

**LAVORI DI STRAORDINARIA MANUTENZIONE PER LA MESSA IN SICUREZZA DELLA
PIARDA IN COMUNE DI FICAROLO FRA STANTI 142-149**

Importo complessivo € 560.000,00

FASCICOLO DEI CALCOLI

Allegato

4

**CLASSIFICA
RO-E-1446**

**PROGETTO
N° 1623 DEL 21/07/2025**

**CUP
B88H25000750001**

RUP
Ing. Ettore Alberani

Aggiornamenti

**REGIONE VENETO
PROVINCIA DI ROVIGO
COMUNE DI FICAROLO**

Progetto:

**RO-E-480M: LAVORI DI MESSA IN SICUREZZA
DELLA PIARDA IN COMUNE DI FICAROLO
FRA GLI STANTI 142-149.
I° STRALCIO**

PROGETTO DEFINITIVO-ESECUTIVO

Titolo elaborato:

FASCICOLO DEI CALCOLI

Committente:



Strada Giuseppe Garibaldi 75 - 43121 Parma
Tel. 0521/7971. Posta certificata: protocollo@cert.agenziapo.it
Codice Fiscale: 92116650349 - Partita IVA: 02297750347

Scala:

Elaborato: **E14**

Data: Ottobre 2023

Revisione:

Progettista:



Ediltecno Service srl

Il direttore tecnico

Ferraro Ing. Valentino

Sede legale: Via Albere 2/a
36060 Romano d'Ezzelino (VI)
P. IVA 02425190242

Slide Analysis Information

913_S2_PL_SISMA circ

Project Summary

File Name:	913_S2_PL_SISMA circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:00.845s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 09:37:01

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $m\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
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:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.066
Seismic Load Coefficient (Vertical):	0.033

Materials

A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	10
Friction Angle [deg]	45
Water Surface	Water Table
Hu Value	1

Support

PALO LEGNO

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.3 m
Failure Mode	Shear
Pile Shear Strength	55.46 kN

Global Minimums

Method: bishop simplified

FS	1.020790
Center:	75.623, 79.476
Radius:	34.874
Left Slip Surface Endpoint:	56.849, 50.087
Right Slip Surface Endpoint:	106.134, 62.588
Left Slope Intercept:	56.849 57.913
Right Slope Intercept:	106.134 62.588
Resisting Moment:	57915.5 kN-m
Driving Moment:	56735.9 kN-m
Total Slice Area:	549.187 m ²
Surface Horizontal Width:	49.285 m
Surface Average Height:	11.1431 m

Method: spencer

FS	1.078190
Center:	73.397, 77.335
Radius:	32.962
Left Slip Surface Endpoint:	54.346, 50.436
Right Slip Surface Endpoint:	102.475, 61.813
Left Slope Intercept:	54.346 57.913
Right Slope Intercept:	102.475 61.813
Resisting Moment:	55944.2 kN-m
Driving Moment:	51887.1 kN-m
Resisting Horizontal Force:	1484.62 kN
Driving Horizontal Force:	1376.95 kN
Passive Support Moment:	6092.68 kN-m
Passive Horizontal Support Force:	160.162 kN
Maximum Single Support Force:	184.867 kN
Total Support Force:	184.867 kN
Total Slice Area:	538.744 m ²
Surface Horizontal Width:	48.1285 m
Surface Average Height:	11.1939 m

Method: sarma

FS		1.144000
Center:	73.397, 77.335	
Radius:	32.962	
Left Slip Surface Endpoint:	54.346, 50.436	
Right Slip Surface Endpoint:	102.475, 61.813	
Left Slope Intercept:	54.346 57.913	
Right Slope Intercept:	102.475 61.813	
Passive Support Moment:	6092.68 kN-m	
Passive Horizontal Support Force:	160.162 kN	
Maximum Single Support Force:	184.867 kN	
Total Support Force:	184.867 kN	
Total Slice Area:	538.744 m2	
Surface Horizontal Width:	48.1285 m	
Surface Average Height:	11.1939 m	

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.02079

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	300.38	0	0
2	58.1674	49.286	213.71	0	0
3	59.1348	48.747	326.411	0	0
4	60.1022	48.2472	440.119	0	0
5	61.0696	47.7848	552.291	0	0
6	62.0369	47.3582	661.234	0	0
7	63.0043	46.966	766.116	0	0
8	63.9717	46.6069	866.195	0	0
9	64.9391	46.2798	960.808	0	0
10	65.9065	45.9839	1049.36	0	0
11	66.8739	45.7183	1117.29	0	0
12	67.8413	45.4823	1179.4	0	0
13	68.8086	45.2752	1235.72	0	0
14	69.776	45.0966	1286.16	0	0
15	70.7434	44.946	1330.66	0	0
16	71.7108	44.8231	1371.13	0	0
17	72.6782	44.7275	1412.66	0	0
18	73.6456	44.6591	1447.65	0	0
19	74.613	44.6176	1475.89	0	0
20	75.5803	44.603	1497.16	0	0
21	76.5477	44.6152	1511.27	0	0
22	77.5151	44.6543	1518.06	0	0
23	78.4825	44.7204	1517.39	0	0
24	79.4499	44.8136	1509.48	0	0
25	80.4173	44.9341	1495.27	0	0
26	81.3847	45.0822	1474.6	0	0
27	82.352	45.2583	1447.27	0	0
28	83.3194	45.4629	1413.11	0	0
29	84.2868	45.6963	1372	0	0
30	85.2542	45.9593	1323.82	0	0
31	86.2216	46.2525	1268.36	0	0
32	87.189	46.5768	1205.28	0	0
33	88.1564	46.933	1134.42	0	0
34	89.1237	47.3223	1055.64	0	0
35	90.0911	47.7458	969.93	0	0
36	91.0585	48.205	878.598	0	0
37	92.0259	48.7014	782.842	0	0
38	92.9933	49.2369	684.396	0	0
39	93.9607	49.8135	583.037	0	0
40	94.9281	50.4338	478.542	0	0
41	95.8955	51.1006	371.694	0	0
42	96.8628	51.8173	263.411	0	0
43	97.7739	52.5414	184.965	0	0
44	98.6851	53.3173	108.608	0	0
45	99.7714	54.3167	18.0584	0	0
46	100.858	55.4065	-63.3421	0	0
47	101.944	56.5996	-131.156	0	0
48	103.031	57.913	-179.589	0	0
49	104.065	59.2973	-206.914	0	0
50	105.1	60.8411	-218.3	0	0
51	106.134	62.5882	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.07819

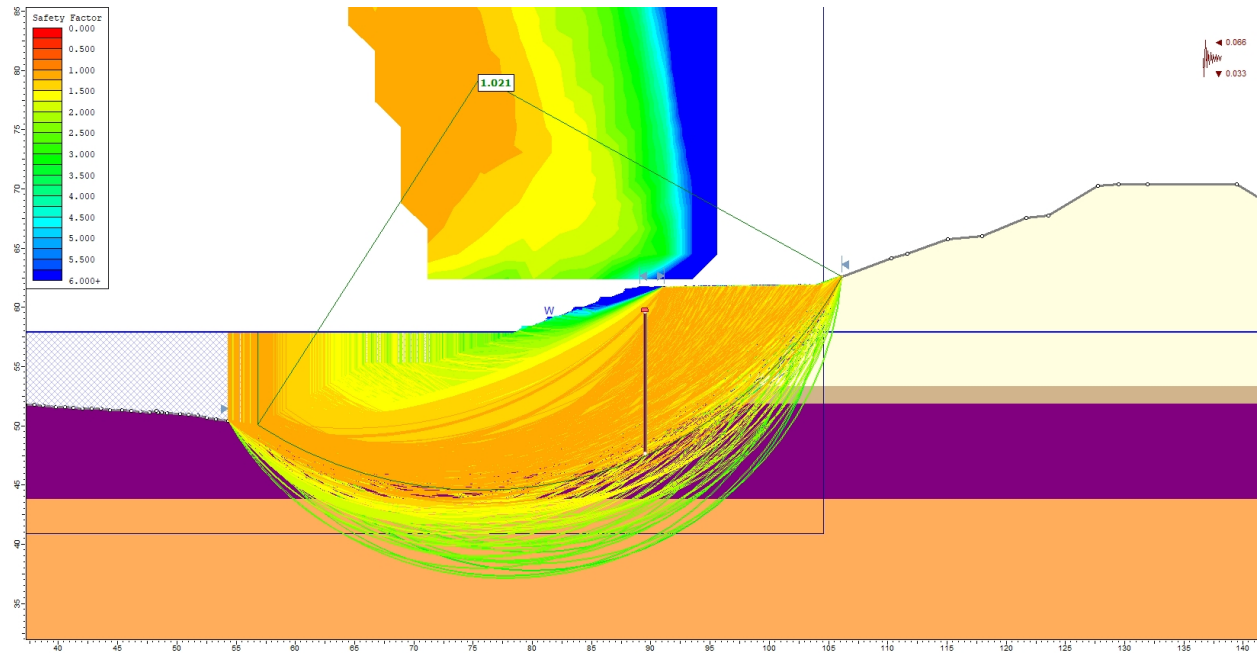
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	54.3463	50.436	274.217	0	0
2	55.778	49.4773	85.1636	11.8523	7.92302
3	56.0841	49.286	137.428	19.1259	7.92298
4	57.063	48.7049	226.642	31.5421	7.92305
5	58.0418	48.1682	356.473	49.6107	7.92302
6	59.0207	47.6735	485.697	67.5949	7.92302
7	59.9996	47.2187	612.814	85.286	7.92303
8	60.9785	46.8021	735.517	102.363	7.92305
9	61.9574	46.422	852.036	118.579	7.92304
10	62.9363	46.0772	961.675	133.837	7.923
11	63.9152	45.7665	1063.83	148.054	7.923
12	64.8941	45.4889	1157.97	161.156	7.92303
13	65.873	45.2435	1243.64	173.079	7.92304
14	66.8519	45.0297	1306.06	181.766	7.92303
15	67.8308	44.8467	1360.58	189.354	7.92305
16	68.8097	44.6941	1407.89	195.937	7.923
17	69.7886	44.5715	1448.03	201.523	7.92299
18	70.7675	44.4784	1481.07	206.122	7.92302
19	71.7464	44.4147	1509.44	210.07	7.92301
20	72.7252	44.3803	1537.67	213.999	7.92302
21	73.7041	44.3748	1558.12	216.845	7.92302
22	74.683	44.3985	1570.66	218.591	7.92304
23	75.6619	44.4513	1575.2	219.222	7.92301
24	76.6408	44.5335	1571.65	218.728	7.92302
25	77.6197	44.6451	1559.96	217.101	7.92301
26	78.5986	44.7865	1540.11	214.338	7.923
27	79.5775	44.9581	1512.47	210.492	7.92302
28	80.5564	45.1604	1477.85	205.673	7.92299
29	81.5353	45.394	1436.1	199.864	7.92304
30	82.5142	45.6595	1387.22	193.061	7.92303
31	83.4931	45.9578	1331.19	185.263	7.92302
32	84.472	46.2898	1267.99	176.467	7.923
33	85.4509	46.6566	1197.63	166.676	7.92305
34	86.4298	47.0595	1119.86	155.852	7.92302
35	87.4086	47.4999	1034.45	143.965	7.923
36	88.3875	47.9796	941.388	131.014	7.92303
37	89.3664	48.5004	840.815	117.017	7.92302
38	90.3453	49.0647	904.669	125.904	7.92304
39	91.3242	49.6751	795.022	110.644	7.92302
40	92.3031	50.3347	683.941	95.1848	7.92302
41	93.282	51.0473	573.264	79.7818	7.92303
42	94.2609	51.8173	462.34	64.3444	7.92303
43	95.1162	52.5412	384.383	53.495	7.92302
44	95.9714	53.3173	309.031	43.0081	7.92301
45	96.9857	54.3127	221.66	30.8486	7.92301
46	98	55.3999	143.583	19.9826	7.92302
47	99.0143	56.5935	78.832	10.9711	7.923
48	100.029	57.913	32.6852	4.54883	7.92302
49	100.844	59.0835	9.81714	1.36626	7.92301
50	101.659	60.3734	-0.968988	-0.134855	7.92302
51	102.475	61.8127	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.144

