0.945527	7.36343	Aoc TE_rid	12	23	7.41157	16.0904	9.63631	0	9.63631
25	0.945527	2.62226	Aoc TE_rid	12	23	6.45957	14.0236	4.76728	0	4.76728

List Of Coordinates

Water Table

X	Y
10.9201	23.8028
73.5758	23.8028
74.9919	23.047
75.8624	22.4157
76.1497	21.9143
76.2374	21.4065
110.92	21.4065

Line Load

X	Y
65.6701	27.7613
56.1701	27.7613

External Boundary

X	Y
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236
110.92	-8.34236
110.92	6.37373
110.92	21.4065
76.9878	21.4065

Material Boundary

X	Y
47.6476	21.358
76.0878	21.4178

Material Boundary

X	Y
76.2374	22.4067
76.2374	21.4181
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
47.6476	21.5298

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298
47.6476	22.5296

1.1.10 Configurazione rilevato "progetto" Post piena – lato Monterotondo - tensioni totali, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Monter_STAT POST PIENA_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Normal to boundary

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]			12.5	0	
Friction Angle [deg]			40	29.3	
Cohesion Type	50	27			500
Water Surface	None	None	Water Table	Water Table	None
Hu Value			1	1	
Ru Value	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.234230
- Center: 43.280, 38.597
- Radius: 17.213
- Left Slip Surface Endpoint: 45.648, 21.548
- Right Slip Surface Endpoint: 56.654, 27.761
- Left Slope Intercept: 45.648 22.530
- Right Slope Intercept: 56.654 27.761
- Resisting Moment=3918.42 kN-m
- Driving Moment=3174.79 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1601
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.23423**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.4	6.47282	GABBIONI	12.5	40	19.1661	23.6554	13.2945	0	13.2945
2	0.4	11.1295	GABBIONI	12.5	40	25.9592	32.0396	23.2863	0	23.2863
3	0.4	12.3201	GABBIONI	12.5	40	27.3614	33.7703	25.349	0	25.349
4	0.4	11.7435	GABBIONI	12.5	40	26.1109	32.2269	23.5096	0	23.5096
5	0.4	11.099	GABBIONI	12.5	40	24.7917	30.5987	21.5692	0	21.5692
6	0.450319	13.5369	Rilevato_rid	0	29.3	12.1416	14.9855	26.7039	0	26.7039
7	0.450319	14.9056	Rilevato_rid	0	29.3	10.9363	13.4979	29.7536	5.7006	24.053
8	0.450319	16.165	Rilevato_rid	0	29.3	10.4421	12.8879	32.3852	9.41922	22.966
9	0.450319	17.3121	Rilevato_rid	0	29.3	10.7688	13.2912	34.4872	10.8026	23.6846
10	0.450319	18.3436	Rilevato_rid	0	29.3	11.1996	13.8229	36.2598	11.6278	24.632
11	0.450319	19.2556	Rilevato_rid	0	29.3	12.5272	15.4615	37.3385	9.78644	27.552
12	0.450319	20.0439	Rilevato_rid	0	29.3	13.7684	16.9934	38.0773	7.79534	30.282
13	0.450319	20.7036	Rilevato_rid	0	29.3	14.9219	18.417	38.4674	5.64853	32.8188
14	0.450319	21.229	Rilevato_rid	0	29.3	15.9861	19.7305	38.4985	3.33925	35.1593
15	0.450319	21.6137	Rilevato_rid	0	29.3	16.9589	20.9312	38.1587	0.859772	37.2989
16	0.450319	21.8505	Rilevato_rid	0	29.3	17.2004	21.2293	37.8302	0	37.8302
17	0.450319	21.931	Rilevato_rid	0	29.3	16.9987	20.9803	37.3864	0	37.3864
18	0.450319	21.8454	Rilevato_rid	0	29.3	16.6599	20.5621	36.6412	0	36.6412
19	0.450319	21.5824	Rilevato_rid	0	29.3	16.1803	19.9702	35.5864	0	35.5864
20	0.450319	20.4423	Rilevato_rid	0	29.3	15.0504	18.5757	33.1015	0	33.1015
21	0.450319	17.3481	Rilevato_rid	0	29.3	12.5279	15.4623	27.5536	0	27.5536
22	0.450319	13.9419	Rilevato_rid	0	29.3	9.86129	12.1711	21.6887	0	21.6887
23	0.450319	10.2872	Rilevato_rid	0	29.3	7.11443	8.78084	15.6473	0	15.6473
24	0.450319	6.35595	Rilevato_rid	0	29.3	4.56077	5.62904	10.0308	0	10.0308
25	0.450319	2.16165	Rilevato_rid	0	29.3	4.96766	6.13123	10.9257	0	10.9257

List Of Coordinates

Water Table

X	Y
10.9201	21.3538
45.6476	21.3538
45.6476	21.5298
47.6476	21.5298
48.527	23.082
49.61	23.8028
110.92	23.8028

Line Load

X	Y
65.6701	27.7613
56.1701	27.7613

External Boundary

X	Y
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236
110.92	-8.34236
110.92	6.37373
110.92	21.4065
76.9878	21.4065

Material Boundary

X	Y
47.6476	21.358
76.0878	21.4178

Material Boundary

X	Y
76.2374	22.4067

76.2374	21.4181
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
47.6476	21.5298

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298
47.6476	22.5296

1.1.11 Configurazione rilevato "progetto" Post piena – lato Monterotondo - tensioni efficaci, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez24_configur Finale_lato Monter_STAT POST PIENA_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]			12.5	0	
Friction Angle [deg]			40	29.3	
Cohesion Type	50	27			500
Water Surface	None	None	Water Table	Water Table	None
Hu Value			1	1	
Ru Value	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.234230
- Center: 43.280, 38.597
- Radius: 17.213
- Left Slip Surface Endpoint: 45.648, 21.548
- Right Slip Surface Endpoint: 56.654, 27.761
- Left Slope Intercept: 45.648 22.530
- Right Slope Intercept: 56.654 27.761
- Resisting Moment=3918.42 kN-m
- Driving Moment=3174.79 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1601
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.23423**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.4	6.47282	GABBIONI	12.5	40	19.1661	23.6554	13.2945	0	13.2945
2	0.4	11.1295	GABBIONI	12.5	40	25.9592	32.0396	23.2863	0	23.2863
3	0.4	12.3201	GABBIONI	12.5	40	27.3614	33.7703	25.349	0	25.349
4	0.4	11.7435	GABBIONI	12.5	40	26.1109	32.2269	23.5096	0	23.5096
5	0.4	11.099	GABBIONI	12.5	40	24.7917	30.5987	21.5692	0	21.5692
6	0.450319	13.5369	Rilevato_rid	0	29.3	12.1416	14.9855	26.7039	0	26.7039
7	0.450319	14.9056	Rilevato_rid	0	29.3	10.9363	13.4979	29.7536	5.7006	24.053
8	0.450319	16.165	Rilevato_rid	0	29.3	10.4421	12.8879	32.3852	9.41922	22.966
9	0.450319	17.3121	Rilevato_rid	0	29.3	10.7688	13.2912	34.4872	10.8026	23.6846
10	0.450319	18.3436	Rilevato_rid	0	29.3	11.1996	13.8229	36.2598	11.6278	24.632
11	0.450319	19.2556	Rilevato_rid	0	29.3	12.5272	15.4615	37.3385	9.78644	27.552
12	0.450319	20.0439	Rilevato_rid	0	29.3	13.7684	16.9934	38.0773	7.79534	30.282
13	0.450319	20.7036	Rilevato_rid	0	29.3	14.9219	18.417	38.4674	5.64853	32.8188
14	0.450319	21.229	Rilevato_rid	0	29.3	15.9861	19.7305	38.4985	3.33925	35.1593
15	0.450319	21.6137	Rilevato_rid	0	29.3	16.9589	20.9312	38.1587	0.859772	37.2989
16	0.450319	21.8505	Rilevato_rid	0	29.3	17.2004	21.2293	37.8302	0	37.8302
17	0.450319	21.931	Rilevato_rid	0	29.3	16.9987	20.9803	37.3864	0	37.3864
18	0.450319	21.8454	Rilevato_rid	0	29.3	16.6599	20.5621	36.6412	0	36.6412
19	0.450319	21.5824	Rilevato_rid	0	29.3	16.1803	19.9702	35.5864	0	35.5864
20	0.450319	20.4423	Rilevato_rid	0	29.3	15.0504	18.5757	33.1015	0	33.1015
21	0.450319	17.3481	Rilevato_rid	0	29.3	12.5279	15.4623	27.5536	0	27.5536
22	0.450319	13.9419	Rilevato_rid	0	29.3	9.86129	12.1711	21.6887	0	21.6887
23	0.450319	10.2872	Rilevato_rid	0	29.3	7.11443	8.78084	15.6473	0	15.6473
24	0.450319	6.35595	Rilevato_rid	0	29.3	4.56077	5.62904	10.0308	0	10.0308
25	0.450319	2.16165	Rilevato_rid	0	29.3	4.96766	6.13123	10.9257	0	10.9257

List Of Coordinates

Water Table

X	Y
10.9201	21.3538
45.6476	21.3538
45.6476	21.5298
47.6476	21.5298
48.527	23.082
49.61	23.8028

110.92	23.8028

Line Load

X	Y
65.6701	27.7613
56.1701	27.7613

External Boundary

X	Y
76.8378	21.4194
76.8378	22.4062
76.2374	22.4067
67.7701	27.8113
65.6701	27.7613
56.1701	27.7613
54.0701	27.8113
47.6476	23.5296
46.1476	23.5296
46.1476	22.5296
45.6476	22.5296
45.6476	21.5298
45.6476	21.3538
44.9605	21.3538
10.9201	21.9148
10.9201	6.37373
10.9201	-8.34236
110.92	-8.34236
110.92	6.37373
110.92	21.4065
76.9878	21.4065

Material Boundary

X	Y
47.6476	21.358
76.0878	21.4178

Material Boundary

X	Y
76.2374	22.4067
76.2374	21.4181
76.0878	21.4178
76.0878	20.6065
76.2582	20.6065
76.2582	15.6065
76.8582	15.6065
76.8582	20.6065
76.9878	20.6065
76.9878	21.4065

Material Boundary

X	Y
46.1476	22.5296
47.6476	22.5296
47.6476	23.5296

Material Boundary

X	Y
45.6476	21.3538
45.6476	19.5283
46.1397	19.5283
46.1394	20.5191
47.6476	20.5195
47.6476	21.358
47.6476	21.5298

Material Boundary

X	Y
47.6476	20.5195
76.0878	20.3956
76.0878	20.6065

Material Boundary

X	Y
10.9201	6.37373
110.92	6.37373

Material Boundary

X	Y
76.2374	21.4181
76.8378	21.4194

Material Boundary

X	Y
45.6476	21.5298
47.6476	21.5298
47.6476	22.5296

1.2 ASSE 1 – SEZ.2 [PRG. 0+050] - SEZIONE TIPO 2

1.2.1 Configurazione rilevato di "precarica" – lato Tevere - tensioni totali, condizioni statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_PREC_lato Tevere-STAT TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10

- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Argine_rid	S-Gh rid	Rilevato_rid
Color						
Strength Type	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	19	19	19	18	18	18
Cohesion [kPa]				0	0	0
Friction Angle [deg]				24.8	29.3	29.3
Cohesion Type	50	27	34.5			
Water Surface	None	None	None	Water Table	Water Table	Water Table
Hu Value				0	0	1
Ru Value	0	0	0			

Global Minimums

Method: bishop simplified

- FS: 2.234000
- Center: 86.076, 37.124
- Radius: 36.369
- Left Slip Surface Endpoint: 51.299, 26.482
- Right Slip Surface Endpoint: 118.520, 20.691
- Left Slope Intercept: 51.299 26.482
- Right Slope Intercept: 118.520 24.064
- Resisting Moment=119120 kN-m
- Driving Moment=53321.3 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1923
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.234**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	1.70723	88.7851	Rilevato_rid	0	29.3	7.86446	17.5692	31.308	0	31.308

2	0.233452	25.6999	Rilevato_rid	0	29.3	17.9805	40.1684	71.5792	0	71.5792
3	2.90853	502.047	Aoc TT_rid	50	0	22.3814	50	133.917	0	133.917
4	2.90853	744.5	Aoc TT_rid	50	0	22.3814	50	227.657	0	227.657
5	2.90853	925.855	Aoc TT_rid	50	0	22.3814	50	296.137	0	296.137
6	2.90853	1069.67	Aoc TT_rid	50	0	22.3814	50	349.908	0	349.908
7	2.90853	1185.85	Aoc TT_rid	50	0	22.3814	50	393.222	0	393.222
8	2.81438	1189.31	Anc1 z=15-20 TT_rid	27	0	12.0859	27	416.24	0	416.24
9	2.81438	1166.71	Anc1 z=15-20 TT_rid	27	0	12.0859	27	409.477	0	409.477
10	2.81438	1183.03	Anc1 z=15-20 TT_rid	27	0	12.0859	27	416.412	0	416.412
11	2.81438	1225.53	Anc1 z=15-20 TT_rid	27	0	12.0859	27	432.564	0	432.564
12	2.81438	1285.46	Anc1 z=15-20 TT_rid	27	0	12.0859	27	454.854	0	454.854
13	2.81438	1340.22	Anc1 z=15-20 TT_rid	27	0	12.0859	27	475.263	0	475.263
14	2.81438	1272.91	Anc1 z=15-20 TT_rid	27	0	12.0859	27	452.288	0	452.288
15	2.81438	1203.24	Anc1 z=15-20 TT_rid	27	0	12.0859	27	428.474	0	428.474
16	2.81438	1144.45	Anc1 z=15-20 TT_rid	27	0	12.0859	27	408.539	0	408.539
17	2.81438	1104.42	Anc1 z=15-20 TT_rid	27	0	12.0859	27	395.309	0	395.309
18	2.81438	1061.93	Anc1 z=15-20 TT_rid	27	0	12.0859	27	381.26	0	381.26
19	2.81438	1005.81	Anc1 z=15-20 TT_rid	27	0	12.0859	27	362.458	0	362.458
20	2.81438	934.705	Anc1 z=15-20 TT_rid	27	0	12.0859	27	338.461	0	338.461
21	2.8302	851.1	Aoc TT_rid	50	0	22.3814	50	315.173	0	315.173
22	2.8302	741.75	Aoc TT_rid	50	0	22.3814	50	279.792	0	279.792
23	2.8302	607.249	Aoc TT_rid	50	0	22.3814	50	236.41	0	236.41
24	2.8302	439.076	Aoc TT_rid	50	0	22.3814	50	182.75	0	182.75
25	2.8302	219.415	Aoc TT_rid	50	0	22.3814	50	114.519	0	114.519