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	54.3463	50.436	274.217	0	0
2	55.778	49.4773	76.6011	4.63748	3.46449
3	56.0841	49.286	265.162	56.1129	11.9485
4	57.063	48.7049	366.937	84.8285	13.017
5	58.0418	48.1682	489.213	95.2144	11.0137
6	59.0207	47.6735	614.816	110.418	10.1815
7	59.9996	47.2187	739.713	127.263	9.76182
8	60.9785	46.8021	852.969	132.448	8.82633
9	61.9574	46.422	962.223	139.571	8.25323
10	62.9363	46.0772	1066.03	147.635	7.88477
11	63.9152	45.7665	1163.39	156.13	7.64357
12	64.8941	45.4889	1253.56	164.752	7.48732
13	65.873	45.2435	1335.9	173.306	7.39169
14	66.8519	45.0297	1392.29	171.708	7.03066
15	67.8308	44.8467	1441.36	169.485	6.70643
16	68.8097	44.6941	1483.64	166.361	6.39787
17	69.7886	44.5715	1519.17	162.433	6.103
18	70.7675	44.4784	1547.91	157.352	5.80443
19	71.7464	44.4147	1572.87	153.772	5.58379
20	72.7252	44.3803	1599.35	156.69	5.59547
21	73.7041	44.3748	1618.2	159.234	5.61992
22	74.683	44.3985	1629.25	161.372	5.65651
23	75.6619	44.4513	1632.32	162.9	5.69905
24	76.6408	44.5335	1627.34	163.967	5.75357
25	77.6197	44.6451	1614.2	164.55	5.82057
26	78.5986	44.7865	1592.83	164.626	5.90082
27	79.5775	44.9581	1563.58	164.171	5.99392
28	80.5564	45.1604	1527.16	163.145	6.09773
29	81.5353	45.394	1483.43	161.493	6.21301
30	82.5142	45.6595	1432.35	159.18	6.34138
31	83.4931	45.9578	1373.9	156.162	6.4846
32	84.472	46.2898	1308.04	152.393	6.64528
33	85.4509	46.6566	1234.67	148.391	6.85332
34	86.4298	47.0595	1152.62	148.14	7.32377
35	87.4086	47.4999	1062.65	146.141	7.83049
36	88.3875	47.9796	964.837	142.183	8.38304
37	89.3664	48.5004	859.835	134.826	8.91167
38	90.3453	49.0647	907.777	154.764	9.67515
39	91.3242	49.6751	795.574	139.947	9.97666
40	92.3031	50.3347	685.879	115.859	9.58792
41	93.282	51.0473	574.621	96.838	9.56589
42	94.2609	51.8173	459.7	84.6181	10.4298
43	95.1162	52.5412	378.623	74.7138	11.1628
44	95.9714	53.3173	300.405	64.6665	12.1484
45	96.9857	54.3127	210.087	52.4853	14.0269
46	98	55.3999	129.838	40.412	17.2887
47	99.0143	56.5935	64.0594	28.6723	24.1128
48	100.029	57.913	18.5804	17.5487	43.3643
49	100.844	59.0835	-2.54113	9.65102	-75.2487
50	101.659	60.3734	-10.8892	3.4732	-17.6905
51	102.475	61.8127	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S2_PL_SISMA no circ

Project Summary

File Name:	913_S2_PL_SISMA no circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:02.179s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 09:37:01

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

Random Numbers

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

Surface Options


Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.066
Seismic Load Coefficient (Vertical):	0.033

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	10
Friction Angle [deg]	45
Water Surface	Water Table
Hu Value	1

Support

PALO LEGNO

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.3 m
Failure Mode	Shear
Pile Shear Strength	55.46 kN

Global Minimums

Method: bishop simplified

FS	1.069770
Axis Location:	75.585, 73.080
Left Slip Surface Endpoint:	57.313, 50.351
Right Slip Surface Endpoint:	102.483, 61.813
Left Slope Intercept:	57.313 57.913
Right Slope Intercept:	102.483 61.813
Resisting Moment:	46772.9 kN-m
Driving Moment:	43722.6 kN-m
Total Slice Area:	527.029 m ²
Surface Horizontal Width:	45.1698 m
Surface Average Height:	11.6677 m

Method: spencer

FS	1.089430
Axis Location:	70.924, 77.906
Left Slip Surface Endpoint:	54.419, 50.423
Right Slip Surface Endpoint:	98.618, 61.757
Left Slope Intercept:	54.419 57.913
Right Slope Intercept:	98.618 61.757
Resisting Moment:	46279.1 kN-m
Driving Moment:	42480.1 kN-m
Resisting Horizontal Force:	1262.99 kN
Driving Horizontal Force:	1159.31 kN
Passive Support Moment:	5909.75 kN-m
Passive Horizontal Support Force:	154.139 kN
Maximum Single Support Force:	184.867 kN
Total Support Force:	184.867 kN
Total Slice Area:	432.638 m ²
Surface Horizontal Width:	44.1987 m
Surface Average Height:	9.78849 m

Method: sarma

FS	1.166840
Axis Location:	69.835, 71.637
Left Slip Surface Endpoint:	54.355, 50.434
Right Slip Surface Endpoint:	94.132, 61.693
Left Slope Intercept:	54.355 57.913
Right Slope Intercept:	94.132 61.693
Passive Support Moment:	4829.1 kN-m
Passive Horizontal Support Force:	127.818 kN
Maximum Single Support Force:	184.867 kN
Total Support Force:	184.867 kN
Total Slice Area:	398.443 m2
Surface Horizontal Width:	39.7764 m
Surface Average Height:	10.0171 m

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.06977

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	57.3128	50.3514	280.461	0	0
2	58.1047	49.8187	122.993	0	0
3	58.8966	49.286	288.783	0	0
4	59.7374	48.7204	400.844	0	0
5	60.5783	48.1547	520.157	0	0
6	61.4192	47.5891	645.37	0	0
7	62.4458	47.1187	764.177	0	0
8	63.4724	46.6482	886	0	0
9	64.499	46.1778	1010.84	0	0
10	65.5255	45.7074	1138.69	0	0
11	66.5521	45.4135	1219.32	0	0
12	67.5787	45.1195	1294.98	0	0
13	68.6053	44.8256	1371.68	0	0
14	69.6319	44.5316	1449.42	0	0
15	70.6585	44.3928	1492.08	0	0
16	71.6851	44.2539	1536.5	0	0
17	72.7116	44.115	1588.93	0	0
18	73.7382	43.9762	1641.21	0	0
19	74.5595	43.982	1654.76	0	0
20	75.3808	43.9878	1667.6	0	0
21	76.202	43.9937	1679.74	0	0
22	77.0233	43.9995	1691.18	0	0
23	77.8446	44.0054	1701.91	0	0
24	78.8712	44.1593	1678.12	0	0
25	79.8978	44.3132	1653.82	0	0
26	80.9243	44.4671	1629.73	0	0
27	81.9509	44.621	1605.86	0	0
28	82.7722	44.8694	1555.23	0	0
29	83.5935	45.1178	1504.84	0	0
30	84.4147	45.3662	1454.7	0	0
31	85.236	45.6146	1404.81	0	0
32	86.0573	45.863	1355.08	0	0
33	87.0839	46.3531	1248.5	0	0
34	88.1104	46.8432	1142.73	0	0
35	89.137	47.3333	1037.75	0	0
36	90.1636	47.8234	935.078	0	0
37	90.9849	48.3967	815.015	0	0
38	91.8062	48.9701	700.453	0	0
39	92.6274	49.5435	592.571	0	0
40	93.4487	50.1168	491.038	0	0
41	94.27	50.6902	394.434	0	0
42	95.3728	51.8173	217.144	0	0
43	96.1066	52.5673	130.325	0	0
44	96.8405	53.3173	52.4644	0	0
45	97.6084	54.1021	-22.7216	0	0
46	98.3763	54.887	-87.8354	0	0
47	99.2734	56.4	-182.677	0	0
48	100.17	57.913	-240.824	0	0
49	100.941	59.213	-266.98	0	0
50	101.712	60.5129	-277.057	0	0
51	102.483	61.8129	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.08943

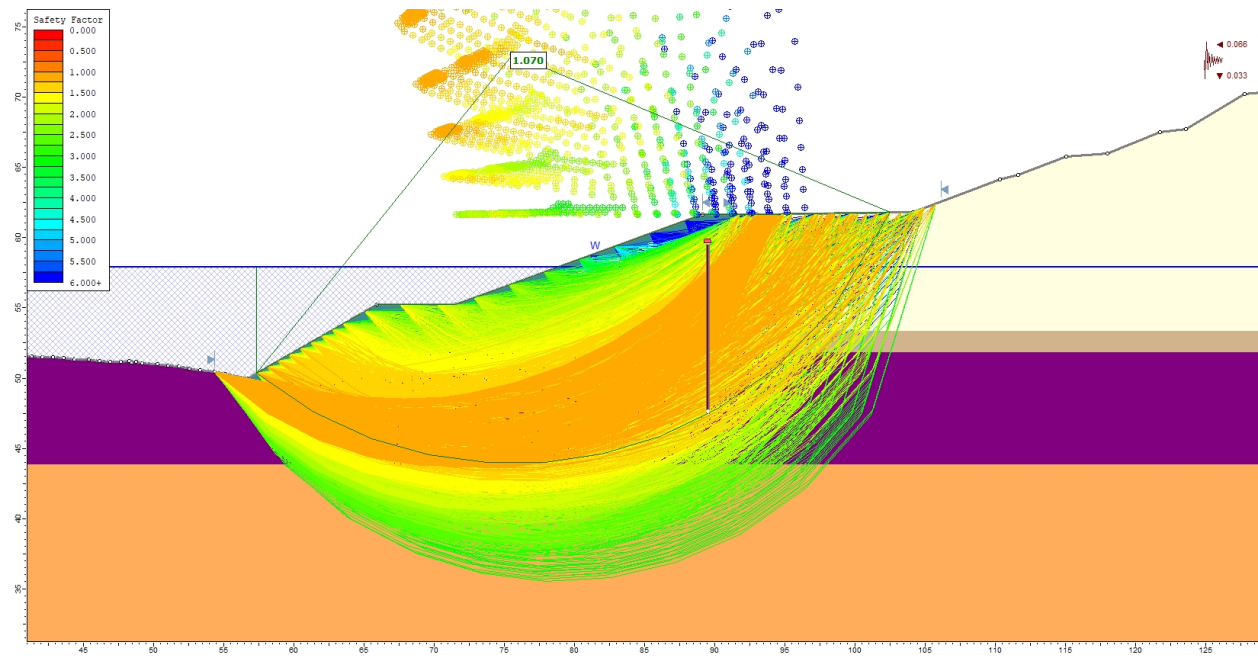
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	54.4191	50.4226	275.202	0	0
2	55.2165	50.0171	31.0183	4.2742	7.84572
3	56.0139	49.6116	63.1947	8.70799	7.84573
4	56.6541	49.286	126.528	17.435	7.8457
5	57.5456	48.8327	231.9	31.955	7.84575
6	58.4372	48.3793	342.972	47.2603	7.84574
7	59.2408	48.1007	424.067	58.4348	7.84573
8	60.0444	47.8221	506.736	69.8263	7.84573
9	60.848	47.5435	590.354	81.3485	7.84573
10	61.6516	47.2649	674.49	92.9421	7.84573
11	62.4552	46.9863	759.143	104.607	7.84573
12	63.4597	46.7793	835.19	115.086	7.84573
13	64.4642	46.5722	909.884	125.379	7.84576
14	65.4688	46.3651	983.225	135.485	7.84575
15	66.4733	46.158	1046.51	144.205	7.84573
16	67.2769	46.0965	1068.59	147.247	7.8457
17	68.0805	46.035	1090.61	150.282	7.84574
18	68.8841	45.9735	1112.58	153.31	7.84577
19	69.6877	45.912	1134.51	156.331	7.84572
20	70.4913	45.8505	1156.38	159.344	7.84569
21	71.295	45.8902	1157.39	159.484	7.84573
22	72.0986	45.9298	1163.91	160.382	7.84571
23	72.9022	45.9695	1171.74	161.462	7.84576
24	73.7058	46.0091	1178.8	162.434	7.84572
25	74.5094	46.0488	1185.07	163.298	7.84573
26	75.5139	46.2272	1165.85	160.65	7.84575
27	76.5184	46.4056	1145.38	157.828	7.84568
28	77.523	46.584	1123.65	154.834	7.8457
29	78.5275	46.7624	1100.66	151.667	7.84574
30	79.532	47.0789	1050.43	144.745	7.84572
31	80.5365	47.3954	1000.33	137.842	7.84575
32	81.541	47.7119	950.425	130.965	7.84573
33	82.5455	48.0284	900.879	124.138	7.84575
34	83.3491	48.407	838.738	115.575	7.84574
35	84.1528	48.7856	777.459	107.131	7.84574
36	84.9564	49.1642	717.04	98.8055	7.84574
37	85.76	49.5429	657.428	90.5911	7.84573
38	86.5636	49.9215	598.306	82.4444	7.84574
39	87.518	50.5534	499.235	68.7926	7.84572
40	88.4724	51.1854	402.374	55.4456	7.84573
41	89.4267	51.8173	307.927	42.4311	7.84572
42	90.5817	52.582	384.326	52.9586	7.84572
43	91.3781	53.3173	309.391	42.6329	7.84573
44	92.1835	54.0609	240.231	33.103	7.84575
45	92.9889	54.8044	181.369	24.992	7.84574
46	93.7943	55.548	131.831	18.1658	7.84573
47	94.5997	56.2915	90.815	12.514	7.84576
48	95.7917	57.913	31.176	4.29594	7.84574
49	96.7337	59.1945	6.81927	0.939669	7.84573
50	97.6758	60.476	-2.84501	-0.392031	7.84572
51	98.6178	61.7574	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.16684

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	54.3554	50.4343	274.34	0	0
2	55.1028	49.9763	34.038	1.79026	3.01075
3	55.8501	49.5184	69.8118	3.61984	2.96821
4	56.2293	49.286	225.312	45.9382	11.5239
5	57.1003	48.7522	312.952	60.0271	10.858
6	57.9714	48.2184	427.367	67.4311	8.96636
7	58.8754	47.8423	526.86	78.161	8.43843
8	59.7794	47.4662	630.111	90.1981	8.14634
9	60.6834	47.0901	732.123	96.3974	7.50089
10	61.5874	46.7141	835.561	102.421	6.98831
11	62.3107	46.5306	896.152	106.302	6.76484
12	63.0339	46.3471	956.535	110.604	6.59581
13	63.7571	46.1636	1016.68	115.263	6.46812
14	64.4803	45.9801	1076.57	120.233	6.37247
15	65.2035	45.7966	1136.19	125.481	6.30221
16	66.1075	45.6985	1177.29	128.317	6.22032
17	67.0115	45.6005	1205.74	126.386	5.98391
18	67.9155	45.5024	1234.17	124.391	5.75536
19	68.8195	45.4044	1262.52	122.142	5.52586
20	69.7235	45.4317	1264.96	118.119	5.33468
21	70.6275	45.4591	1267.3	113.705	5.12698
22	71.5315	45.4865	1269.8	109.229	4.91652
23	72.4356	45.5138	1281.04	110.733	4.94036
24	73.1588	45.6373	1268.76	110.782	4.99014
25	73.882	45.7608	1255.8	110.808	5.04255
26	74.6052	45.8843	1242.16	110.813	5.09786
27	75.3284	46.0078	1227.85	110.716	5.15246
28	76.0516	46.1313	1212.87	110.587	5.20971
29	76.9556	46.4223	1166.52	108.776	5.32733
30	77.8596	46.7134	1119.61	106.896	5.45385
31	78.7636	47.0044	1072.13	104.947	5.59067
32	79.6676	47.2955	1024.37	102.905	5.73651
33	80.3908	47.6545	963.245	99.6307	5.90524
34	81.114	48.0136	902.737	96.2144	6.08366
35	81.8372	48.3727	842.953	92.668	6.27348
36	82.5605	48.7318	784.018	89.0068	6.47686
37	83.2837	49.0908	725.934	85.2282	6.69615
38	84.1877	49.7399	622.541	77.7289	7.11698
39	85.0917	50.389	522.888	69.9292	7.61734
40	85.9957	51.0381	426.066	63.2597	8.44523
41	86.8997	51.6871	332.252	55.9387	9.55682
42	87.0242	51.8173	314.301	54.2278	9.78913
43	87.742	52.5673	230.07	45.9172	11.2868
44	88.4598	53.3173	152.801	37.2315	13.6939
45	89.4877	54.3915	51.3563	22.7843	23.9245
46	90.5157	55.4656	122.061	42.5086	19.201
47	91.2263	56.6893	56.892	29.4006	27.329
48	91.9368	57.913	17.4519	16.7373	43.8026
49	92.6685	59.1731	-3.43169	7.63559	-65.7993
50	93.4001	60.4331	-9.80256	2.57142	-14.6987
51	94.1318	61.6931	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S2_PL_SLU circ

Project Summary

File Name:	913_S2_PL_SLU circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:01.307s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 09:37:01

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $m\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
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:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Support

PALO LEGNO

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.3 m
Failure Mode	Shear
Pile Shear Strength	55.46 kN

Global Minimums

Method: bishop simplified

FS	1.030910
Center:	75.623, 79.476
Radius:	34.874
Left Slip Surface Endpoint:	56.849, 50.087
Right Slip Surface Endpoint:	106.134, 62.588
Left Slope Intercept:	56.849 56.581
Right Slope Intercept:	106.134 62.588
Resisting Moment:	49896 kN-m
Driving Moment:	48399.9 kN-m
Total Slice Area:	523.321 m ²
Surface Horizontal Width:	49.285 m
Surface Average Height:	10.6183 m