List Of Coordinates

Water Table

X	Y
16.775	25.678
32.6765	25.678
42.9731	24.9239
47.7404	23.355
52.0282	20.6673
73.2334	20.6673
77.1178	22.9127
79.1647	23.8091
80.5739	24.0637
84.0536	24.0637
87.1773	24.0637
121.553	24.0637

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
79.6104	24.9208
79.5062	24.9208
73.2186	24.9208
72.0906	25.6742
69.539	27.3785
68.9123	27.7971
67.7701	28.56
65.5373	28.56
60.9201	28.56
56.1701	28.56
55.6055	28.56
54.0701	28.56
52.5681	27.4412
52.2449	27.1912
50.9114	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

Material Boundary

X	Y
73.2334	20.6673
79.6104	24.9208

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
48.7476	24.5685
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654
72.111	20.6666
72.711	20.6666
73.2334	20.6673
92.236	20.6912

Material Boundary

X	Y
48.7476	24.5685
50.9114	26.1912

1.2.2 Configurazione rilevato "progetto" – lato Tevere - tensioni totali, cond. statiche

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_FINALE_lato Tevere-STAT TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program

- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 26
- Orientation: Vertical

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Argine_rid	S-Gh rid	GABBIONI	Rilevato_rid	CLS
Color								
Strength Type	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	18	18	17	18	25
Cohesion [kPa]				0	0	12.5	0	
Friction Angle [deg]				24.8	29.3	40	29.3	
Cohesion Type	50	27	34.5					500
Water Surface	None	None	None	Water Table	Water Table	Water Table	Water Table	None
Hu Value				0	0	1	1	
Ru Value	0	0	0					0

Global Minimums

Method: bishop simplified

- FS: 2.272110
- Center: 85.317, 32.274
- Radius: 31.579
- Left Slip Surface Endpoint: 54.072, 27.692
- Right Slip Surface Endpoint: 114.696, 20.691
- Left Slope Intercept: 54.072 27.692
- Right Slope Intercept: 114.696 24.064
- Resisting Moment=96801 kN-m
- Driving Moment=42604 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1813
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.27211**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.29209	164.48	Rilevato_rid	0	29.3	9.29629	21.1222	41.4138	3.77443	37.6394
2	2.38107	444.167	Aoc TT_rid	50	0	22.006	50	171.38	0	171.38
3	2.38107	620.665	Aoc TT_rid	50	0	22.006	50	256.784	0	256.784
4	2.38107	750.855	Aoc TT_rid	50	0	22.006	50	317.89	0	317.89
5	2.38107	852.293	Aoc TT_rid	50	0	22.006	50	362.561	0	362.561
6	2.38107	935.815	Aoc TT_rid	50	0	22.006	50	377.432	0	377.432
7	2.43539	988.681	Anc1 z=15-20 TT_rid	27	0	11.8832	27	399.074	0	399.074
8	2.43539	1040.27	Anc1 z=15-20 TT_rid	27	0	11.8832	27	421.574	0	421.574
9	2.43539	980.723	Anc1 z=15-20 TT_rid	27	0	11.8832	27	398.298	0	398.298
10	2.43539	1017.4	Anc1 z=15-20 TT_rid	27	0	11.8832	27	414.422	0	414.422
11	2.43539	1071.51	Anc1 z=15-20 TT_rid	27	0	11.8832	27	437.638	0	437.638
12	2.43539	1152.13	Anc1 z=15-20 TT_rid	27	0	11.8832	27	471.692	0	471.692
13	2.43539	1156.36	Anc1 z=15-20 TT_rid	27	0	11.8832	27	474.355	0	474.355
14	2.43539	1090.8	Anc1 z=15-20 TT_rid	27	0	11.8832	27	448.354	0	448.354
15	2.43539	1038.37	Anc1 z=15-20 TT_rid	27	0	11.8832	27	427.75	0	427.75
16	2.43539	988.755	Anc1 z=15-20 TT_rid	27	0	11.8832	27	408.331	0	408.331
17	2.43539	950.419	Anc1 z=15-20 TT_rid	27	0	11.8832	27	393.587	0	393.587
18	2.43539	913.74	Anc1 z=15-20 TT_rid	27	0	11.8832	27	379.593	0	379.593
19	2.43539	866.449	Anc1 z=15-20 TT_rid	27	0	11.8832	27	361.345	0	361.345
20	2.43539	807.343	Anc1 z=15-20 TT_rid	27	0	11.8832	27	338.397	0	338.397
21	2.46616	743.354	Aoc TT_rid	50	0	22.006	50	317.068	0	317.068
22	2.46616	651.795	Aoc TT_rid	50	0	22.006	50	283.513	0	283.513
23	2.46616	538.454	Aoc TT_rid	50	0	22.006	50	242.277	0	242.277
24	2.46616	394.312	Aoc TT_rid	50	0	22.006	50	190.835	0	190.835
25	2.46616	197.316	Aoc TT_rid	50	0	22.006	50	124.075	0	124.075

List Of Coordinates

Water Table

X	Y
16.775	24.0637
121.553	24.0637

Line Load

X	Y
56.1701	27.6425
60.9201	27.7613

65.6701	27.6425

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
78.3069	24.0514
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885

53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2526
72.711	23.2526
72.8406	23.2526
72.8408	24.0525

Material Boundary

X	Y
72.111	23.2526
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666
72.711	23.2526

Material Boundary

X	Y
72.711	20.6666
92.236	20.6912

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912

52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.2.3 Configurazione rilevato "progetto" – lato Tevere - tensioni efficaci, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_FINALE_lato Tevere-STAT TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 26
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	Argine_rid	S-Gh rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	18	18	17	18	25
Cohesion [kPa]	12	0	0	0	12.5	0	
Friction Angle [deg]	23	23	24.8	29.3	40	29.3	
Cohesion Type							500
Water Surface	Water Table	Water Table	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	0	0	1	1	
Ru Value							0

Global Minimums

Method: bishop simplified

- FS: 2.829770
- Center: 71.195, 34.275
- Radius: 12.464
- Left Slip Surface Endpoint: 60.574, 27.753
- Right Slip Surface Endpoint: 78.559, 24.220
- Resisting Moment=10476.7 kN-m
- Driving Moment=3702.31 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2078
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.82977**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.721054	6.86635	Rilevato_rid	0	29.3	5.46776	15.4725	27.5716	0	27.5716
2	0.721054	19.0772	Rilevato_rid	0	29.3	8.41538	23.8136	42.4353	0	42.4353
3	0.721054	29.1139	Rilevato_rid	0	29.3	10.9814	31.0748	55.3748	0	55.3748
4	0.721054	37.5762	Rilevato_rid	0	29.3	13.2452	37.4809	66.7903	0	66.7903
5	0.721054	44.7848	Rilevato_rid	0	29.3	15.2524	43.1607	76.9115	0	76.9115
6	0.721054	50.9471	Rilevato_rid	0	29.3	16.4848	46.6481	86.2478	3.12189	83.1259
7	0.721054	56.2057	Rilevato_rid	0	29.3	17.3137	48.9938	94.5792	7.27338	87.3059
8	0.721054	60.8615	Rilevato_rid	0	29.3	13.6898	38.7389	79.8511	10.819	69.0321
9	0.721054	65.0481	Rilevato_rid	0	29.3	14.0717	39.8198	84.7739	13.8158	70.9581
10	0.721054	68.5645	Rilevato_rid	0	29.3	14.698	41.5921	90.4224	16.3062	74.1162
11	0.721054	68.0941	Rilevato_rid	0	29.3	14.3747	40.6772	90.8084	18.3224	72.486
12	0.721054	65.2048	Rilevato_rid	0	29.3	13.4806	38.1469	87.8653	19.8883	67.977
13	0.721054	62.3067	Rilevato_rid	0	29.3	12.6412	35.7718	84.766	21.0215	63.7445
14	0.721054	57.0104	Rilevato_rid	0	29.3	11.2108	31.7241	78.2658	21.734	56.5318
15	0.721054	51.1673	Rilevato_rid	0	29.3	9.67757	27.3853	70.8334	22.0333	48.8001
16	0.721054	45.8818	Rilevato_rid	0	29.3	8.34524	23.6151	64.004	21.9224	42.0816
17	0.6	47.1622	CLS	500	0	176.693	500	95.9282	0	95.9282
18	0.731015	28.3429	Argine_rid	0	24.8	6.49293	18.3735	39.7639	0	39.7639
19	0.731015	25.8497	Argine_rid	0	24.8	5.9836	16.9322	36.6445	0	36.6445
20	0.731015	23.4772	Argine_rid	0	24.8	5.49402	15.5468	33.6465	0	33.6465
21	0.731015	20.4717	Argine_rid	0	24.8	4.84661	13.7148	29.6816	0	29.6816
22	0.731015	16.7951	Argine_rid	0	24.8	4.02637	11.3937	24.6583	0	24.6583
23	0.731015	12.3969	Argine_rid	0	24.8	3.01317	8.52658	18.4533	0	18.4533
24	0.731015	7.20939	Argine_rid	0	24.8	1.77952	5.03562	10.8981	0	10.8981

25	0.731015	1.49404	Argine_rid	0	24.8	0.375349	1.06215	2.2987	0	2.2987

List Of Coordinates

Water Table

X	Y
16.775	24.0637
121.553	24.0637

Line Load

X	Y
56.1701	27.6425
60.9201	27.7613
65.6701	27.6425

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
78.3069	24.0514
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912

27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2526
72.711	23.2526
72.8406	23.2526
72.8408	24.0525

Material Boundary

X	Y
72.111	23.2526
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666
72.711	23.2526

Material Boundary

X	Y
72.711	20.6666
92.236	20.6912

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912
52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.2.4 Configurazione rilevato "progetto" – lato Tevere - tensioni totali, cond. sismiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_FINALE_lato Tevere-SISM TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- Seismic Load Coefficient (Horizontal): 0.08
- Seismic Load Coefficient (Vertical): 0.04
- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	Anc2 z=20-25 TT	Argine_rid	S-Gh	GABBIONI	Rilevato	CLS
Color								
Strength Type	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	18	18	17	18	25
Cohesion [kPa]				0	0	12.5	0	
Friction Angle [deg]				24.8	35	40	35	
Cohesion Type	75	38	48.5					500
Water Surface	None	None	None	Water Table	Water Table	Water Table	Water Table	None
Hu Value				0	0	1	0	
Ru Value	0	0	0					0

Global Minimums

Method: bishop simplified

- FS: 1.992950
- Center: 88.702, 32.811
- Radius: 35.005
- Left Slip Surface Endpoint: 54.073, 27.692
- Right Slip Surface Endpoint: 121.542, 20.691
- Left Slope Intercept: 54.073 27.692
- Right Slope Intercept: 121.542 24.064
- Resisting Moment=175889 kN-m
- Driving Moment=88255.5 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1862
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.99295**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.18574	156.886	Rilevato	0	35	11.5269	22.9726	32.8083	0	32.8083
2	2.57745	496.907	Aoc TT	75	0	37.6327	75	137.846	0	137.846
3	2.57745	714.765	Aoc TT	75	0	37.6327	75	246.891	0	246.891
4	2.57745	873.734	Aoc TT	75	0	37.6327	75	322.673	0	322.673
5	2.57745	998.29	Aoc TT	75	0	37.6327	75	376.671	0	376.671
6	2.73877	1162.62	Anc1 z=15-20 TT	38	0	19.0672	38	427.412	0	427.412
7	2.73877	1187.85	Anc1 z=15-20 TT	38	0	19.0672	38	439.597	0	439.597
8	2.73877	1244.11	Anc1 z=15-20 TT	38	0	19.0672	38	463.16	0	463.16
9	2.78332	1254.52	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	459.419	0	459.419
10	2.78332	1328.95	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	489.513	0	489.513
11	2.78332	1443.38	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	534.388	0	534.388
12	2.78332	1450.72	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	539.142	0	539.142
13	2.78332	1379.42	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	514.349	0	514.349
14	2.78332	1331.95	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	497.896	0	497.896
15	2.78332	1289.16	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	483.327	0	483.327
16	2.78332	1263.83	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	475.851	0	475.851
17	2.78332	1227.55	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	464.413	0	464.413
18	2.78332	1177.97	Anc2 z=20-25 TT	48.5	0	24.3358	48.5	448.164	0	448.164
19	2.73877	1096.71	Anc1 z=15-20 TT	38	0	19.0672	38	424.399	0	424.399
20	2.73877	1019.22	Anc1 z=15-20 TT	38	0	19.0672	38	397.176	0	397.176
21	2.73877	923.755	Anc1 z=15-20 TT	38	0	19.0672	38	363.529	0	363.529
22	2.6767	789.749	Aoc TT	75	0	37.6327	75	339.616	0	339.616
23	2.6767	651.32	Aoc TT	75	0	37.6327	75	294.177	0	294.177
24	2.6767	475.062	Aoc TT	75	0	37.6327	75	238.262	0	238.262
25	2.6767	232.061	Aoc TT	75	0	37.6327	75	168.179	0	168.179