Method: spencer

FS	1.050920
Center:	75.623, 79.476
Radius:	34.874
Left Slip Surface Endpoint:	56.849, 50.087
Right Slip Surface Endpoint:	106.134, 62.588
Left Slope Intercept:	56.849 56.581
Right Slope Intercept:	106.134 62.588
Resisting Moment:	50864.2 kN-m
Driving Moment:	48399.9 kN-m
Resisting Horizontal Force:	1303.19 kN
Driving Horizontal Force:	1240.05 kN
Total Slice Area:	523.321 m ²
Surface Horizontal Width:	49.285 m
Surface Average Height:	10.6183 m

Method: sarma

FS		1.125880
Center:	75.623, 79.476	
Radius:	34.874	
Left Slip Surface Endpoint:	56.849, 50.087	
Right Slip Surface Endpoint:	106.134, 62.588	
Left Slope Intercept:	56.849 56.581	
Right Slope Intercept:	106.134 62.588	
Total Slice Area:	523.321 m2	
Surface Horizontal Width:	49.285 m	
Surface Average Height:	10.6183 m	

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.03091

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	206.826	0	0
2	58.1674	49.286	158.574	0	0
3	59.1596	48.7337	261.058	0	0
4	60.1518	48.2226	365.94	0	0
5	61.144	47.7508	470.406	0	0
6	62.1362	47.3165	572.712	0	0
7	63.1283	46.9181	671.966	0	0
8	64.1205	46.5545	767.376	0	0
9	65.1127	46.2245	858.234	0	0
10	66.1049	45.927	942.447	0	0
11	67.0971	45.6612	1014.94	0	0
12	68.0893	45.4264	1082.11	0	0
13	69.0815	45.222	1143.91	0	0
14	70.0737	45.0473	1200.22	0	0
15	71.0659	44.902	1250.94	0	0
16	72.0581	44.7857	1298.91	0	0
17	73.0503	44.698	1343.63	0	0
18	74.0424	44.6388	1382.54	0	0
19	75.0346	44.6079	1415.37	0	0
20	76.0268	44.6053	1441.94	0	0
21	77.019	44.6309	1463.19	0	0
22	78.0112	44.6848	1479.04	0	0
23	79.0034	44.7672	1488.92	0	0
24	79.9956	44.8782	1492.53	0	0
25	80.9878	45.0181	1489.28	0	0
26	81.98	45.1873	1478.69	0	0
27	82.9722	45.3861	1460.5	0	0
28	83.9644	45.6152	1434.44	0	0
29	84.9565	45.8752	1400.28	0	0
30	85.9487	46.1667	1357.76	0	0
31	86.9409	46.4906	1306.61	0	0
32	87.9331	46.8479	1246.99	0	0
33	88.9253	47.2397	1179.1	0	0
34	89.9175	47.6672	1103.32	0	0
35	90.9097	48.132	1020.86	0	0
36	91.9019	48.6356	932.328	0	0
37	92.8941	49.1801	838.727	0	0
38	93.8863	49.7676	740.742	0	0
39	94.8785	50.4009	638.159	0	0
40	95.8706	51.0829	531.668	0	0
41	96.8628	51.8173	422.084	0	0
42	97.7739	52.5414	337.918	0	0
43	98.6851	53.3173	253.794	0	0
44	99.7246	54.2718	156.518	0	0
45	100.764	55.3086	64.0579	0	0
46	101.804	56.4387	-20.3063	0	0
47	102.843	57.6768	-92.3427	0	0
48	103.883	59.0423	-146.446	0	0
49	104.922	60.563	-177.88	0	0
50	105.962	62.2798	-180.103	0	0
51	106.134	62.5882	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.05092

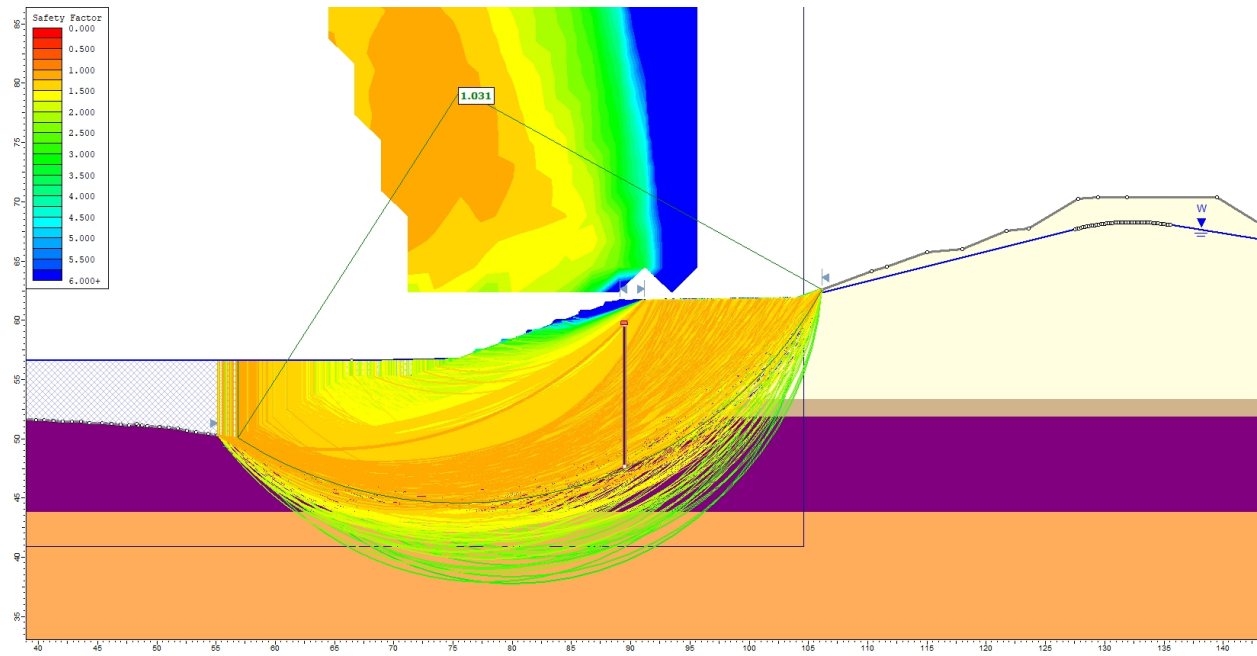
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	206.826	0	0
2	58.1674	49.286	216.713	23.6915	6.23891
3	59.1596	48.7337	329.368	36.0073	6.23894
4	60.1518	48.2226	443.878	48.5258	6.23894
5	61.144	47.7508	557.219	60.9164	6.23892
6	62.1362	47.3165	667.562	72.9794	6.23893
7	63.1283	46.9181	774.018	84.6174	6.23893
8	64.1205	46.5545	875.806	95.7451	6.23893
9	65.1127	46.2245	972.241	106.288	6.23895
10	66.1049	45.927	1061.17	116.01	6.23895
11	67.0971	45.6612	1137.33	124.336	6.23895
12	68.0893	45.4264	1207.58	132.016	6.23896
13	69.0815	45.222	1271.93	139.05	6.23892
14	70.0737	45.0473	1330.3	145.431	6.23891
15	71.0659	44.902	1382.65	151.154	6.23891
16	72.0581	44.7857	1431.96	156.545	6.23892
17	73.0503	44.698	1477.72	161.548	6.23894
18	74.0424	44.6388	1517.34	165.879	6.23893
19	75.0346	44.6079	1550.57	169.512	6.23893
20	76.0268	44.6053	1577.28	172.432	6.23893
21	77.019	44.6309	1598.47	174.749	6.23895
22	78.0112	44.6848	1614.08	176.454	6.2389
23	79.0034	44.7672	1623.58	177.494	6.23895
24	79.9956	44.8782	1626.7	177.835	6.23894
25	80.9878	45.0181	1622.91	177.421	6.23896
26	81.98	45.1873	1611.76	176.201	6.23892
27	82.9722	45.3861	1593.03	174.154	6.23894
28	83.9644	45.6152	1566.51	171.255	6.23895
29	84.9565	45.8752	1532.02	167.484	6.23893
30	85.9487	46.1667	1489.35	162.82	6.23896
31	86.9409	46.4906	1438.29	157.237	6.23892
32	87.9331	46.8479	1379.04	150.76	6.23894
33	88.9253	47.2397	1311.86	143.415	6.23891
34	89.9175	47.6672	1237.17	135.25	6.23892
35	90.9097	48.132	1156.25	126.404	6.23893
36	91.9019	48.6356	1069.71	116.944	6.23898
37	92.8941	49.1801	978.612	106.984	6.23892
38	93.8863	49.7676	883.644	96.602	6.23893
39	94.8785	50.4009	784.641	85.7788	6.23893
40	95.8706	51.0829	682.313	74.592	6.23893
41	96.8628	51.8173	577.486	63.1321	6.23893
42	97.7739	52.5414	495.41	54.1594	6.23894
43	98.6851	53.3173	413.73	45.2299	6.23893
44	99.7246	54.2718	320.162	35.0008	6.23892
45	100.764	55.3086	231.697	25.3296	6.23892
46	101.804	56.4387	151.425	16.5541	6.23892
47	102.843	57.6768	83.2778	9.10412	6.23893
48	103.883	59.0423	32.3861	3.54052	6.23893
49	104.922	60.563	2.94104	0.321522	6.23894
50	105.962	62.2798	0.614923	0.0672248	6.23893
51	106.134	62.5882	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.12588