List Of Coordinates

Water Table

X	Y
16.775	24.0637
121.553	24.0637

Line Load

X	Y
56.1701	27.6425
60.9201	27.7613
65.6701	27.6425

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
78.3069	24.0514
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885

53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2526
72.711	23.2526
72.8406	23.2526
72.8408	24.0525

Material Boundary

X	Y
72.111	23.2526
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666
72.711	23.2526

Material Boundary

X	Y
72.711	20.6666
92.236	20.6912

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912
52.0681	26.1912

54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.2.5 Configurazione rilevato "progetto" Post piena – lato Tevere - tensioni totali, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_POST PIENA_lato Tevere-STAT TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25

- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Argine_rid	S-Gh rid	GABBIONI	Rilevato_rid	CLS
Color								
Strength Type	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	18	18	17	18	25
Cohesion [kPa]				0	0	12.5	0	
Friction Angle [deg]				24.8	29.3	40	29.3	
Cohesion Type	50	27	34.5					500

Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Global Minimums

Method: bishop simplified

- FS: 2.470580
- Center: 85.320, 32.273
- Radius: 31.578
- Left Slip Surface Endpoint: 54.076, 27.692
- Right Slip Surface Endpoint: 114.698, 20.691
- Left Slope Intercept: 54.076 27.692
- Right Slope Intercept: 114.698 24.064
- Resisting Moment=97226.6 kN-m
- Driving Moment=39353.8 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1951
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.47058**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.29209	164.479	Rilevato_rid	0	29.3	9.21083	22.7561	40.5508	0	40.5508
2	2.38118	444.192	Aoc TT_rid	50	0	20.2382	50	160.689	0	160.689
3	2.38118	620.699	Aoc TT_rid	50	0	20.2382	50	245.187	0	245.187
4	2.38118	750.888	Aoc TT_rid	50	0	20.2382	50	305.773	0	305.773
5	2.38118	852.329	Aoc TT_rid	50	0	20.2382	50	351.349	0	351.349
6	2.38118	935.834	Aoc TT_rid	50	0	20.2382	50	378.679	0	378.679
7	2.43517	988.477	Anc1 z=15-20 TT_rid	27	0	10.9286	27	399.58	0	399.58
8	2.43517	1040.02	Anc1 z=15-20 TT_rid	27	0	10.9286	27	421.963	0	421.963
9	2.43517	980.611	Anc1 z=15-20 TT_rid	27	0	10.9286	27	398.641	0	398.641
10	2.43517	1017.28	Anc1 z=15-20 TT_rid	27	0	10.9286	27	414.679	0	414.679
11	2.43517	1071.47	Anc1 z=15-20 TT_rid	27	0	10.9286	27	437.852	0	437.852
12	2.43517	1152.04	Anc1 z=15-20 TT_rid	27	0	10.9286	27	471.813	0	471.813
13	2.43517	1156.16	Anc1 z=15-20 TT_rid	27	0	10.9286	27	474.353	0	474.353
14	2.43517	1090.59	Anc1 z=15-20 TT_rid	27	0	10.9286	27	448.276	0	448.276
15	2.43517	1038.2	Anc1 z=15-20 TT_rid	27	0	10.9286	27	427.61	0	427.61
16	2.43517	988.606	Anc1 z=15-20 TT_rid	27	0	10.9286	27	408.12	0	408.12
17	2.43517	950.303	Anc1 z=15-20 TT_rid	27	0	10.9286	27	393.307	0	393.307
18	2.43517	913.634	Anc1 z=15-20 TT_rid	27	0	10.9286	27	379.23	0	379.23

19	2.43517	866.355	Anc1 z=15-20 TT_rid	27	0	10.9286	27	360.891	0	360.891
20	2.43517	807.264	Anc1 z=15-20 TT_rid	27	0	10.9286	27	337.84	0	337.84
21	2.46626	743.387	Aoc TT_rid	50	0	20.2382	50	315.81	0	315.81
22	2.46626	651.826	Aoc TT_rid	50	0	20.2382	50	281.968	0	281.968
23	2.46626	538.481	Aoc TT_rid	50	0	20.2382	50	240.353	0	240.353
24	2.46626	394.333	Aoc TT_rid	50	0	20.2382	50	188.347	0	188.347
25	2.46626	197.326	Aoc TT_rid	50	0	20.2382	50	120.531	0	120.531

List Of Coordinates

Water Table

X	Y
16.775	25.8483
69.6888	25.8483
71.0377	25.1544
72.0906	24.0637
72.6906	24.0637
121.553	24.0637

Line Load

X	Y
56.1701	27.6425
60.9201	27.7613
65.6701	27.6425

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
78.3069	24.0514
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925

65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2526
72.711	23.2526
72.8406	23.2526
72.8408	24.0525

Material Boundary

X	Y

72.111	23.2526
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666
72.711	23.2526

Material Boundary

X	Y
72.711	20.6666
92.236	20.6912

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912
52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.2.6 Configurazione rilevato "progetto" Post piena – lato Tevere - tensioni efficaci, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_POST PIENA_lato Tevere-STAT TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 12
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	Argine_rid	S-Gh rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	18	18	17	18	25
Cohesion [kPa]	12	0	0	0	12.5	0	
Friction Angle [deg]	23	23	24.8	29.3	40	29.3	
Cohesion Type							500
Water Surface	Water Table	Water Table	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	0	0	1	1	
Ru Value							0

Global Minimums

Method: bishop simplified

- FS: 2.841870
- Center: 71.197, 34.179
- Radius: 12.375
- Left Slip Surface Endpoint: 60.622, 27.754
- Right Slip Surface Endpoint: 78.318, 24.059
- Left Slope Intercept: 60.622 27.754
- Right Slope Intercept: 78.318 24.064
- Resisting Moment=8808.6 kN-m
- Driving Moment=3099.57 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2111
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.84187**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.718081	6.85561	Rilevato_rid	0	29.3	3.29859	9.37416	16.7046	0	16.7046
2	0.718081	19.054	Rilevato_rid	0	29.3	6.15176	17.4825	31.1535	0	31.1535
3	0.718081	29.0744	Rilevato_rid	0	29.3	8.0402	22.8492	44.3836	3.66675	40.7169
4	0.718081	37.514	Rilevato_rid	0	29.3	9.11509	25.9039	56.4084	10.2482	46.1602
5	0.718081	44.6981	Rilevato_rid	0	29.3	10.0605	28.5907	66.8249	15.8768	50.9481
6	0.718081	50.8363	Rilevato_rid	0	29.3	10.895	30.9623	75.8857	20.7117	55.174
7	0.718081	56.0724	Rilevato_rid	0	29.3	11.6316	33.0556	83.7662	24.8618	58.9044
8	0.718081	60.7221	Rilevato_rid	0	29.3	10.2274	29.0649	80.1983	28.4053	51.793
9	0.718081	64.8879	Rilevato_rid	0	29.3	10.8152	30.7355	86.1693	31.3994	54.7699
10	0.718081	68.3801	Rilevato_rid	0	29.3	11.3957	32.3852	91.5969	33.8871	57.7098
11	0.718081	67.7667	Rilevato_rid	0	29.3	10.9964	31.2504	91.5881	35.9007	55.6874
12	0.718081	64.9685	Rilevato_rid	0	29.3	10.0879	28.6686	88.551	37.4643	51.0867
13	0.718081	62.0487	Rilevato_rid	0	29.3	9.20457	26.1582	85.2089	38.5955	46.6134
14	0.718081	56.7978	Rilevato_rid	0	29.3	8.36411	23.7697	78.4991	36.1421	42.357
15	0.718081	51.003	Rilevato_rid	0	29.3	7.52561	21.3868	70.9275	32.8166	38.1109
16	0.718081	45.7685	Rilevato_rid	0	29.3	7.63262	21.6909	64.0798	25.4271	38.6527
17	0.6	47.2573	CLS	500	0	175.94	500	96.1055	0	96.1055
18	0.70087	27.3127	Argine_rid	0	24.8	6.49717	18.4641	39.9601	0	39.9601
19	0.70087	24.9748	Argine_rid	0	24.8	6.00059	17.0529	36.906	0	36.906
20	0.70087	22.8266	Argine_rid	0	24.8	5.54209	15.7499	34.086	0	34.086
21	0.70087	20.1187	Argine_rid	0	24.8	4.93914	14.0364	30.3775	0	30.3775
22	0.70087	16.8195	Argine_rid	0	24.8	4.17873	11.8754	25.7007	0	25.7007
23	0.70087	12.8871	Argine_rid	0	24.8	3.24371	9.21819	19.9501	0	19.9501
24	0.70087	8.26639	Argine_rid	0	24.8	2.11098	5.99912	12.9833	0	12.9833
25	0.70087	2.88409	Argine_rid	0	24.8	0.74869	2.12768	4.60471	0	4.60471

List Of Coordinates

Water Table

X	Y
16.775	25.8483
69.6888	25.8483
71.0377	25.1544
72.0906	24.0637
72.6906	24.0637
121.553	24.0637

Line Load

X	Y
56.1701	27.6425

60.9201	27.7613
65.6701	27.6425

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
92.236	20.6912
83.7504	26.3482
81.7504	26.3482
78.3069	24.0514
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885

53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2526
72.711	23.2526
72.8406	23.2526
72.8408	24.0525

Material Boundary

X	Y
72.111	23.2526
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666
72.711	23.2526

Material Boundary

X	Y
72.711	20.6666
92.236	20.6912

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912

52.0681	25.8912
52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.2.7 Configurazione rilevato "progetto" Post piena con scalzamento – lato Tevere - tensioni totali, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_POST PIENA SCALZ_lato Tevere-STAT TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc3 z=25-30 TT_rid	S-Gh rid	GABBIONI	Rilevato_rid	Rilevato	CLS
Color								
Strength Type	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Infinite strength
Unit Weight [kN/m3]	19	19	19	18	17	18	18	25
Cohesion [kPa]				0	12.5	0	0	
Friction Angle [deg]				29.3	40	29.3	35	
Cohesion Type	50	27	42.5					
Water Surface	None	None	None	Water Table	Water Table	Water Table	Water Table	None
Hu Value				0	1	1	0	
Ru Value	0	0	0					0

Global Minimums

Method: bishop simplified

- FS: 1.872040
- Center: 78.517, 27.191
- Radius: 26.055
- Left Slip Surface Endpoint: 52.463, 27.191
- Right Slip Surface Endpoint: 103.746, 20.682
- Resisting Moment=72882.1 kN-m
- Driving Moment=38932 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 637
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.87204**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.0324518	0.359715	GABBIONI	12.5	40	0.614357	1.1501	-13.5263	0	-13.5263
2	0.492288	31.8851	Rilevato_rid	0	29.3	4.08817	7.65321	32.3594	18.7216	13.6378
3	0.0244008	2.49571	Aoc TT_rid	50	0	26.7088	50	-27.2442	0	-27.2442
4	0.0826147	8.81678	Rilevato_rid	0	29.3	8.27375	15.4888	68.4981	40.8974	27.6007
5	2.14115	358.165	Aoc TT_rid	50	0	26.7088	50	92.5127	0	92.5127
6	2.14115	549.743	Aoc TT_rid	50	0	26.7088	50	212.687	0	212.687
7	2.14115	675.898	Aoc TT_rid	50	0	26.7088	50	283.24	0	283.24
8	2.14115	772.029	Aoc TT_rid	50	0	26.7088	50	335.161	0	335.161
9	2.14115	845.527	Aoc TT_rid	50	0	26.7088	50	374.507	0	374.507
10	2.45286	1038.99	Anc1 z=15-20 TT_rid	27	0	14.4228	27	414.835	0	414.835
11	2.45286	1096.03	Anc1 z=15-20 TT_rid	27	0	14.4228	27	440.08	0	440.08
12	2.45286	1094.52	Anc1 z=15-20 TT_rid	27	0	14.4228	27	441.178	0	441.178
13	2.45286	1064.1	Anc1 z=15-20 TT_rid	27	0	14.4228	27	430.321	0	430.321
14	2.45286	896.681	Anc1 z=15-20 TT_rid	27	0	14.4228	27	363.506	0	363.506
15	2.45286	907.598	Anc1 z=15-20 TT_rid	27	0	14.4228	27	369.335	0	369.335
16	2.45286	907.655	Anc1 z=15-20 TT_rid	27	0	14.4228	27	370.72	0	370.72
17	2.45286	896.854	Anc1 z=15-20 TT_rid	27	0	14.4228	27	367.695	0	367.695
18	2.45286	874.89	Anc1 z=15-20 TT_rid	27	0	14.4228	27	360.178	0	360.178
19	2.45286	841.114	Anc1 z=15-20 TT_rid	27	0	14.4228	27	347.952	0	347.952
20	2.45286	794.421	Anc1 z=15-20 TT_rid	27	0	14.4228	27	330.632	0	330.632
21	2.45286	733.038	Anc1 z=15-20 TT_rid	27	0	14.4228	27	307.597	0	307.597

22	2.62784	696.881	Aoc TT_rid	50	0	26.7088	50	286.108	0	286.108
23	2.62784	577.895	Aoc TT_rid	50	0	26.7088	50	247.466	0	247.466
24	2.62784	416.227	Aoc TT_rid	50	0	26.7088	50	196.684	0	196.684
25	2.62784	161.103	Aoc TT_rid	50	0	26.7088	50	126.909	0	126.909

List Of Coordinates

Water Table

X	Y
16.775	25.8483
69.6888	25.8483
71.0377	25.1544
71.9406	23.2526
72.711	23.2526
72.711	23.1881
72.711	20.6666
121.553	20.6667

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
72.711	20.6666
72.711	23.2534
72.8406	23.2526
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912

27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2528
72.711	23.2534

Material Boundary

X	Y
72.111	23.2528
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666

Material Boundary

X	Y
52.5681	27.1912

54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912
52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.2.8 Configurazione rilevato "progetto" Post piena con scalzamento – lato Tevere - tensioni efficaci, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez2_POST PIENA SCALZ_lato Tevere-STAT TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard

- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Material Properties

Property	Aoc TE_rid	Anc TE_rid	S-Gh rid	GABBIONI	Rilevato_rid	Rilevato	CLS
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Infinite strength
Unit Weight [kN/m3]	19	19	18	17	18	18	25
Cohesion [kPa]	12	0	0	12.5	0	0	
Friction Angle [deg]	23	23	29.3	40	29.3	35	
Water Surface	Water Table	Water Table	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	0	1	1	0	
Ru Value							0

Global Minimums

Method: bishop simplified

- FS: 3.883790
- Center: 74.108, 30.694
- Radius: 21.538
- Left Slip Surface Endpoint: 52.781, 27.691
- Right Slip Surface Endpoint: 93.175, 20.677
- Resisting Moment=98976.8 kN-m
- Driving Moment=25484.6 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 377
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 3.88379**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.265651	3.38801	GABBIONI	12.5	40	2.69177	10.4543	-2.43801	0	-2.43801
2	0.0663838	1.87254	Rilevato	0	35	2.80311	10.8867	15.5478	0	15.5478
3	2.0292	162.776	Rilevato_rid	0	29.3	5.65013	21.9439	65.1826	26.0791	39.1035
4	0.120074	15.7631	Aoc TE_rid	12	23	14.5292	56.4285	104.667	0	104.667
5	0.157604	21.3725	Rilevato_rid	0	29.3	9.14189	35.5052	119.381	56.1114	63.2696
6	1.88777	309.762	Aoc TE_rid	12	23	18.1192	70.3712	137.514	0	137.514
7	1.88777	397.614	Aoc TE_rid	12	23	23.3253	90.5907	185.148	0	185.148
8	1.88777	465.14	Aoc TE_rid	12	23	27.4566	106.636	222.948	0	222.948
9	1.88777	516.794	Aoc TE_rid	12	23	30.7311	119.353	252.907	0	252.907
10	1.88777	556.395	Aoc TE_rid	12	23	33.3429	129.497	276.805	0	276.805
11	1.88777	587.688	Aoc TE_rid	12	23	35.4919	137.843	296.469	0	296.469
12	1.88777	609.039	Aoc TE_rid	12	23	37.0847	144.029	311.041	0	311.041
13	1.88777	597.544	Aoc TE_rid	12	23	36.8189	142.997	308.609	0	308.609
14	1.88777	599.149	Aoc TE_rid	12	23	37.2742	144.765	312.775	0	312.775
15	1.88777	467.444	Aoc TE_rid	12	23	30.0377	116.66	246.564	0	246.564
16	1.88777	411.074	Aoc TE_rid	12	23	27.045	105.037	219.182	0	219.182
17	1.88777	404.523	Aoc TE_rid	12	23	26.927	104.579	218.102	0	218.102
18	1.88777	391.825	Aoc TE_rid	12	23	26.4518	102.733	213.754	0	213.754
19	1.88777	372.656	Aoc TE_rid	12	23	25.5958	99.4086	205.922	0	205.922
20	1.88777	346.482	Aoc TE_rid	12	23	24.3217	94.4605	194.265	0	194.265
21	1.88777	312.475	Aoc TE_rid	12	23	22.5721	87.6652	178.256	0	178.256
22	1.88777	269.342	Aoc TE_rid	12	23	20.2561	78.6705	157.066	0	157.066
23	1.88777	214.983	Aoc TE_rid	12	23	17.2217	66.8855	129.302	0	129.302
24	1.88777	145.648	Aoc TE_rid	12	23	13.1825	51.198	92.3449	0	92.3449

25	1.88777	53.3139	Aoc TE_rid	12	23	7.46001	28.9731	39.9863	0	39.9863

List Of Coordinates

Water Table

X	Y
16.775	25.8483
69.6888	25.8483
71.0377	25.1544
71.9406	23.2526
72.711	23.2526
72.711	23.1881
72.711	20.6666
121.553	20.6667

External Boundary

X	Y
16.775	26.2986
16.775	5.69121
16.775	0.691209
16.775	-4.30879
16.775	-14.7543
121.553	-14.7543
121.553	-4.30879
121.553	0.691209
121.553	5.69121
121.553	20.6912
72.711	20.6666
72.711	23.2534
72.8406	23.2526
72.8408	24.0525
72.6906	24.0526
72.6906	25.0526
72.0906	25.0526
68.9869	27.1217
68.876	26.9553
67.7701	27.6925
65.6701	27.6425
60.9201	27.7613
56.1701	27.6425
54.0681	27.6925
52.5681	27.6912
52.5681	27.1912
52.0681	27.1912
52.0681	26.1912
48.5681	26.1912
29.1598	26.1912
27.4853	26.2986

Material Boundary

X	Y
29.1598	26.1912
44.6703	25.2034
49.2619	24.4885
49.2619	23.9885
50.0119	23.9885
50.0119	23.4885
50.7619	23.4885
50.7619	22.9885
51.5119	22.9885
51.5119	22.4885
52.2619	22.4885
52.2619	21.9885
53.0119	21.9885
53.0119	21.4885
53.7619	21.4885
53.7619	20.9885
54.5119	20.9885
54.5119	20.4885
55.2619	20.4885
55.2619	19.9885
56.0119	19.9885
56.0119	19.6654
72.111	19.6654

Material Boundary

X	Y
72.0906	25.0526
72.0906	24.0526
71.9406	24.0526
71.9406	23.2526
72.111	23.2528
72.711	23.2534

Material Boundary

X	Y
72.111	23.2528
72.111	19.6654
72.111	9.25257
72.711	9.25257
72.711	20.6666

Material Boundary

X	Y
52.5681	27.1912
54.0681	27.1912
54.0681	27.6925

Material Boundary

X	Y
54.0681	26.1912
54.0681	25.8912
52.0681	25.8912
52.0681	26.1912
54.0681	26.1912
54.0681	27.1912

Material Boundary

X	Y
16.775	5.69121
121.553	5.69121

Material Boundary

X	Y
16.775	0.691209
121.553	0.691209

Material Boundary

X	Y
16.775	-4.30879
121.553	-4.30879

1.3 ASSE 1 – SEZ.41B [PRG. 2+029.6] - SEZIONE TIPO 3

1.3.1 Configurazione rilevato di "precarica" – lato Tevere - tensioni totali, condizioni statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_configur PRECARICA_lato Monter_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10

- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Anc3 z=25-30 TT_rid	Rilevato_rid
Color					
Strength Type	Undrained	Undrained	Undrained	Undrained	Mohr-Coulomb
Unit Weight [kN/m3]	19	19	19	19	18
Cohesion [kPa]					0
Friction Angle [deg]					29.3
Cohesion Type	50	27	34.5	42.5	
Water Surface	None	None	None	None	Water Table
Hu Value					1
Ru Value	0	0	0	0	

Global Minimums

Method: bishop simplified

- FS: 1.461740
- Center: 158.540, 39.888
- Radius: 39.348
- Left Slip Surface Endpoint: 120.857, 28.564
- Right Slip Surface Endpoint: 192.799, 20.533
- Resisting Moment=134528 kN-m
- Driving Moment=92033.2 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2046
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.46174**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	3.96774	320.029	Rilevato_rid	0	29.3	16.5849	24.2428	43.2002	0	43.2002
2	2.91029	585.499	Aoc TT_rid	50	0	34.2058	50	151.887	0	151.887
3	2.91029	792.035	Aoc TT_rid	50	0	34.2058	50	233.712	0	233.712
4	2.91029	955.763	Aoc TT_rid	50	0	34.2058	50	297.305	0	297.305

5	2.91029	1089.09	Aoc TT_rid	50	0	34.2058	50	348.661	0	348.661
6	2.91029	1198.79	Aoc TT_rid	50	0	34.2058	50	390.844	0	390.844
7	2.73776	1210.5	Anc1 z=15-20 TT_rid	27	0	18.4711	27	432.774	0	432.774
8	2.73776	1276.16	Anc1 z=15-20 TT_rid	27	0	18.4711	27	458.474	0	458.474
9	2.73776	1329.17	Anc1 z=15-20 TT_rid	27	0	18.4711	27	479.401	0	479.401
10	2.73776	1370.55	Anc1 z=15-20 TT_rid	27	0	18.4711	27	495.971	0	495.971
11	2.73776	1395.01	Anc1 z=15-20 TT_rid	27	0	18.4711	27	506.282	0	506.282
12	2.73776	1343.22	Anc1 z=15-20 TT_rid	27	0	18.4711	27	488.686	0	488.686
13	2.73776	1265.32	Anc1 z=15-20 TT_rid	27	0	18.4711	27	461.529	0	461.529
14	2.73776	1175.49	Anc1 z=15-20 TT_rid	27	0	18.4711	27	430.004	0	430.004
15	2.73776	1075.6	Anc1 z=15-20 TT_rid	27	0	18.4711	27	394.815	0	394.815
16	2.73776	1007.46	Anc1 z=15-20 TT_rid	27	0	18.4711	27	371.255	0	371.255
17	2.73776	976.942	Anc1 z=15-20 TT_rid	27	0	18.4711	27	361.482	0	361.482
18	2.73776	935.568	Anc1 z=15-20 TT_rid	27	0	18.4711	27	347.822	0	347.822
19	2.73776	882.566	Anc1 z=15-20 TT_rid	27	0	18.4711	27	330.025	0	330.025
20	2.73776	816.915	Anc1 z=15-20 TT_rid	27	0	18.4711	27	307.763	0	307.763
21	3.01891	807.425	Aoc TT_rid	50	0	34.2058	50	288.606	0	288.606
22	3.01891	688.481	Aoc TT_rid	50	0	34.2058	50	253.898	0	253.898
23	3.01891	542.826	Aoc TT_rid	50	0	34.2058	50	211.511	0	211.511
24	3.01891	362.319	Aoc TT_rid	50	0	34.2058	50	159.627	0	159.627
25	3.01891	131.028	Aoc TT_rid	50	0	34.2058	50	95.1657	0	95.1657

List Of Coordinates

Water Table

X	Y
60.7064	20.469
203.96	20.469

External Boundary

X	Y
164.112	20.5311
158.088	24.5473
152.063	28.5635
139.183	28.5635
137.083	28.5635
135.758	28.5635
127.583	28.5635
112.751	28.5635
106.803	24.598
100.706	20.5335
60.7064	20.5335
60.7064	5.52194
60.7064	0.52194
60.7064	-4.47806
60.7064	-27.3
203.96	-27.3
203.96	-4.47806
203.96	0.52194
203.96	5.52194

203.96	20.5335

Material Boundary

X	Y
60.7064	5.52194
203.96	5.52194

Material Boundary

X	Y
109.151	20.5335
113.411	20.4269
114.039	20.4263
114.592	20.4255
120.75	20.4064
125.115	20.4012
132.333	20.5219
155.94	20.5219
155.94	19.7219
132.333	19.7219
125.115	19.6012
120.75	19.6064
114.592	19.6255
114.039	19.6263
113.411	19.6269
109.151	19.7335
109.151	20.5335

Material Boundary

X	Y
155.94	20.5219
164.112	20.5311

Material Boundary

X	Y
100.706	20.5335
109.151	20.5335

Material Boundary

X	Y
60.7064	0.52194
203.96	0.52194

Material Boundary

X	Y
60.7064	-4.47806
203.96	-4.47806

1.3.2 Configurazione rilevato "progetto" – lato Tevere - tensioni totali, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config FINALE_lato Tevere_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 66
- Orientation: Vertical