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	206.826	0	0
2	58.1674	49.286	364.519	94.4501	14.5264
3	59.1596	48.7337	464.188	92.6543	11.2882
4	60.1518	48.2226	572.887	99.8187	9.88388
5	61.144	47.7508	677.863	103.098	8.64799
6	62.1362	47.3165	782.403	109.345	7.95586
7	63.1283	46.9181	884.437	117.039	7.53825
8	64.1205	46.5545	982.689	125.508	7.27835
9	65.1127	46.2245	1076.21	134.398	7.11829
10	66.1049	45.927	1161.96	141.843	6.95979
11	67.0971	45.6612	1233.06	143.704	6.64741
12	68.0893	45.4264	1298.5	144.85	6.36513
13	69.0815	45.222	1358.26	145.229	6.10304
14	70.0737	45.0473	1412.27	144.832	5.85536
15	71.0659	44.902	1460.37	143.317	5.60491
16	72.0581	44.7857	1506.84	145.183	5.50342
17	73.0503	44.698	1550.79	149.986	5.52423
18	74.0424	44.6388	1588.69	154.577	5.55729
19	75.0346	44.6079	1620.27	158.881	5.60043
20	76.0268	44.6053	1645.36	162.83	5.65177
21	77.019	44.6309	1664.86	166.365	5.70647
22	78.0112	44.6848	1678.3	166.309	5.65918
23	79.0034	44.7672	1685.68	165.864	5.61958
24	79.9956	44.8782	1686.69	164.902	5.58387
25	80.9878	45.0181	1680.64	159.555	5.42324
26	81.98	45.1873	1667.36	153.743	5.2682
27	82.9722	45.3861	1646.62	147.373	5.11436
28	83.9644	45.6152	1618.21	140.344	4.95674
29	84.9565	45.8752	1581.91	132.643	4.79303
30	85.9487	46.1667	1537.34	126.001	4.68551
31	86.9409	46.4906	1484.3	119.255	4.59352
32	87.9331	46.8479	1421.85	119.165	4.79075
33	88.9253	47.2397	1351.19	118.067	4.99382
34	89.9175	47.6672	1273.37	113.512	5.09405
35	90.9097	48.132	1189.32	107.817	5.17995
36	91.9019	48.6356	1100.72	97.5827	5.06623
37	92.8941	49.1801	1007.78	86.3574	4.89775
38	93.8863	49.7676	909.301	79.6016	5.00301
39	94.8785	50.4009	806.58	72.5749	5.14155
40	95.8706	51.0829	700.462	65.0002	5.30165
41	96.8628	51.8173	591.838	56.848	5.48662
42	97.7739	52.5414	506.241	50.3791	5.68314
43	98.6851	53.3173	421.133	43.79	5.93636
44	99.7246	54.2718	323.801	35.9981	6.34372
45	100.764	55.3086	231.848	28.3213	6.96444
46	101.804	56.4387	148.511	20.9414	8.02631
47	102.843	57.6768	77.9422	14.0808	10.2404
48	103.883	59.0423	25.7617	7.79282	16.8304
49	104.922	60.563	-4.04182	3.09658	-37.457
50	105.962	62.2798	-5.20866	0.0256821	-0.282503
51	106.134	62.5882	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S2_PL_SLU_morbida circ

Project Summary

File Name:	913_S2_PL_SLU_morbida circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:00.869s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 09:37:01

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
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:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Support

PALO LEGNO

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.3 m
Failure Mode	Shear
Pile Shear Strength	55.46 kN

Global Minimums

Method: bishop simplified

FS	1.121030
Center:	75.623, 75.194
Radius:	31.095
Left Slip Surface Endpoint:	57.091, 50.225
Right Slip Surface Endpoint:	103.699, 61.830
Left Slope Intercept:	57.091 55.368
Right Slope Intercept:	103.699 61.830
Resisting Moment:	47594.1 kN-m
Driving Moment:	42455.6 kN-m
Total Slice Area:	495.038 m ²
Surface Horizontal Width:	46.6082 m
Surface Average Height:	10.6213 m

Method: spencer

FS	1.132670
Center:	75.623, 79.476
Radius:	34.874
Left Slip Surface Endpoint:	56.849, 50.087
Right Slip Surface Endpoint:	106.134, 62.588
Left Slope Intercept:	56.849 55.368
Right Slope Intercept:	106.134 62.588
Resisting Moment:	55294.9 kN-m
Driving Moment:	48818.4 kN-m
Resisting Horizontal Force:	1401.25 kN
Driving Horizontal Force:	1237.13 kN
Total Slice Area:	502.143 m ²
Surface Horizontal Width:	49.285 m
Surface Average Height:	10.1886 m

Method: sarma

FS		1.168500
Center:	75.623, 79.476	
Radius:	34.874	
Left Slip Surface Endpoint:	56.849, 50.087	
Right Slip Surface Endpoint:	106.134, 62.588	
Left Slope Intercept:	56.849 55.368	
Right Slope Intercept:	106.134 62.588	
Total Slice Area:	502.143 m2	
Surface Horizontal Width:	49.285 m	
Surface Average Height:	10.1886 m	

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.12103

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	57.0912	50.2251	129.733	0	0
2	58.4287	49.286	155.688	0	0
3	59.3481	48.6988	245.695	0	0
4	60.2676	48.1555	338.694	0	0
5	61.187	47.6536	431.79	0	0
6	62.1065	47.1909	523.472	0	0
7	63.026	46.7654	612.835	0	0
8	63.9454	46.3756	699.081	0	0
9	64.8649	46.0199	781.507	0	0
10	65.7844	45.6971	859.483	0	0
11	66.7038	45.4062	931.866	0	0
12	67.6233	45.1462	999.239	0	0
13	68.5427	44.9163	1061.64	0	0
14	69.4622	44.716	1118.96	0	0
15	70.3817	44.5445	1171.1	0	0
16	71.3011	44.4013	1217.99	0	0
17	72.2206	44.2862	1260.1	0	0
18	73.1401	44.1988	1298.02	0	0
19	74.0595	44.1389	1331.54	0	0
20	74.979	44.1062	1360.25	0	0
21	75.8985	44.1008	1383.79	0	0
22	76.8179	44.1225	1401.79	0	0
23	77.7374	44.1715	1413.92	0	0
24	78.6568	44.2479	1419.86	0	0
25	79.5763	44.3519	1419.47	0	0
26	80.4958	44.4837	1412.89	0	0
27	81.4152	44.6438	1399.84	0	0
28	82.3347	44.8325	1380.1	0	0
29	83.2542	45.0505	1353.49	0	0
30	84.1736	45.2983	1319.86	0	0
31	85.0931	45.5767	1279.08	0	0
32	86.0126	45.8866	1230.97	0	0
33	86.932	46.229	1175.2	0	0
34	87.8515	46.605	1111.57	0	0
35	88.7709	47.016	1039.92	0	0
36	89.6904	47.4636	960.467	0	0
37	90.6099	47.9495	874.714	0	0
38	91.5293	48.4759	783.33	0	0
39	92.4488	49.0452	688.092	0	0
40	93.3683	49.6602	589.951	0	0
41	94.2877	50.3244	488.289	0	0
42	95.2072	51.0418	383.602	0	0
43	96.1266	51.8173	276.838	0	0
44	96.9234	52.5408	203.536	0	0
45	97.7201	53.3173	131.943	0	0
46	98.6606	54.31	47.9139	0	0
47	99.6011	55.3969	-28.1447	0	0
48	100.542	56.5946	-91.956	0	0
49	101.482	57.926	-137.634	0	0
50	102.591	59.7145	-166.353	0	0
51	103.699	61.8303	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.13267

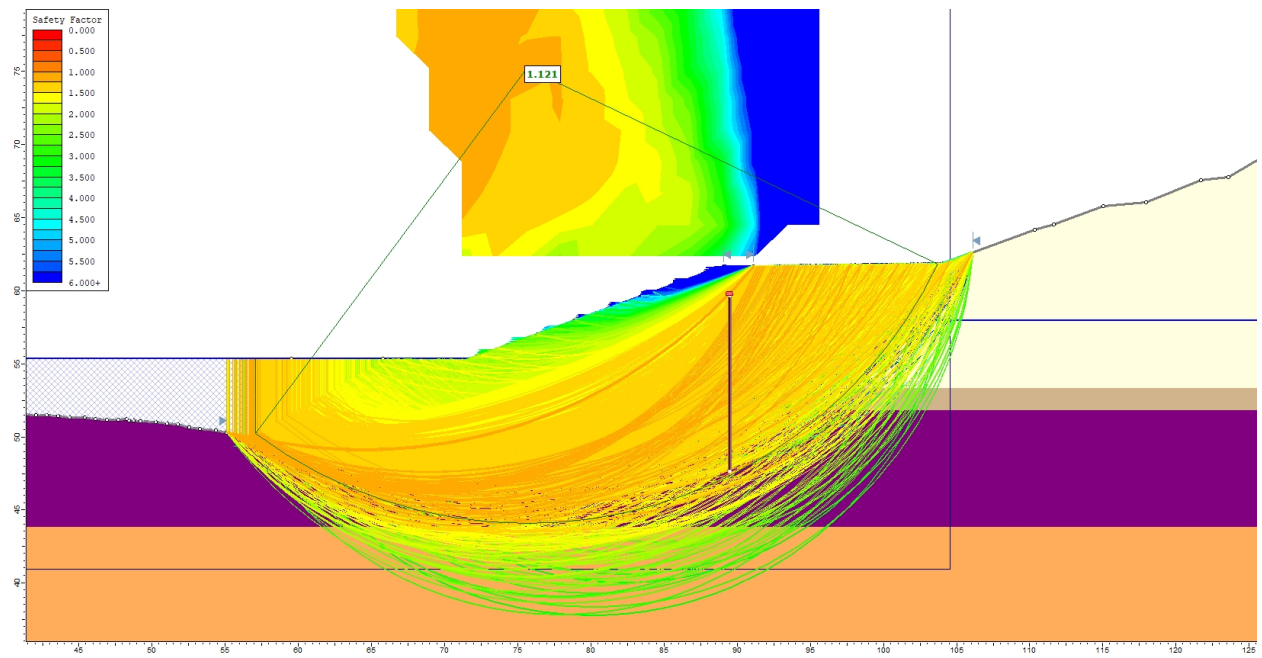
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	136.773	0	0
2	58.1674	49.286	171.152	17.1152	5.71059
3	59.1348	48.747	264.031	26.4031	5.71059
4	60.1022	48.2472	359.232	35.9232	5.71059
5	61.0696	47.7848	454.014	45.4014	5.71059
6	62.0369	47.3582	546.576	54.6576	5.71059
7	63.0043	46.966	636.062	63.6062	5.71059
8	63.9717	46.6069	721.718	72.1718	5.71059
9	64.9391	46.2798	802.879	80.2879	5.71059
10	65.9065	45.9839	878.955	87.8955	5.71059
11	66.8739	45.7183	948.858	94.8858	5.71059
12	67.8413	45.4823	1013.67	101.367	5.71059
13	68.8086	45.2752	1073.33	107.333	5.71059
14	69.776	45.0966	1127.77	112.777	5.71059
15	70.7434	44.946	1176.93	117.693	5.71059
16	71.7108	44.8231	1220.87	122.087	5.71059
17	72.6782	44.7275	1260.43	126.043	5.71059
18	73.6456	44.6591	1295.89	129.589	5.71059
19	74.613	44.6176	1326.86	132.686	5.71059
20	75.5803	44.603	1352.94	135.294	5.71059
21	76.5477	44.6152	1373.79	137.379	5.71059
22	77.5151	44.6543	1389.06	138.906	5.71059
23	78.4825	44.7204	1398.44	139.844	5.71059
24	79.4499	44.8136	1401.72	140.172	5.71059
25	80.4173	44.9341	1399.18	139.918	5.71059
26	81.3847	45.0822	1390.58	139.058	5.71059
27	82.352	45.2583	1375.68	137.568	5.71059
28	83.3194	45.4629	1354.34	135.434	5.71059
29	84.2868	45.6963	1326.42	132.642	5.71059
30	85.2542	45.9593	1291.84	129.184	5.71059
31	86.2216	46.2525	1250.42	125.042	5.71059
32	87.189	46.5768	1201.92	120.192	5.71059
33	88.1564	46.933	1146.18	114.618	5.71059
34	89.1237	47.3223	1083.09	108.309	5.71059
35	90.0911	47.7458	1013.44	101.344	5.71059
36	91.0585	48.205	938.308	93.8308	5.71059
37	92.0259	48.7014	858.754	85.8754	5.71059
38	92.9933	49.2369	776.29	77.629	5.71059
39	93.9607	49.8135	690.816	69.0816	5.71059
40	94.9281	50.4338	602.217	60.2217	5.71059
41	95.8955	51.1006	511.219	51.1219	5.71059
42	96.8628	51.8173	418.66	41.866	5.71059
43	97.7739	52.5414	350.056	35.0056	5.71059
44	98.6851	53.3173	283.045	28.3045	5.71059
45	99.774	54.3192	203.467	20.3467	5.71059
46	100.863	55.4119	131.765	13.1765	5.71059
47	101.952	56.6084	71.9314	7.19314	5.71059
48	103.041	57.926	29.1397	2.91397	5.71059
49	104.072	59.3069	5.06324	0.506324	5.71059
50	105.103	60.8465	-5.1302	-0.51302	5.71059
51	106.134	62.5882	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.1685

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	136.773	0	0
2	58.1674	49.286	236.163	49.7339	11.8922
3	59.1348	48.747	324.45	53.8982	9.43194
4	60.1022	48.2472	418.166	62.2923	8.47279
5	61.0696	47.7848	509.343	67.6748	7.56838
6	62.0369	47.3582	599.445	74.3589	7.0712
7	63.0043	46.966	687.142	81.6852	6.77932
8	63.9717	46.6069	771.474	89.347	6.60619
9	64.9391	46.2798	851.666	97.1725	6.50913
10	65.9065	45.9839	927.055	105.051	6.465
11	66.8739	45.7183	994.018	107.602	6.17819
12	67.8413	45.4823	1056.15	109.848	5.93787
13	68.8086	45.2752	1113.21	111.369	5.71304
14	69.776	45.0966	1165.15	112.232	5.50199
15	70.7434	44.946	1211.84	112.163	5.288
16	71.7108	44.8231	1253.8	112.579	5.13084
17	72.6782	44.7275	1291.63	113.041	5.00167
18	73.6456	44.6591	1325.33	112.608	4.85653
19	74.613	44.6176	1354.67	111.837	4.71944
20	75.5803	44.603	1379.24	110.632	4.58601
21	76.5477	44.6152	1398.69	109.048	4.45801
22	77.5151	44.6543	1412.69	107.075	4.33445
23	78.4825	44.7204	1420.9	104.696	4.2141
24	79.4499	44.8136	1423.38	105.135	4.22436
25	80.4173	44.9341	1420.15	107.364	4.32336
26	81.3847	45.0822	1410.75	109.236	4.42764
27	82.352	45.2583	1394.96	110.713	4.53785
28	83.3194	45.4629	1372.6	111.762	4.65496
29	84.2868	45.6963	1343.55	112.351	4.78009
30	85.2542	45.9593	1307.69	112.445	4.91463
31	86.2216	46.2525	1264.57	114.341	5.16657
32	87.189	46.5768	1214.12	115.762	5.44648
33	88.1564	46.933	1156.22	116.341	5.74587
34	89.1237	47.3223	1090.8	115.887	6.06438
35	90.0911	47.7458	1019.33	111.746	6.25618
36	91.0585	48.205	942.31	106.984	6.47727
37	92.0259	48.7014	862.365	96.5472	6.38802
38	92.9933	49.2369	779.547	86.0497	6.29905
39	93.9607	49.8135	691.896	80.3888	6.62727
40	94.9281	50.4338	601.109	74.1599	7.03314
41	95.8955	51.1006	507.971	67.3325	7.55065
42	96.8628	51.8173	413.408	59.8627	8.23933
43	97.7739	52.5414	343.114	53.6303	8.88371
44	98.6851	53.3173	274.6	47.1278	9.73843
45	99.774	54.3192	193.583	38.8763	11.3554
46	100.863	55.4119	121.011	30.477	14.1361
47	101.952	56.6084	61.1379	22.0907	19.8661
48	103.041	57.926	19.5158	13.9184	35.4959
49	104.072	59.3069	-2.4497	7.03471	-70.8003
50	105.103	60.8465	-10.7321	2.53949	-13.3128
51	106.134	62.5882	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S2_PL_SLU no circ

Project Summary

File Name:	913_S2_PL_SLU no circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:04.221s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 09:37:01

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $m_{\alpha} < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

Random Numbers

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

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Support

PALO LEGNO

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.3 m
Failure Mode	Shear
Pile Shear Strength	55.46 kN

Global Minimums

Method: bishop simplified

FS	1.034250
Axis Location:	75.021, 73.087
Left Slip Surface Endpoint:	56.859, 50.093
Right Slip Surface Endpoint:	102.064, 61.807
Left Slope Intercept:	56.859 56.581
Right Slope Intercept:	102.064 61.807
Resisting Moment:	39747 kN-m
Driving Moment:	38430.9 kN-m
Total Slice Area:	505.328 m ²
Surface Horizontal Width:	45.2049 m
Surface Average Height:	11.1786 m

Method: spencer

FS	1.059140
Axis Location:	75.021, 73.087
Left Slip Surface Endpoint:	56.859, 50.093
Right Slip Surface Endpoint:	102.064, 61.807
Left Slope Intercept:	56.859 56.581
Right Slope Intercept:	102.064 61.807
Resisting Moment:	40670 kN-m
Driving Moment:	38399.2 kN-m
Resisting Horizontal Force:	1214.35 kN
Driving Horizontal Force:	1146.54 kN
Total Slice Area:	505.328 m ²
Surface Horizontal Width:	45.2049 m
Surface Average Height:	11.1786 m

Method: sarma

FS	1.138950
Axis Location:	75.021, 73.087
Left Slip Surface Endpoint:	56.859, 50.093
Right Slip Surface Endpoint:	102.064, 61.807
Left Slope Intercept:	56.859 56.581
Right Slope Intercept:	102.064 61.807
Total Slice Area:	505.328 m ²
Surface Horizontal Width:	45.2049 m
Surface Average Height:	11.1786 m

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.03425

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.859	50.0929	206.479	0	0
2	58.079	49.286	157.104	0	0
3	59.0422	48.649	268.7	0	0
4	60.0053	48.0119	390.984	0	0
5	60.9685	47.3749	522.531	0	0
6	61.7904	47.0047	611.207	0	0
7	62.6124	46.6345	702.228	0	0
8	63.4343	46.2643	795.595	0	0
9	64.2562	45.8941	891.308	0	0
10	65.0781	45.524	989.367	0	0
11	66.1055	45.236	1076.55	0	0
12	67.1328	44.948	1157.95	0	0
13	68.1602	44.66	1240.47	0	0
14	69.1876	44.372	1324.22	0	0
15	70.215	44.238	1375.69	0	0
16	71.2424	44.1041	1427.32	0	0
17	72.2698	43.9702	1483.16	0	0
18	73.2972	43.8362	1540.96	0	0
19	74.1191	43.8456	1561.6	0	0
20	74.941	43.8549	1581.95	0	0
21	75.7629	43.8642	1602	0	0
22	76.5848	43.8735	1622.31	0	0
23	77.4067	43.8828	1643.52	0	0
24	78.4341	44.0407	1636.26	0	0
25	79.4615	44.1987	1629.09	0	0
26	80.4889	44.3566	1621.99	0	0
27	81.5162	44.5145	1614.49	0	0
28	82.3381	44.766	1577.47	0	0
29	83.1601	45.0175	1540.08	0	0
30	83.982	45.269	1502.31	0	0
31	84.8039	45.5205	1464.17	0	0
32	85.6258	45.772	1425.65	0	0
33	86.4477	46.1672	1351.45	0	0
34	87.2696	46.5624	1277.16	0	0
35	88.0915	46.9577	1203.32	0	0
36	88.9134	47.3529	1130	0	0
37	89.7353	47.7481	1057.6	0	0
38	90.7627	48.4691	918.687	0	0
39	91.7901	49.19	786.567	0	0
40	92.8175	49.911	662.005	0	0
41	93.8449	50.6319	545.176	0	0
42	95	51.8173	360.014	0	0
43	95.7308	52.5673	268.69	0	0
44	96.4617	53.3173	185.145	0	0
45	97.2081	54.0832	105.465	0	0
46	97.9544	54.849	34.143	0	0
47	98.9492	56.5333	-95.0349	0	0
48	99.9439	58.2175	-182.863	0	0
49	100.939	59.9018	-229.341	0	0
50	101.933	61.586	-234.469	0	0
51	102.064	61.8069	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.05914