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Anc3 z=25-30 TT_rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Undrained	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	19	17	18	25
Cohesion [kPa]					12.5	0	
Friction Angle [deg]					40	29.3	
Cohesion Type	50	27	34.5	42.5			500
Water Surface	None	None	None	None	Water Table	Water Table	None
Hu Value					1	1	
Ru Value	0	0	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.381700
- Center: 81.113, 35.849
- Radius: 35.380
- Left Slip Surface Endpoint: 47.306, 25.416
- Right Slip Surface Endpoint: 113.006, 20.531
- Resisting Moment=114932 kN-m
- Driving Moment=83181.9 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2253
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.3817**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.37561	123.902	Rilevato_rid	0	29.3	24.0757	33.2654	59.2783	0	59.2783
2	2.64179	383.648	Aoc TT_rid	50	0	36.1873	50	152.02	0	152.02
3	2.64179	573.383	Aoc TT_rid	50	0	36.1873	50	238.268	0	238.268
4	2.64179	720.214	Aoc TT_rid	50	0	36.1873	50	302.886	0	302.886
5	2.64179	838.495	Aoc TT_rid	50	0	36.1873	50	354.215	0	354.215
6	2.64179	935.262	Aoc TT_rid	50	0	36.1873	50	396.013	0	396.013
7	2.71202	1042.42	Anc1 z=15-20 TT_rid	27	0	19.5411	27	439.763	0	439.763
8	2.71202	1110.06	Anc1 z=15-20 TT_rid	27	0	19.5411	27	466.774	0	466.774
9	2.71202	1163.67	Anc1 z=15-20 TT_rid	27	0	19.5411	27	488.395	0	488.395
10	2.71202	1204.55	Anc1 z=15-20 TT_rid	27	0	19.5411	27	505.173	0	505.173
11	2.71202	1233.6	Anc1 z=15-20 TT_rid	27	0	19.5411	27	517.489	0	517.489
12	2.71202	1251.42	Anc1 z=15-20 TT_rid	27	0	19.5411	27	513.136	0	513.136
13	3.90145	1777.49	Anc1 z=15-20 TT_rid	27	0	19.5411	27	455.597	0	455.597
14	2.32459	1020.06	Anc1 z=15-20 TT_rid	27	0	19.5411	27	440.542	0	440.542
15	2.32459	866.746	Anc1 z=15-20 TT_rid	27	0	19.5411	27	375.901	0	375.901
16	2.32459	846.955	Anc1 z=15-20 TT_rid	27	0	19.5411	27	368.743	0	368.743
17	2.32459	820.24	Anc1 z=15-20 TT_rid	27	0	19.5411	27	358.67	0	358.67
18	2.32459	785.791	Anc1 z=15-20 TT_rid	27	0	19.5411	27	345.359	0	345.359
19	2.32459	743.011	Anc1 z=15-20 TT_rid	27	0	19.5411	27	328.591	0	328.591
20	2.32459	691.193	Anc1 z=15-20 TT_rid	27	0	19.5411	27	308.105	0	308.105
21	2.73399	732.373	Aoc TT_rid	50	0	36.1873	50	291.975	0	291.975
22	2.73399	627.213	Aoc TT_rid	50	0	36.1873	50	258.903	0	258.903
23	2.73399	497.888	Aoc TT_rid	50	0	36.1873	50	218.522	0	218.522
24	2.73399	335.835	Aoc TT_rid	50	0	36.1873	50	169.005	0	169.005
25	2.73399	122.618	Aoc TT_rid	50	0	36.1873	50	107.333	0	107.333

List Of Coordinates

Water Table

X	Y
1.78e-014	20.469
121.815	20.469

Line Load

X	Y
43.3301	25.441

78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194
0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263

43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

1.3.3 Configurazione rilevato "progetto" – lato Tevere - tensioni efficaci, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config FINALE_lato Tevere_STAT_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 66
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500
Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 2.199350
- Center: 84.535, 33.408
- Radius: 13.686
- Left Slip Surface Endpoint: 73.545, 25.251
- Right Slip Surface Endpoint: 89.160, 20.527
- Resisting Moment=12908.2 kN-m
- Driving Moment=5869.1 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1816
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.19935**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.645958	4.65647	Rilevato_rid	0	29.3	14.1742	31.1741	55.5516	0	55.5516
2	0.645958	13.3317	Rilevato_rid	0	29.3	17.3444	38.1465	67.9763	0	67.9763
3	0.645958	20.8613	Rilevato_rid	0	29.3	20.2255	44.4829	79.2675	0	79.2675
4	0.645958	27.4608	Rilevato_rid	0	29.3	22.8561	50.2685	89.5775	0	89.5775
5	0.645958	33.2761	Rilevato_rid	0	29.3	25.2651	55.5668	99.0188	0	99.0188
6	0.645958	38.4115	Rilevato_rid	0	29.3	27.4743	60.4256	107.677	0	107.677
7	0.645958	42.944	Rilevato_rid	0	29.3	29.5008	64.8825	115.619	0	115.619
8	0.645958	46.9323	Rilevato_rid	0	29.3	29.9062	65.7741	117.208	0	117.208
9	0.645958	50.4495	Rilevato_rid	0	29.3	17.9211	39.4148	70.2362	0	70.2362
10	0.645958	53.5227	Rilevato_rid	0	29.3	19.2761	42.395	75.5471	0	75.5471
11	0.645958	56.1611	Rilevato_rid	0	29.3	20.3098	44.6683	80.3811	0.783131	79.5979
12	0.645958	56.1027	Rilevato_rid	0	29.3	20.0995	44.2059	81.4353	2.66121	78.7741
13	0.645958	53.3753	Rilevato_rid	0	29.3	18.9556	41.69	78.497	4.20635	74.2906
14	0.645958	50.2671	Rilevato_rid	0	29.3	17.7102	38.951	74.8401	5.43025	69.4098
15	0.645958	46.7886	Rilevato_rid	0	29.3	16.3647	35.9916	70.4781	6.34178	64.1363
16	0.645958	42.9475	Rilevato_rid	0	29.3	14.9191	32.8124	65.4184	6.94733	58.471
17	0.645958	38.7487	Rilevato_rid	0	29.3	13.373	29.4118	59.6623	7.25106	52.4113
18	0.170451	10.7733	Aoc TE_rid	12	23	17.6738	38.8709	63.3039	0	63.3039
19	0.6	44.6109	CLS	500	0	227.34	500	82.0279	0	82.0279
20	0.643807	10.4692	Aoc TE_rid	12	23	8.72844	19.1969	16.9548	0	16.9548
21	0.643807	8.42161	Aoc TE_rid	12	23	8.18171	17.9944	14.122	0	14.122
22	0.643807	7.23624	Aoc TE_rid	12	23	7.89345	17.3605	12.6284	0	12.6284
23	0.643807	5.66244	Aoc TE_rid	12	23	7.47968	16.4504	10.4846	0	10.4846
24	0.643807	3.68875	Aoc TE_rid	12	23	6.93323	15.2486	7.6532	0	7.6532

25	0.643807	1.30014	Aoc TE_rid	12	23	6.2451	13.7352	4.08777	0	4.08777

List Of Coordinates

Water Table

X	Y
1.78e-014	20.469
121.815	20.469

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	-17.051
121.815	-17.051
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
37.7382	21.0412
37.7382	22.041

Material Boundary

X	Y
84.6765	22.7754
84.6765	20.7754
84.5265	20.7754
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

1.3.4 Configurazione rilevato "progetto" – lato Monterotondo - tensioni totali, cond. statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config FINALE_lato Monter_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1

- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 66
- Orientation: Vertical

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Anc3 z=25-30 TT_rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Undrained	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	19	17	18	25
Cohesion [kPa]					12.5	0	
Friction Angle [deg]					40	29.3	
Cohesion Type	50	27	34.5	42.5			500
Water Surface	None	None	None	None	Water Table	Water Table	None
Hu Value					1	1	
Ru Value	0	0	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.394190
- Center: 37.182, 35.653
- Radius: 35.175
- Left Slip Surface Endpoint: 5.423, 20.533
- Right Slip Surface Endpoint: 70.789, 25.269
- Resisting Moment=113754 kN-m
- Driving Moment=81591.4 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2313
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.39419**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.72217	122.381	Aoc TT_rid	50	0	35.8631	50	107.299	0	107.299
2	2.72217	334.977	Aoc TT_rid	50	0	35.8631	50	169.011	0	169.011
3	2.72217	496.27	Aoc TT_rid	50	0	35.8631	50	218.515	0	218.515
4	2.72217	624.884	Aoc TT_rid	50	0	35.8631	50	258.862	0	258.862
5	2.72217	729.418	Aoc TT_rid	50	0	35.8631	50	291.896	0	291.896
6	2.73342	818.205	Anc1 z=15-20 TT_rid	27	0	19.3661	27	309.86	0	309.86
7	2.73342	887.741	Anc1 z=15-20 TT_rid	27	0	19.3661	27	333.218	0	333.218
8	2.73342	942.833	Anc1 z=15-20 TT_rid	27	0	19.3661	27	351.514	0	351.514
9	2.73342	984.842	Anc1 z=15-20 TT_rid	27	0	19.3661	27	365.171	0	365.171
10	2.73342	1014.69	Anc1 z=15-20 TT_rid	27	0	19.3661	27	374.483	0	374.483
11	2.73342	1032.98	Anc1 z=15-20 TT_rid	27	0	19.3661	27	379.631	0	379.631
12	3.49605	1488.01	Anc1 z=15-20 TT_rid	27	0	19.3661	27	425.626	0	425.626
13	2.34293	1056.67	Anc1 z=15-20 TT_rid	27	0	19.3661	27	449.386	0	449.386
14	2.34293	1079.06	Anc1 z=15-20 TT_rid	27	0	19.3661	27	465.68	0	465.68
15	2.34293	1059.23	Anc1 z=15-20 TT_rid	27	0	19.3661	27	513.805	0	513.805
16	2.34293	1031.65	Anc1 z=15-20 TT_rid	27	0	19.3661	27	500.612	0	500.612
17	2.34293	996.165	Anc1 z=15-20 TT_rid	27	0	19.3661	27	483.953	0	483.953
18	2.34293	952.197	Anc1 z=15-20 TT_rid	27	0	19.3661	27	463.548	0	463.548
19	2.34293	898.95	Anc1 z=15-20 TT_rid	27	0	19.3661	27	439.005	0	439.005
20	2.64233	936.598	Aoc TT_rid	50	0	35.8631	50	396.591	0	396.591
21	2.64233	838.061	Aoc TT_rid	50	0	35.8631	50	354.125	0	354.125
22	2.64233	717.739	Aoc TT_rid	50	0	35.8631	50	302.009	0	302.009
23	2.64233	568.315	Aoc TT_rid	50	0	35.8631	50	236.342	0	236.342
24	2.64233	374.827	Aoc TT_rid	50	0	35.8631	50	148.411	0	148.411
25	2.2468	112.446	Rilevato_rid	0	29.3	23.4299	32.6658	58.2097	0	58.2097

List Of Coordinates

Water Table

X	Y
1.78e-014	20.469
121.815	20.469

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194
0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y

0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412

37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

Material Boundary

X	Y
0	-9.47806
121.815	-9.47806

Material Boundary

X	Y
0	-14.4781
121.815	-14.4781

1.3.5 Configurazione rilevato "progetto" – lato Monterotondo - tensioni efficaci, cond. Statiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config FINALE_lato Monter_STAT_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 66
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500
Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 1.656030
- Center: 36.601, 29.407
- Radius: 10.698
- Left Slip Surface Endpoint: 30.625, 20.533
- Right Slip Surface Endpoint: 46.529, 25.421
- Resisting Moment=7713.49 kN-m
- Driving Moment=4657.8 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1750
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.65603**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.648008	2.48441	Aoc TE_rid	12	23	9.79139	16.2148	9.92953	0	9.92953
2	0.648008	7.08148	Aoc TE_rid	12	23	11.6247	19.2509	17.0821	0	17.0821
3	0.648008	10.9736	Aoc TE_rid	12	23	13.0821	21.6644	22.7679	0	22.7679
4	0.648008	14.228	Aoc TE_rid	12	23	14.2214	23.551	27.2125	0	27.2125
5	0.648008	16.8943	Aoc TE_rid	12	23	15.083	24.9779	30.574	0	30.574
6	0.648008	19.0093	Aoc TE_rid	12	23	15.6965	25.9939	32.9677	0	32.9677
7	0.648008	20.6	Aoc TE_rid	12	23	16.0838	26.6353	34.4787	0	34.4787
8	0.648008	24.5616	Aoc TE_rid	12	23	17.4302	28.865	39.7314	0	39.7314
9	0.648008	50.8468	Aoc TE_rid	12	23	27.6692	45.8211	79.6776	0	79.6776
10	0.648008	55.7524	Aoc TE_rid	12	23	29.1733	48.3118	85.5452	0	85.5452
11	0.648008	55.2674	Aoc TE_rid	12	23	28.5393	47.262	83.072	0	83.072
12	0.648008	52.505	Aoc TE_rid	12	23	27.0487	44.7934	77.2565	0	77.2565
13	0.648008	56.1688	Aoc TE_rid	12	23	28.0093	46.3842	81.0042	0	81.0042
14	0.648008	59.3179	Aoc TE_rid	12	23	28.7333	47.5832	83.8287	0	83.8287
15	0.648008	61.9287	Aoc TE_rid	12	23	29.2151	48.3811	85.7085	0	85.7085
16	0.648008	63.9692	Aoc TE_rid	12	23	29.4454	48.7624	86.6069	0	86.6069
17	0.615062	61.711	Rilevato_rid	0	29.3	27.2645	45.1509	86.9966	6.53868	80.4579
18	0.615062	58.808	Rilevato_rid	0	29.3	26.1885	43.3689	80.6166	3.33417	77.2824
19	0.615062	54.5882	Rilevato_rid	0	29.3	24.5356	40.6317	72.4048	0	72.4048
20	0.615062	49.6819	Rilevato_rid	0	29.3	25.2434	41.8039	74.4936	0	74.4936
21	0.615062	43.9458	Rilevato_rid	0	29.3	35.6768	59.0819	105.283	0	105.283
22	0.615062	37.2228	Rilevato_rid	0	29.3	31.546	52.2411	93.0925	0	93.0925
23	0.615062	29.255	Rilevato_rid	0	29.3	26.9231	44.5854	79.4502	0	79.4502
24	0.615062	19.5614	Rilevato_rid	0	29.3	21.6511	35.8548	63.8925	0	63.8925
25	0.615062	7.10253	Rilevato_rid	0	29.3	15.4172	25.5314	45.4964	0	45.4964

List Of Coordinates

Water Table

X	Y
1.78e-014	20.469
121.815	20.469

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229

85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	-17.051
121.815	-17.051
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
37.7382	21.0412
37.7382	22.041

Material Boundary

X	Y
84.6765	22.7754
84.6765	20.7754
84.5265	20.7754
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

1.3.6 Configurazione rilevato "progetto" – lato Tevere - tensioni totali, cond. sismiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config FINALE_lato Tevere_SISM_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- Seismic Load Coefficient (Horizontal): 0.08
- Seismic Load Coefficient (Vertical): 0.04
- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 52
- Orientation: Vertical