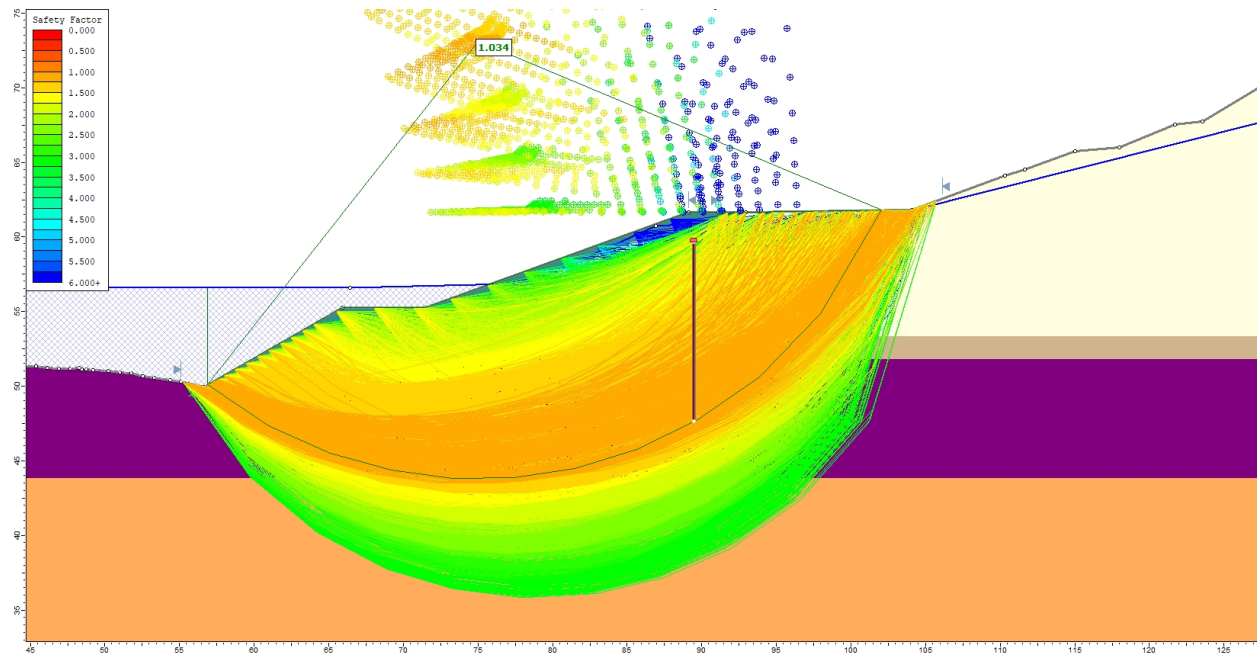
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.859	50.0929	206.479	0	0
2	58.079	49.286	222.591	24.1732	6.19798
3	59.0422	48.649	347.151	37.7004	6.198
4	60.0053	48.0119	483.602	52.5188	6.19799
5	60.9685	47.3749	630.358	68.4565	6.198
6	61.7904	47.0047	726.032	78.8465	6.19799
7	62.6124	46.6345	824.218	89.5095	6.19799
8	63.4343	46.2643	924.918	100.445	6.19796
9	64.2562	45.8941	1028.13	111.654	6.19798
10	65.0781	45.524	1133.86	123.136	6.19797
11	66.1055	45.236	1225.51	133.089	6.19797
12	67.1328	44.948	1311.03	142.377	6.19799
13	68.1602	44.66	1397.74	151.793	6.19797
14	69.1876	44.372	1485.74	161.35	6.19798
15	70.215	44.238	1538.61	167.092	6.19799
16	71.2424	44.1041	1591.64	172.851	6.19799
17	72.2698	43.9702	1649.05	179.086	6.198
18	73.2972	43.8362	1708.46	185.538	6.19801
19	74.1191	43.8456	1729.09	187.778	6.19799
20	74.941	43.8549	1749.4	189.984	6.198
21	75.7629	43.8642	1769.39	192.155	6.19801
22	76.5848	43.8735	1789.65	194.354	6.19797
23	77.4067	43.8828	1810.79	196.651	6.19801
24	78.4341	44.0407	1802.87	195.79	6.19798
25	79.4615	44.1987	1795.02	194.938	6.19799
26	80.4889	44.3566	1787.23	194.092	6.19799
27	81.5162	44.5145	1779.02	193.201	6.19801
28	82.3381	44.766	1741.87	189.165	6.19796
29	83.1601	45.0175	1704.33	185.089	6.19799
30	83.982	45.269	1666.43	180.973	6.19799
31	84.8039	45.5205	1628.15	176.815	6.19796
32	85.6258	45.772	1589.49	172.617	6.19797
33	86.4477	46.1672	1516.72	164.715	6.198
34	87.2696	46.5624	1443.86	156.802	6.19798
35	88.0915	46.9577	1371.43	148.936	6.19798
36	88.9134	47.3529	1299.48	141.123	6.19801
37	89.7353	47.7481	1228.42	133.406	6.19801
38	90.7627	48.4691	1095.01	118.918	6.19803
39	91.7901	49.19	968.11	105.136	6.19799
40	92.8175	49.911	848.452	92.1413	6.19799
41	93.8449	50.6319	736.21	79.9519	6.19799
42	95	51.8173	562.91	61.1316	6.19799
43	95.7308	52.5673	475.221	51.6087	6.198
44	96.4617	53.3173	394.986	42.8952	6.19799
45	97.2081	54.0832	318.81	34.6225	6.19798
46	97.9544	54.849	250.604	27.2154	6.19799
47	98.9492	56.5333	131.475	14.2781	6.19799
48	99.9439	58.2175	50.3735	5.47052	6.19798
49	100.939	59.9018	7.29881	0.792646	6.19799
50	101.933	61.586	2.25112	0.24447	6.19799
51	102.064	61.8069	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.13895

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.859	50.0929	206.479	0	0
2	58.079	49.286	402.627	102.798	14.3227
3	59.0422	48.649	506.726	96.5197	10.7843
4	60.0053	48.0119	634.678	104.68	9.36571
5	60.9685	47.3749	767.314	108.404	8.04137
6	61.7904	47.0047	857.304	113.011	7.50951
7	62.6124	46.6345	950.481	119.032	7.13819
8	63.4343	46.2643	1046.61	126.117	6.87104
9	64.2562	45.8941	1145.55	134.061	6.67483
10	65.0781	45.524	1247.22	142.738	6.52881
11	66.1055	45.236	1335.19	149.764	6.39993
12	67.1328	44.948	1414.66	151.338	6.10619
13	68.1602	44.66	1495.11	152.672	5.8305
14	69.1876	44.372	1576.6	153.655	5.56645
15	70.215	44.238	1625.18	152.285	5.35318
16	71.2424	44.1041	1673.68	150.224	5.12894
17	72.2698	43.9702	1728.12	153.52	5.07663
18	73.2972	43.8362	1785.1	158.92	5.08739
19	74.1191	43.8456	1804.29	161.902	5.12751
20	74.941	43.8549	1823.14	164.907	5.16846
21	75.7629	43.8642	1841.64	167.887	5.20878
22	76.5848	43.8735	1860.36	170.944	5.25003
23	77.4067	43.8828	1879.63	172.593	5.24635
24	78.4341	44.0407	1869.54	171.068	5.22816
25	79.4615	44.1987	1859.46	169.508	5.20868
26	80.4889	44.3566	1849.32	165.886	5.12577
27	81.5162	44.5145	1838.66	160.126	4.97724
28	82.3381	44.766	1799.92	153.847	4.88545
29	83.1601	45.0175	1760.82	147.43	4.7861
30	83.982	45.269	1721.34	140.873	4.67861
31	84.8039	45.5205	1681.49	134.177	4.56233
32	85.6258	45.772	1641.16	128.182	4.46599
33	86.4477	46.1672	1566.16	121.367	4.43119
34	87.2696	46.5624	1490.55	116.408	4.46558
35	88.0915	46.9577	1414.45	114.689	4.63562
36	88.9134	47.3529	1338.9	112.606	4.80745
37	89.7353	47.7481	1264.8	108.409	4.89898
38	90.7627	48.4691	1126.27	99.048	5.02585
39	91.7901	49.19	995.915	86.8851	4.98594
40	92.8175	49.911	873.539	74.1516	4.852
41	93.8449	50.6319	757.031	65.8366	4.97033
42	95	51.8173	576.166	53.1283	5.26835
43	95.7308	52.5673	484.636	46.3618	5.46447
44	96.4617	53.3173	400.886	40.0584	5.70632
45	97.2081	54.0832	321.415	33.9192	6.02418
46	97.9544	54.849	250.281	28.2462	6.43904
47	98.9492	56.5333	125.67	18.0027	8.15237
48	99.9439	58.2175	41.4544	9.85685	13.3752
49	100.939	59.9018	-2.36536	3.80856	-58.1571
50	101.933	61.586	-5.78956	-0.142148	1.40647
51	102.064	61.8069	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide2 Analysis Information

913_S2_PL_svaso_2022

Project Summary

File Name:	913_S2_PL_svaso_2022.slmd
Slide2 Modeler Version:	9.029
Compute Time:	00h:00m:01.105s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 09:37:01

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
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:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unit Weight	17 kN/m3
Saturated U.W.	20 kN/m3
Cohesion	8 kPa
Phi	20 °
Water Surface	Water Table
Hu Type	Custom
Hu	1
Specify alternate strength type above water surface	No