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	Anc2 z=20-25 TT	Anc3 z=25-30 TT	GABBIONI	Rilevato	CLS
Color							
Strength Type	Undrained	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	19	17	18	25
Cohesion [kPa]					12.5	0	
Friction Angle [deg]					40	35	
Cohesion Type	75	38	48.5	59.5			500
Water Surface	None	None	None	None	Water Table	Water Table	None
Hu Value					1	0	
Ru Value	0	0	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.383290
- Center: 83.511, 37.937
- Radius: 42.060
- Left Slip Surface Endpoint: 43.351, 25.441
- Right Slip Surface Endpoint: 121.801, 20.531
- Resisting Moment=236100 kN-m
- Driving Moment=170680 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2123
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.38329**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.29985	120.229	Rilevato	0	35	23.5988	32.644	46.6203	0	46.6203
2	2.76493	416.321	Aoc TT	75	0	54.2186	75	113.279	0	113.279
3	2.76493	640.894	Aoc TT	75	0	54.2186	75	220.071	0	220.071
4	2.76493	816.919	Aoc TT	75	0	54.2186	75	300.211	0	300.211
5	2.76493	960.925	Aoc TT	75	0	54.2186	75	364.411	0	364.411
6	3.79391	1508.17	Anc1 z=15-20 TT	38	0	27.4707	38	445.195	0	445.195
7	3.79391	1686.9	Anc1 z=15-20 TT	38	0	27.4707	38	498.452	0	498.452
8	3.20225	1534.63	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	534.222	0	534.222
9	3.20225	1614	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	563.385	0	563.385
10	3.20225	1675.36	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	586.41	0	586.41
11	3.20225	1720.06	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	603.825	0	603.825
12	3.20225	1749.16	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	589.104	0	589.104
13	3.20225	1719.22	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	557.019	0	557.019
14	3.20225	1612.82	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	525.137	0	525.137
15	3.20225	1481.09	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	485.049	0	485.049
16	3.20225	1451.2	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	478.11	0	478.11
17	3.20225	1405.42	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	466.141	0	466.141
18	3.20225	1342.91	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	448.935	0	448.935
19	3.20225	1262.38	Anc2 z=20-25 TT	48.5	0	35.0613	48.5	426.169	0	426.169
20	3.79391	1362.85	Anc1 z=15-20 TT	38	0	27.4707	38	389.559	0	389.559
21	3.79391	1182.64	Anc1 z=15-20 TT	38	0	27.4707	38	344.421	0	344.421
22	2.87204	747.908	Aoc TT	75	0	54.2186	75	320.034	0	320.034
23	2.87204	590.419	Aoc TT	75	0	54.2186	75	273.553	0	273.553
24	2.87204	396.089	Aoc TT	75	0	54.2186	75	218.126	0	218.126
25	2.87204	144.063	Aoc TT	75	0	54.2186	75	151.843	0	151.843

List Of Coordinates

Water Table

X	Y
1.78e-014	20.469
121.815	20.469

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194
0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219

84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255

49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

Material Boundary

X	Y
0	-9.47806
121.815	-9.47806

Material Boundary

X	Y
0	-14.4781
121.815	-14.4781

1.3.7 Configurazione rilevato "progetto" – lato Monterotondo - tensioni totali, cond. sismiche

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config FINALE_lato Monter_SISM_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- Seismic Load Coefficient (Horizontal): 0.08
- Seismic Load Coefficient (Vertical): 0.04
- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 52
- Orientation: Vertical

Material Properties

Property	Aoc TT	Anc1 z=15-20 TT	Anc2 z=20-25 TT	Anc3 z=25-30 TT	GABBIONI	Rilevato	CLS

Color							
Strength Type	Undrained	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	19	17	18	25
Cohesion [kPa]					12.5	0	
Friction Angle [deg]					40	35	
Cohesion Type	75	38	48.5	59.5			500
Water Surface	None	None	None	None	Water Table	Water Table	None
Hu Value					1	0	
Ru Value	0	0	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.366570
- Center: 38.162, 37.692
- Radius: 42.170
- Left Slip Surface Endpoint: 0.000, 19.749
- Right Slip Surface Endpoint: 78.446, 25.221
- Left Slope Intercept: 0.000 20.533
- Right Slope Intercept: 78.446 25.221
- Resisting Moment=235185 kN-m
- Driving Moment=172099 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2259
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.36657**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	3.63226	270.315	Aoc TT	75	0	54.8819	75	172.044	0	172.044
2	3.63226	641.464	Aoc TT	75	0	54.8819	75	251.535	0	251.535
3	3.63226	916.226	Aoc TT	75	0	54.8819	75	314.778	0	314.778
4	3.67403	1145.06	Anc1 z=15-20 TT	38	0	27.8068	38	345.198	0	345.198
5	3.67403	1319.58	Anc1 z=15-20 TT	38	0	27.8068	38	390.305	0	390.305
6	3.0642	1208.32	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	427.32	0	427.32
7	3.0642	1286.39	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	450.457	0	450.457
8	3.0642	1348.32	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	468.416	0	468.416
9	3.0642	1395.38	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	481.529	0	481.529
10	3.0642	1428.43	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	490.029	0	490.029
11	3.0642	1488.38	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	507.748	0	507.748

12	3.0642	1621.23	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	550.251	0	550.251
13	3.0642	1699.79	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	574.326	0	574.326
14	3.0642	1695.96	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	612.698	0	612.698
15	3.0642	1661.84	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	608.103	0	608.103
16	3.0642	1613.7	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	588.909	0	588.909
17	3.0642	1550.71	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	564.468	0	564.468
18	3.0642	1471.71	Anc2 z=20-25 TT	48.5	0	35.4903	48.5	534.295	0	534.295
19	3.67403	1634.19	Anc1 z=15-20 TT	38	0	27.8068	38	497.815	0	497.815
20	3.67403	1458.22	Anc1 z=15-20 TT	38	0	27.8068	38	443.709	0	443.709
21	2.72105	941.902	Aoc TT	75	0	54.8819	75	361.176	0	361.176
22	2.72105	797.553	Aoc TT	75	0	54.8819	75	295.68	0	295.68
23	2.72105	621.505	Aoc TT	75	0	54.8819	75	213.985	0	213.985
24	2.72105	397.111	Aoc TT	75	0	54.8819	75	104.909	0	104.909
25	2.13414	105.872	Rilevato	0	35	22.8777	31.264	44.6496	0	44.6496

List Of Coordinates

Water Table

X	Y
1.78e-014	20.469
121.815	20.469

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194

0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y

84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

Material Boundary

X	Y
0	-9.47806
121.815	-9.47806

Material Boundary

X	Y
0	-14.4781
121.815	-14.4781

1.3.8 Configurazione rilevato "progetto" Post piena – lato Tevere - tensioni totali, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config POST PIENA_lato Tevere_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 52
- Orientation: Vertical

Material Properties

Property	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Anc3 z=25-30 TT_rid	Aoc TE_rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	19	17	18	25
Cohesion [kPa]				12	12.5	0	
Friction Angle [deg]				23	40	29.3	
Cohesion Type	27	34.5	42.5				500
Water Surface	None	None	None	Water Table	Water Table	Water Table	None
Hu Value				0	1	1	
Ru Value	0	0	0				0

Global Minimums

Method: bishop simplified

- FS: 2.011850
- Center: 84.494, 33.413
- Radius: 13.693
- Left Slip Surface Endpoint: 73.499, 25.252
- Right Slip Surface Endpoint: 89.124, 20.527
- Left Slope Intercept: 73.499 25.252
- Right Slope Intercept: 89.124 20.531
- Resisting Moment=10634.2 kN-m
- Driving Moment=5285.79 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1829
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.01185**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.635352	4.50978	Rilevato_rid	0	29.3	12.2297	24.6044	43.8445	0	43.8445
2	0.635352	12.9206	Rilevato_rid	0	29.3	15.5067	31.1972	55.5928	0	55.5928
3	0.635352	20.2364	Rilevato_rid	0	29.3	17.9455	36.1036	66.8754	2.53951	64.3358
4	0.635352	26.6611	Rilevato_rid	0	29.3	19.4299	39.0901	77.7475	8.08969	69.6578
5	0.635352	32.3335	Rilevato_rid	0	29.3	20.79	41.8264	87.5285	12.9946	74.5339
6	0.635352	37.3529	Rilevato_rid	0	29.3	22.0408	44.3428	96.3572	17.3393	79.0179
7	0.635352	41.7932	Rilevato_rid	0	29.3	23.1936	46.6621	104.338	21.1873	83.1509
8	0.635352	45.7104	Rilevato_rid	0	29.3	24.2574	48.8022	111.551	24.5866	86.9644
9	0.635352	49.1665	Rilevato_rid	0	29.3	13.7318	27.6264	76.8044	27.5747	49.2297
10	0.635352	52.205	Rilevato_rid	0	29.3	13.0827	26.3204	77.0837	30.1813	46.9024
11	0.635352	54.8262	Rilevato_rid	0	29.3	13.748	27.6589	81.7175	32.4298	49.2877
12	0.635352	55.8277	Rilevato_rid	0	29.3	13.8508	27.8657	83.995	34.339	49.656
13	0.635352	53.4081	Rilevato_rid	0	29.3	12.6219	25.3933	81.1739	35.9237	45.2502
14	0.635352	50.4806	Rilevato_rid	0	29.3	11.8263	23.7927	77.3318	34.9337	42.3981
15	0.635352	47.199	Rilevato_rid	0	29.3	11.0619	22.2549	72.8359	33.1781	39.6578
16	0.635352	43.5709	Rilevato_rid	0	29.3	10.4109	20.9451	67.7027	30.379	37.3237
17	0.635352	39.6016	Rilevato_rid	0	29.3	10.4457	21.0151	61.9401	24.4916	37.4485
18	0.396751	23.8632	Rilevato_rid	0	29.3	12.6221	25.3938	60.151	14.9	45.251
19	0.6	44.6112	CLS	500	0	248.527	500	83.4945	0	83.4945
20	0.637757	10.403	Aoc TE_rid	12	23	9.57236	19.2582	17.0991	0	17.0991
21	0.637757	8.35652	Aoc TE_rid	12	23	8.97466	18.0557	14.2663	0	14.2663
22	0.637757	7.1723	Aoc TE_rid	12	23	8.66255	17.4278	12.787	0	12.787
23	0.637757	5.61031	Aoc TE_rid	12	23	8.21478	16.5269	10.6647	0	10.6647
24	0.637757	3.65941	Aoc TE_rid	12	23	7.62324	15.3368	7.86104	0	7.86104
25	0.637757	1.30508	Aoc TE_rid	12	23	6.87784	13.8372	4.32813	0	4.32813

List Of Coordinates

Water Table

X	Y
0	23.7311
81.5489	23.7311
83.2133	23.0037
84.2064	22.0054
84.6765	20.7754
85.4265	20.5311
121.815	20.5311

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194
0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

1.3.9 Configurazione rilevato "progetto" Post piena – lato Tevere - tensioni efficaci, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config POST PIENA_lato Tevere_STAT_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 52
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500
Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 2.011850
- Center: 84.494, 33.413
- Radius: 13.693
- Left Slip Surface Endpoint: 73.499, 25.252
- Right Slip Surface Endpoint: 89.124, 20.527
- Left Slope Intercept: 73.499 25.252
- Right Slope Intercept: 89.124 20.531
- Resisting Moment=10634.2 kN-m
- Driving Moment=5285.79 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1819

- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.01185**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.635352	4.50978	Rilevato_rid	0	29.3	12.2297	24.6044	43.8445	0	43.8445
2	0.635352	12.9206	Rilevato_rid	0	29.3	15.5067	31.1972	55.5928	0	55.5928
3	0.635352	20.2364	Rilevato_rid	0	29.3	17.9455	36.1036	66.8754	2.53951	64.3358
4	0.635352	26.6611	Rilevato_rid	0	29.3	19.4299	39.0901	77.7475	8.08969	69.6578
5	0.635352	32.3335	Rilevato_rid	0	29.3	20.79	41.8264	87.5285	12.9946	74.5339
6	0.635352	37.3529	Rilevato_rid	0	29.3	22.0408	44.3428	96.3572	17.3393	79.0179
7	0.635352	41.7932	Rilevato_rid	0	29.3	23.1936	46.6621	104.338	21.1873	83.1509
8	0.635352	45.7104	Rilevato_rid	0	29.3	24.2574	48.8022	111.551	24.5866	86.9644
9	0.635352	49.1665	Rilevato_rid	0	29.3	13.7318	27.6264	76.8044	27.5747	49.2297
10	0.635352	52.205	Rilevato_rid	0	29.3	13.0827	26.3204	77.0837	30.1813	46.9024
11	0.635352	54.8262	Rilevato_rid	0	29.3	13.748	27.6589	81.7175	32.4298	49.2877
12	0.635352	55.8277	Rilevato_rid	0	29.3	13.8508	27.8657	83.995	34.339	49.656
13	0.635352	53.4081	Rilevato_rid	0	29.3	12.6219	25.3933	81.1739	35.9237	45.2502
14	0.635352	50.4806	Rilevato_rid	0	29.3	11.8263	23.7927	77.3318	34.9337	42.3981
15	0.635352	47.199	Rilevato_rid	0	29.3	11.0619	22.2549	72.8359	33.1781	39.6578
16	0.635352	43.5709	Rilevato_rid	0	29.3	10.4109	20.9451	67.7027	30.379	37.3237
17	0.635352	39.6016	Rilevato_rid	0	29.3	10.4457	21.0151	61.9401	24.4916	37.4485
18	0.396751	23.8632	Rilevato_rid	0	29.3	12.6221	25.3938	60.151	14.9	45.251
19	0.6	44.6112	CLS	500	0	248.527	500	83.4945	0	83.4945
20	0.637757	10.403	Aoc TE_rid	12	23	9.57236	19.2582	17.0991	0	17.0991
21	0.637757	8.35652	Aoc TE_rid	12	23	8.97466	18.0557	14.2663	0	14.2663
22	0.637757	7.1723	Aoc TE_rid	12	23	8.66255	17.4278	12.787	0	12.787
23	0.637757	5.61031	Aoc TE_rid	12	23	8.21478	16.5269	10.6647	0	10.6647
24	0.637757	3.65941	Aoc TE_rid	12	23	7.62324	15.3368	7.86104	0	7.86104
25	0.637757	1.30508	Aoc TE_rid	12	23	6.87784	13.8372	4.32813	0	4.32813

List Of Coordinates

Water Table

X	Y
0	23.7311
81.5489	23.7311
83.2133	23.0037
84.2064	22.0054
84.6765	20.7754
85.4265	20.5311
121.815	20.5311

Line Load

X	Y
43.3301	25.441

78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	-17.051
121.815	-17.051
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461

36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
37.7382	21.0412
37.7382	22.041

Material Boundary

X	Y
84.6765	22.7754
84.6765	20.7754
84.5265	20.7754
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219

84.5265	19.7219
84.5265	19.9754

1.3.10 Configurazione rilevato "progetto" Post piena – lato Monterotondo - tensioni totali, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config POST PIENA_lato Monter_STAT_TT
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled
- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 52
- Orientation: Vertical

Material Properties

Property	Aoc TT_rid	Anc1 z=15-20 TT_rid	Anc2 z=20-25 TT_rid	Anc3 z=25-30 TT_rid	GABBIONI	Rilevato_rid	CLS
Color							
Strength Type	Undrained	Undrained	Undrained	Undrained	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	19	19	17	18	25
Cohesion [kPa]					12.5	0	
Friction Angle [deg]					40	29.3	
Cohesion Type	50	27	34.5	42.5			500
Water Surface	None	None	None	None	Water Table	Water Table	None
Hu Value					1	1	
Ru Value	0	0	0	0			0

Global Minimums

Method: bishop simplified

- FS: 1.520440
- Center: 37.182, 35.653
- Radius: 35.175
- Left Slip Surface Endpoint: 5.423, 20.533
- Right Slip Surface Endpoint: 70.789, 25.269
- Resisting Moment=112436 kN-m
- Driving Moment=73949.8 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 2343
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.52044**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	2.72217	122.381	Aoc TT_rid	50	0	32.8852	50	102.123	0	102.123
2	2.72217	334.977	Aoc TT_rid	50	0	32.8852	50	165.196	0	165.196
3	2.72217	496.27	Aoc TT_rid	50	0	32.8852	50	215.508	0	215.508
4	2.72217	624.884	Aoc TT_rid	50	0	32.8852	50	256.429	0	256.429
5	2.72217	729.418	Aoc TT_rid	50	0	32.8852	50	289.908	0	289.908
6	2.73342	818.205	Anc1 z=15-20 TT_rid	27	0	17.758	27	308.986	0	308.986
7	2.73342	887.741	Anc1 z=15-20 TT_rid	27	0	17.758	27	332.517	0	332.517
8	2.73342	942.833	Anc1 z=15-20 TT_rid	27	0	17.758	27	350.967	0	350.967
9	2.73342	984.842	Anc1 z=15-20 TT_rid	27	0	17.758	27	364.767	0	364.767
10	2.73342	1014.69	Anc1 z=15-20 TT_rid	27	0	17.758	27	374.212	0	374.212
11	2.73342	1032.98	Anc1 z=15-20 TT_rid	27	0	17.758	27	379.489	0	379.489
12	3.49605	1488.01	Anc1 z=15-20 TT_rid	27	0	17.758	27	425.626	0	425.626
13	2.34293	1056.67	Anc1 z=15-20 TT_rid	27	0	17.758	27	449.522	0	449.522
14	2.34293	1079.06	Anc1 z=15-20 TT_rid	27	0	17.758	27	464.216	0	464.216
15	2.34293	1059.23	Anc1 z=15-20 TT_rid	27	0	17.758	27	500.162	0	500.162
16	2.34293	1031.65	Anc1 z=15-20 TT_rid	27	0	17.758	27	487.087	0	487.087
17	2.34293	996.165	Anc1 z=15-20 TT_rid	27	0	17.758	27	470.553	0	470.553
18	2.34293	952.197	Anc1 z=15-20 TT_rid	27	0	17.758	27	450.284	0	450.284
19	2.34293	898.95	Anc1 z=15-20 TT_rid	27	0	17.758	27	425.891	0	425.891
20	2.64233	936.598	Aoc TT_rid	50	0	32.8852	50	384.572	0	384.572
21	2.64233	838.061	Aoc TT_rid	50	0	32.8852	50	342.538	0	342.538
22	2.64233	717.739	Aoc TT_rid	50	0	32.8852	50	290.968	0	290.968
23	2.64233	568.315	Aoc TT_rid	50	0	32.8852	50	226.057	0	226.057
24	2.64233	374.827	Aoc TT_rid	50	0	32.8852	50	139.346	0	139.346
25	2.2468	112.446	Rilevato_rid	0	29.3	17.3669	26.4053	59.1767	12.123	47.0537

List Of Coordinates

Water Table

X	Y
0.165468	20.5311
35.7382	20.5335
35.7382	21.0412
37.7311	21.0412
38.9028	22.8837
40.8021	23.7311
121.98	23.7311

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y
85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194
0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y

0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219
84.5265	19.9754
84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412

37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064
53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

1.3.11 Configurazione rilevato "progetto" Post piena – lato Monterotondo - tensioni efficaci, cond. stat.

Slide Analysis Information
SLIDE - An Interactive Slope Stability Program

Project Summary

- File Name: Asse1_Sez41b_config POST PIENA_lato Monter_STAT_TE
- Slide Modeler Version: 6.005
- Project Title: SLIDE - An Interactive Slope Stability Program
- Date Created: 13/02/2019, 11:27:00

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Auto Refine Search
- Divisions along slope: 10
- Circles per division: 10
- Number of iterations: 10
- Divisions to use in next iteration: 50%
- Composite Surfaces: Disabled

- Minimum Elevation: Not Defined
- Minimum Depth: 1.5

Loading

- 1 Distributed Load present

Distributed Load 1

- Distribution: Constant
- Magnitude [kN/m2]: 52
- Orientation: Vertical

Material Properties

Property	Aoc TE_rid	Anc TE_rid	GABBIONI	Rilevato_rid	CLS
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Undrained
Unit Weight [kN/m3]	19	19	17	18	25
Cohesion [kPa]	12	0	12.5	0	
Friction Angle [deg]	23	23	40	29.3	
Cohesion Type					500
Water Surface	Water Table	Water Table	Water Table	Water Table	None
Hu Value	0	0	1	1	
Ru Value					0

Global Minimums

Method: bishop simplified

- FS: 1.570950
- Center: 36.372, 29.408
- Radius: 10.699
- Left Slip Surface Endpoint: 30.397, 20.533
- Right Slip Surface Endpoint: 46.301, 25.422
- Resisting Moment=6572.57 kN-m
- Driving Moment=4183.83 kN-m

Valid / Invalid Surfaces

Method: bishop simplified

- Number of Valid Surfaces: 1831
- Number of Invalid Surfaces: 0

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.57095**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.648625	2.48821	Aoc TE_rid	12	23	10.426	16.3788	10.3157	0	10.3157
2	0.648625	7.09196	Aoc TE_rid	12	23	12.3574	19.4128	17.4634	0	17.4634
3	0.648625	10.9891	Aoc TE_rid	12	23	13.8861	21.8144	23.1214	0	23.1214
4	0.648625	14.2469	Aoc TE_rid	12	23	15.0756	23.683	27.5234	0	27.5234
5	0.648625	16.9151	Aoc TE_rid	12	23	15.97	25.088	30.8333	0	30.8333
6	0.648625	19.0308	Aoc TE_rid	12	23	16.6012	26.0797	33.1698	0	33.1698
7	0.648625	20.6208	Aoc TE_rid	12	23	16.9933	26.6956	34.6206	0	34.6206
8	0.648625	21.7046	Aoc TE_rid	12	23	17.1637	26.9633	35.2513	0	35.2513
9	0.648625	42.3333	Aoc TE_rid	12	23	25.5719	40.1722	66.3695	0	66.3695
10	0.648625	55.7351	Aoc TE_rid	12	23	30.7119	48.2469	85.3923	0	85.3923
11	0.648625	55.4121	Aoc TE_rid	12	23	30.0861	47.2638	83.0764	0	83.0764
12	0.648625	52.5448	Aoc TE_rid	12	23	28.4522	44.697	77.0293	0	77.0293
13	0.648625	54.4795	Aoc TE_rid	12	23	28.755	45.1727	78.1499	0	78.1499
14	0.648625	57.6275	Aoc TE_rid	12	23	29.5014	46.3453	80.9126	0	80.9126
15	0.648625	60.2354	Aoc TE_rid	12	23	29.9917	47.1155	82.727	0	82.727
16	0.648625	62.2708	Aoc TE_rid	12	23	30.2162	47.4682	83.5579	0	83.5579
17	0.613962	60.3482	Rilevato_rid	0	29.3	18.1835	28.5654	89.3875	38.4846	50.9029
18	0.613962	58.639	Rilevato_rid	0	29.3	17.8594	28.0562	85.2738	35.2782	49.9956
19	0.613962	54.426	Rilevato_rid	0	29.3	16.4768	25.8842	77.6635	31.5384	46.1251
20	0.613962	49.5299	Rilevato_rid	0	29.3	14.9658	23.5105	69.0874	27.1922	41.8952
21	0.613962	43.8201	Rilevato_rid	0	29.3	25.0828	39.4039	92.3541	22.1371	70.217
22	0.613962	37.1136	Rilevato_rid	0	29.3	24.9375	39.1756	86.0313	16.2212	69.8101
23	0.613962	29.1663	Rilevato_rid	0	29.3	22.209	34.8892	71.3761	9.20437	62.1718
24	0.613962	19.4998	Rilevato_rid	0	29.3	19.0391	29.9095	53.9596	0.661427	53.2981
25	0.613962	7.0795	Rilevato_rid	0	29.3	13.0286	20.4673	36.4724	0	36.4724

List Of Coordinates

Water Table

X	Y
0.165468	20.5311
35.7382	20.5335
35.7382	21.0412
37.7311	21.0412
38.9028	22.8837
40.8021	23.7311
121.98	23.7311

Line Load

X	Y
43.3301	25.441
78.6501	25.2193

External Boundary

X	Y

85.4265	20.5229
85.4265	20.7754
85.2765	20.7754
85.2765	22.7754
84.6765	22.7754
80.6501	25.2193
78.6501	25.2193
43.3301	25.441
41.3382	25.441
37.7382	23.041
36.2382	23.041
36.2382	22.041
35.7382	22.041
35.7382	21.0412
35.7382	20.5335
29.2932	20.5335
0	20.5335
0	5.52194
0	0.52194
0	-4.47806
0	-9.47806
0	-14.4781
0	-17.051
121.815	-17.051
121.815	-14.4781
121.815	-9.47806
121.815	-4.47806
121.815	0.52194
121.815	5.52194
121.815	20.5311
92.6987	20.5311

Material Boundary

X	Y
0	5.52194
121.815	5.52194

Material Boundary

X	Y
35.7382	20.5335
35.738	18.7461
36.2301	18.7461
36.2301	19.7335
37.7381	19.7335
37.738	20.5335
41.9978	20.4269
42.6261	20.4263
43.1793	20.4255
49.3367	20.4064
53.7022	20.4012
60.9201	20.5219
84.5265	20.5219
84.5265	19.9754

84.697	19.9754
85.297	19.9754
85.4259	19.9754
85.4265	20.5229

Material Boundary

X	Y
37.738	20.5335
37.7382	21.0412
37.7382	22.041
37.7382	23.041

Material Boundary

X	Y
84.5265	20.5219
84.5265	20.7754
84.6765	20.7754
84.6765	22.7754

Material Boundary

X	Y
36.2382	22.041
37.7382	22.041

Material Boundary

X	Y
35.7382	21.0412
37.7382	21.0412

Material Boundary

X	Y
84.697	19.9754
84.697	12.9762
85.297	12.9762
85.297	19.9754

Material Boundary

X	Y
37.7381	19.7335
41.9978	19.6269
42.6261	19.6263
43.1793	19.6255
49.3367	19.6064

53.7022	19.6012
60.9201	19.7219
84.5265	19.7219
84.5265	19.9754

Material Boundary

X	Y
0	0.52194
121.815	0.52194

Material Boundary

X	Y
0	-4.47806
121.815	-4.47806

2 OUTPUT CODICE DI CALCOLO - VERIFICHE DI FILTRAZIONE

2.1 CONFIGURAZIONE 1 – CASO 1

Slide Analysis Information

Project Summary

- File Name: Conf 1_Trans taglione 5 m piede 1 m.slim
- Last saved with Slide version: 6.005

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified
- Janbu simplified

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 75
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Steady State FEA
- Pore Fluid Unit Weight: 9.81 kN/m3
- Tolerance: 1e-006
- Maximum number of iterations: 500
- Advanced Groundwater Method: Transient FEA

Transient Settings

Stage Name	Time [d]	Calculate Safety Factor
Stage 1	0	No
Stage 2	0.82	No
Stage 3	1.14	No
Stage 4	1.3	No
Stage 5	1.4	No
Stage 6	2.1	No

Stage 7	3	No
Stage 8	3.2	No
Stage 9	3.25	No
Stage 10	3.35	No
Stage 11	4.2	No
Stage 12	4.5	No
Stage 13	5	No
Stage 14	6	No
Stage 15	8	No
Stage 16	9	No

- Tolerance (Transient): 1e-006
- Maximum number of iterations (Transient): 500
- Time Steps (Transient): Automatic
- Mesh Element Type: 3 noded triangles
- Number of Elements: 6335
- Number of Nodes: 3292

Transient Boundary Conditions

Curva afflusso-deflusso

Time [d]	Total Head [m]
0	21.5
0.82	21.5
1.14	21.8
1.3	22.2
1.4	22.3
2.1	22.7
3	23.5
3.2	23.7
3.25	23.72
3.35	23.71
4.2	22.8
4.5	22.6
5	22.4
6	22
8	21.5
9	21.5

- Seepage Face Condition: Yes

Curva nuova

Time [d]	Total Head [m]
0	21.5
0.82	21.5
1.14	21.8
1.3	22.2
1.4	22.3
2.1	22.7

3	23.5
3.2	23.7
3.25	23.72
3.35	23.71
4.2	22.8
4.5	22.6
5	22.4
6	22
8	21.5
9	21.5

- Seepage Face Condition: Yes

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 10
- Composite Surfaces: Disabled
- Reverse Curvature: Invalid Surfaces
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Rilevato	Argilla	Gabbione	Muro C.A.	Taglione	Bonifica e Scotico	Anticapillare	Magrone
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Infinite strength	Infinite strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	18	19	22	25	25	20	20	20
Cohesion [kPa]	0	25	5			1	1	1
Friction Angle [deg]	34	27	45			35	35	35

List Of Coordinates

External Boundary

X	Y
-19.8748	22
-21.6492	22
-22.9049	22
-23.8604	22
-26.9384	22
-28.2927	22
-29.1159	22

-40	22
-40	-10
40	-10
40	22.1662
22.429	22.0329
21.2448	22.0318
20.0211	22.0308
18.7627	22.03
17.4747	22.0294
15.636	22.0271
15.4795	22.2118
14.9968	22.2119
14.4966	21.7117
13.9966	21.7117
13.4961	22.2122
13.0131	22.2122
12.8631	22.2123
12.8631	23.2123
12.2631	23.2123
9.04856	25.115
7.20251	26.3457
5.10251	26.2957
-4.75	26.973
-6.85	27.023
-10.6172	24.5115
-12.1172	24.5114
-12.1172	23.5114
-12.6172	23.5114
-12.6172	22.2117
-13.1172	22.2117
-14.1172	21.2117
-15.1172	21.2117
-16.1172	22.2117
-16.6172	22.2117

Material Boundary

X	Y
12.2836	21.4123
12.2836	20.4122
12.2836	19.4122
12.2836	18.4122
12.2836	17.4122
12.2836	16.4122
12.8836	16.4122
12.8836	17.4122
12.8836	18.4122
12.8836	19.4122
12.8836	20.4122
12.8836	21.4123

Material Boundary

X	Y
-12.6172	22.2117

-10.6172	22.2117
-10.6172	21.9

Material Boundary

X	Y
-10.6172	24.5115
-10.6172	22.2117

Material Boundary

X	Y
-12.6172	21.4254
-12.6172	20.4342
-12.1252	20.4342
-12.1252	21.4254

Material Boundary

X	Y
-10.6172	21.8
12.1131	21.8

Material Boundary

X	Y
12.1131	21.4181
12.1131	21.8
12.1131	21.9
12.1131	22.2117
12.2631	22.2123
12.2631	23.2123

Material Boundary

X	Y
12.1131	21.4181
12.2836	21.4123
12.8836	21.4123
13.0131	21.4123
13.0131	22.2122

Material Boundary

X	Y
-10.6172	21.8
-10.6172	21.9
12.1131	21.9

Material Boundary

X	Y
-12.6172	22.2117
-12.6172	21.4254
-12.1252	21.4254
-10.6172	21.4254
-10.6172	21.8

Material Boundary

X	Y
-10.6172	21.4254
12.1131	21.4181

2.2 CONFIGURAZIONE 1 – CASO 2

Slide Analysis Information

Project Summary

- File Name: Conf 1_Trans taglione 5 m piede 1 m Tr20.slim
- Last saved with Slide version: 6.005

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified
- Janbu simplified

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 75
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Steady State FEA
- Pore Fluid Unit Weight: 9.81 kN/m3
- Tolerance: 1e-006
- Maximum number of iterations: 500
- Advanced Groundwater Method: Transient FEA

Transient Settings

Stage Name	Time [d]	Calculate Safety Factor
Stage 1	0	No
Stage 2	0.24	No
Stage 3	0.26	No
Stage 4	0.28	No
Stage 5	0.45	No
Stage 6	0.6	No
Stage 7	0.88	No
Stage 8	1.005	No
Stage 9	1.05	No
Stage 10	1.1	No
Stage 11	1.2	No
Stage 12	1.3	No

- Tolerance (Transient): 1e-006
- Maximum number of iterations (Transient): 500
- Time Steps (Transient): Automatic
- Mesh Element Type: 3 noded triangles
- Number of Elements: 6335
- Number of Nodes: 3292

Transient Boundary Conditions

Curva afflusso-deflusso

Time [d]	Total Head [m]
0	21.5
0.82	21.5
1.14	21.8
1.3	22.2
1.4	22.3
2.1	22.7
3	23.5
3.2	23.7
3.25	23.72
3.35	23.71
4.2	22.8
4.5	22.6
5	22.4
6	22
8	21.5
9	21.5

- Seepage Face Condition: Yes

Curva nuova

Time [d]	Total Head [m]
0	21.5
0.82	21.5
1.14	21.8
1.3	22.2
1.4	22.3
2.1	22.7
3	23.5
3.2	23.7
3.25	23.72
3.35	23.71
4.2	22.8
4.5	22.6
5	22.4
6	22
8	21.5
9	21.5

- Seepage Face Condition: Yes

Tr20anni

Time [d]	Total Head [m]
0	22
0.24	22
0.26	22
0.28	22
0.45	22.47
0.6	22.6
0.88	22.6
1.005	22
1.05	22
1.1	22
1.2	22
1.3	22

- Seepage Face Condition: Yes

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search

- Radius Increment: 10
- Composite Surfaces: Disabled
- Reverse Curvature: Invalid Surfaces
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Rilevato	Argilla	Gabbione	Muro C.A.	Taglione	Bonifica e Scotico	Anticapillare	Magrone
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Infinite strength	Infinite strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	18	19	22	25	25	20	20	20
Cohesion [kPa]	0	25	5			1	1	1
Friction Angle [deg]	34	27	45			35	35	35

List Of Coordinates

External Boundary

X	Y
-19.8748	22
-21.6492	22
-22.9049	22
-23.8604	22
-26.9384	22
-28.2927	22
-29.1159	22
-40	22
-40	-10
40	-10
40	22.1662
22.429	22.0329
21.2448	22.0318
20.0211	22.0308
18.7627	22.03
17.4747	22.0294
15.636	22.0271
15.4795	22.2118
14.9968	22.2119
14.4966	21.7117
13.9966	21.7117
13.4961	22.2122
13.0131	22.2122
12.8631	22.2123
12.8631	23.2123
12.2631	23.2123
9.04856	25.115
7.20251	26.3457
5.10251	26.2957
-4.75	26.973
-6.85	27.023
-10.6172	24.5115

-12.1172	24.5114
-12.1172	23.5114
-12.6172	23.5114
-12.6172	22.2117
-13.1172	22.2117
-14.1172	21.2117
-15.1172	21.2117
-16.1172	22.2117
-16.6172	22.2117

Material Boundary

X	Y
12.2836	21.4123
12.2836	20.4122
12.2836	19.4122
12.2836	18.4122
12.2836	17.4122
12.2836	16.4122
12.8836	16.4122
12.8836	17.4122
12.8836	18.4122
12.8836	19.4122
12.8836	20.4122
12.8836	21.4123

Material Boundary

X	Y
-12.6172	22.2117
-10.6172	22.2117
-10.6172	21.9

Material Boundary

X	Y
-10.6172	24.5115
-10.6172	22.2117

Material Boundary

X	Y
-12.6172	21.4254
-12.6172	20.4342
-12.1252	20.4342
-12.1252	21.4254

Material Boundary

X	Y
-10.6172	21.8

12.1131	21.8

Material Boundary

X	Y
12.1131	21.4181
12.1131	21.8
12.1131	21.9
12.1131	22.2117
12.2631	22.2123
12.2631	23.2123

Material Boundary

X	Y
12.1131	21.4181
12.2836	21.4123
12.8836	21.4123
13.0131	21.4123
13.0131	22.2122

Material Boundary

X	Y
-10.6172	21.8
-10.6172	21.9
12.1131	21.9

Material Boundary

X	Y
-12.6172	22.2117
-12.6172	21.4254
-12.1252	21.4254
-10.6172	21.4254
-10.6172	21.8

Material Boundary

X	Y
-10.6172	21.4254
12.1131	21.4181

2.3 CONFIGURAZIONE 2

Slide Analysis Information

Project Summary

- File Name: Conf 2_Staz taglione 5 m piede 1 m.slim
- Last saved with Slide version: 6.005

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Right to Left
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified
- Janbu simplified

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 75
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Steady State FEA
- Pore Fluid Unit Weight: 9.81 kN/m3
- Tolerance: 1e-006
- Maximum number of iterations: 500
- Advanced Groundwater Method: None
- Mesh Element Type: 3 noded triangles
- Number of Elements: 6335
- Number of Nodes: 3292

Transient Boundary Conditions

Curva afflusso-deflusso

Time [d]	Total Head [m]
0	21.5
0.82	21.5
1.14	21.8

1.3	22.2
1.4	22.3
2.1	22.7
3	23.5
3.2	23.7
3.25	23.72
3.35	23.71
4.2	22.8
4.5	22.6
5	22.4
6	22
8	21.5
9	21.5

- Seepage Face Condition: Yes

Curva nuova

Time [d]	Total Head [m]
0	21.5
0.82	21.5
1.14	21.8
1.3	22.2
1.4	22.3
2.1	22.7
3	23.5
3.2	23.7
3.25	23.72
3.35	23.71
4.2	22.8
4.5	22.6
5	22.4
6	22
8	21.5
9	21.5

- Seepage Face Condition: Yes

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 10
- Composite Surfaces: Disabled
- Reverse Curvature: Invalid Surfaces
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Rilevato	Argilla	Gabbione	Muro C.A.	Taglione	Bonifica e Scotico	Anticapillare	Magrone
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Infinite strength	Infinite strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	18	19	22	25	25	20	20	20
Cohesion [kPa]	0	25	5			1	1	1
Friction Angle [deg]	34	27	45			35	35	35
Ks [meters/second]	0.0001	0.0001	0.01	1e-011	1e-011	0.0001	0.01	1e-011
K2/K1	1	1	1	1	1	1	1	1
K Angle [deg]	0	0	0	0	0	0	0	0
Groundwater Model	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple
GW Model Properties	Soil Type: General	Soil Type: General	Soil Type: General	Soil Type: General	Soil Type: General	Soil Type: General	Soil Type: General	Soil Type: General

List Of Coordinates

External Boundary

X	Y
-19.8748	22
-21.6492	22
-22.9049	22
-23.8604	22
-26.9384	22
-28.2927	22
-29.1159	22
-40	22
-40	-10
40	-10
40	22.1662
22.429	22.0329
21.2448	22.0318
20.0211	22.0308
18.7627	22.03
17.4747	22.0294
15.636	22.0271
15.4795	22.2118
14.9968	22.2119
14.4966	21.7117
13.9966	21.7117
13.4961	22.2122
13.0131	22.2122
12.8631	22.2123
12.8631	23.2123
12.2631	23.2123
9.04856	25.115
7.20251	26.3457
5.10251	26.2957

-4.75	26.973
-6.85	27.023
-10.6172	24.5115
-12.1172	24.5114
-12.1172	23.5114
-12.6172	23.5114
-12.6172	22.2117
-13.1172	22.2117
-14.1172	21.2117
-15.1172	21.2117
-16.1172	22.2117
-16.6172	22.2117

Material Boundary

X	Y
12.2836	21.4123
12.2836	20.4122
12.2836	19.4122
12.2836	18.4122
12.2836	17.4122
12.2836	16.4122
12.8836	16.4122
12.8836	17.4122
12.8836	18.4122
12.8836	19.4122
12.8836	20.4122
12.8836	21.4123

Material Boundary

X	Y
-12.6172	22.2117
-10.6172	22.2117
-10.6172	21.9

Material Boundary

X	Y
-10.6172	24.5115
-10.6172	22.2117

Material Boundary

X	Y
-12.6172	21.4254
-12.6172	20.4342
-12.1252	20.4342
-12.1252	21.4254

Material Boundary

X	Y
-10.6172	21.8
12.1131	21.8

Material Boundary

X	Y
12.1131	21.4181
12.1131	21.8
12.1131	21.9
12.1131	22.2117
12.2631	22.2123
12.2631	23.2123

Material Boundary

X	Y
12.1131	21.4181
12.2836	21.4123
12.8836	21.4123
13.0131	21.4123
13.0131	22.2122

Material Boundary

X	Y
-10.6172	21.8
-10.6172	21.9
12.1131	21.9

Material Boundary

X	Y
-12.6172	22.2117
-12.6172	21.4254
-12.1252	21.4254
-10.6172	21.4254
-10.6172	21.8

Material Boundary

X	Y
-10.6172	21.4254
12.1131	21.4181