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unit Weight	18 kN/m3
Saturated U.W.	20 kN/m3
Cohesion	8 kPa
Phi	22 °
Water Surface	Water Table
Hu Type	Custom
Hu	1
Specify alternate strength type above water surface	No


C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unit Weight	13.19 kN/m3
Saturated U.W.	15 kN/m3
Cohesion	7.6 kPa
Phi	12 °
Water Surface	Water Table
Hu Type	Custom
Hu	1
Specify alternate strength type above water surface	No

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unit Weight	19.7 kN/m3
Saturated U.W.	20 kN/m3
Cohesion	0 kPa
Phi	33.8 °
Water Surface	Water Table
Hu Type	Custom
Hu	1
Specify alternate strength type above water surface	No

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight	22 kN/m3
Cohesion	8 kPa
Phi	38.66 °
Water Surface	Water Table
Hu Type	Custom
Hu	1
Specify alternate strength type above water surface	No

PALO LEGNO

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.3 m
Failure Mode	Shear
Pile Shear Strength	55.46 kN

Global Minimums

Method: bishop simplified

FS	1.214850
Center:	75.623, 79.476
Radius:	34.874
Left Slip Surface Endpoint:	56.849, 50.087
Right Slip Surface Endpoint:	106.134, 62.588
Left Slope Intercept:	56.849 56.581
Right Slope Intercept:	106.134 62.588
Resisting Moment:	54845.4 kN-m
Driving Moment:	45146 kN-m
Total Slice Area:	523.332 m ²
Surface Horizontal Width:	49.285 m
Surface Average Height:	10.6185 m

Method: spencer

FS	1.229920
Center:	75.623, 79.476
Radius:	34.874
Left Slip Surface Endpoint:	56.849, 50.087
Right Slip Surface Endpoint:	106.134, 62.588
Left Slope Intercept:	56.849 56.581
Right Slope Intercept:	106.134 62.588
Resisting Moment:	55525.8 kN-m
Driving Moment:	45146 kN-m
Resisting Horizontal Force:	1400.32 kN
Driving Horizontal Force:	1138.55 kN
Total Slice Area:	523.332 m ²
Surface Horizontal Width:	49.285 m
Surface Average Height:	10.6185 m

Method: sarma

FS		1.250850
Center:	75.623, 79.476	
Radius:	34.874	
Left Slip Surface Endpoint:	56.849, 50.087	
Right Slip Surface Endpoint:	106.134, 62.588	
Left Slope Intercept:	56.849 56.581	
Right Slope Intercept:	106.134 62.588	
Total Slice Area:	523.332 m2	
Surface Horizontal Width:	49.285 m	
Surface Average Height:	10.6185 m	

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.21485

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	206.826	0	0
2	58.1674	49.286	145.416	0	0
3	59.1596	48.7337	244.85	0	0
4	60.1518	48.2226	346.371	0	0
5	61.144	47.7508	447.284	0	0
6	62.1362	47.3165	545.906	0	0
7	63.1283	46.9181	641.359	0	0
8	64.1205	46.5545	732.861	0	0
9	65.1127	46.2245	819.712	0	0
10	66.1049	45.927	899.832	0	0
11	67.0971	45.6612	968.292	0	0
12	68.0893	45.4264	1031.52	0	0
13	69.0815	45.222	1089.46	0	0
14	70.0737	45.0473	1141.99	0	0
15	71.0659	44.902	1189.01	0	0
16	72.0581	44.7857	1233.34	0	0
17	73.0503	44.698	1274.35	0	0
18	74.0424	44.6388	1309.48	0	0
19	75.0346	44.6079	1338.46	0	0
20	76.0268	44.6053	1361.11	0	0
21	77.019	44.6309	1378.3	0	0
22	78.0112	44.6848	1389.94	0	0
23	79.0034	44.7672	1395.52	0	0
24	79.9956	44.8782	1394.71	0	0
25	80.9878	45.0181	1386.98	0	0
26	81.98	45.1873	1371.98	0	0
27	82.9722	45.3861	1350.13	0	0
28	83.9644	45.6152	1321.23	0	0
29	84.9565	45.8752	1285.14	0	0
30	85.9487	46.1667	1241.66	0	0
31	86.9409	46.4906	1190.45	0	0
32	87.9331	46.8479	1131.27	0	0
33	88.9253	47.2397	1063.92	0	0
34	89.9175	47.6672	988.872	0	0
35	90.9097	48.132	907.53	0	0
36	91.9019	48.6356	820.832	0	0
37	92.8941	49.1801	730.555	0	0
38	93.8863	49.7676	636.768	0	0
39	94.8785	50.4009	539.104	0	0
40	95.8706	51.0829	438.319	0	0
41	96.8628	51.8173	335.305	0	0
42	97.7739	52.5414	259.93	0	0
43	98.6851	53.3173	185.969	0	0
44	99.5952	54.1488	111.741	0	0
45	100.505	55.0424	42.5758	0	0
46	101.416	56.0052	-19.1888	0	0
47	102.326	57.0461	-70.6414	0	0
48	103.236	58.1766	-108.079	0	0
49	104.202	59.4916	-132.323	0	0
50	105.168	60.9498	-143.031	0	0
51	106.134	62.5882	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.22992

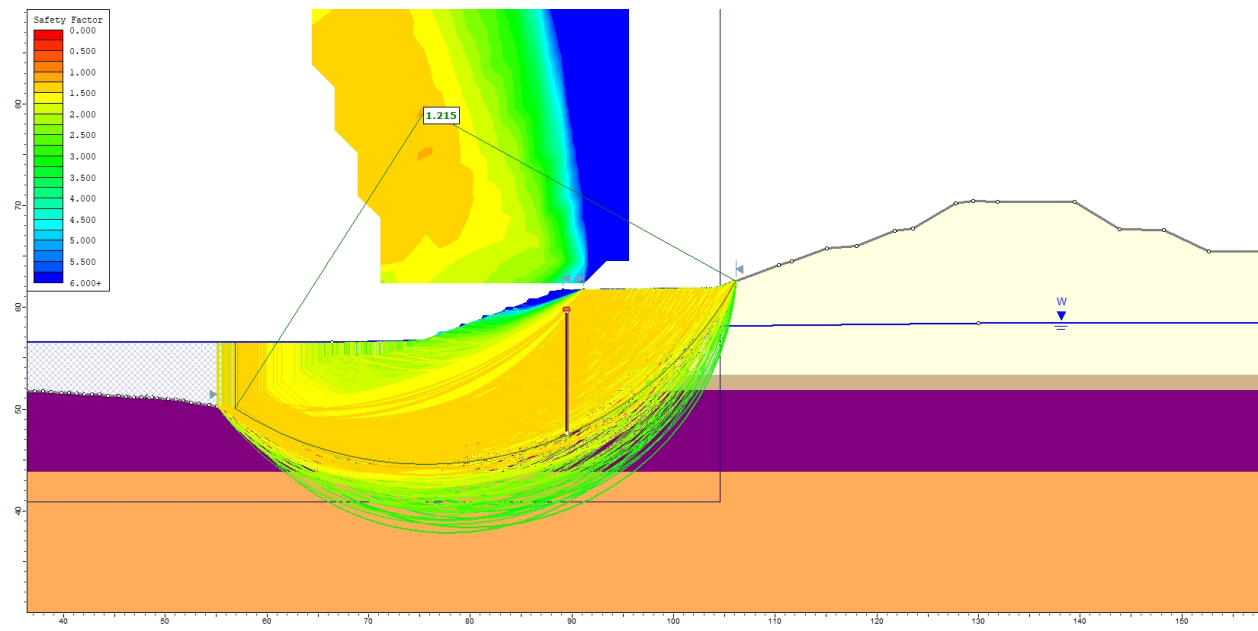
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	206.826	0	0
2	58.1674	49.286	180.424	17.2234	5.45297
3	59.1596	48.7337	287.959	27.4888	5.45298
4	60.1518	48.2226	397.148	37.9121	5.45298
5	61.144	47.7508	505.128	48.22	5.45299
6	62.1362	47.3165	610.149	58.2454	5.45299
7	63.1283	46.9181	711.333	67.9045	5.45298
8	64.1205	46.5545	807.907	77.1235	5.45298
9	65.1127	46.2245	899.187	85.8372	5.45298
10	66.1049	45.927	983.049	93.8428	5.45299
11	67.0971	45.6612	1054.41	100.655	5.45299
12	68.0893	45.4264	1120.07	106.923	5.45299
13	69.0815	45.222	1180.03	112.647	5.453
14	70.0737	45.0473	1234.19	117.817	5.45299
15	71.0659	44.902	1282.5	122.428	5.45296
16	72.0581	44.7857	1327.88	126.761	5.453
17	73.0503	44.698	1369.72	130.755	5.453
18	74.0424	44.6388	1405.42	134.163	5.453
19	75.0346	44.6079	1434.74	136.962	5.453
20	76.0268	44.6053	1457.53	139.137	5.45298
21	77.019	44.6309	1474.71	140.777	5.45298
22	78.0112	44.6848	1486.23	141.876	5.45295
23	79.0034	44.7672	1491.59	142.388	5.45296
24	79.9956	44.8782	1490.49	142.284	5.453
25	80.9878	45.0181	1482.46	141.517	5.45298
26	81.98	45.1873	1467.18	140.058	5.45297
27	82.9722	45.3861	1445.09	137.95	5.453
28	83.9644	45.6152	1416.05	135.177	5.45297
29	84.9565	45.8752	1379.94	131.73	5.45297
30	85.9487	46.1667	1336.62	127.595	5.45298
31	86.9409	46.4906	1285.77	122.741	5.45299
32	87.9331	46.8479	1227.23	117.152	5.45296
33	88.9253	47.2397	1160.83	110.814	5.45299
34	89.9175	47.6672	1087.09	103.775	5.453
35	90.9097	48.132	1007.45	96.1718	5.45297
36	91.9019	48.6356	922.856	88.0966	5.45298
37	92.8941	49.1801	835.085	79.718	5.45299
38	93.8863	49.7676	744.231	71.045	5.45299
39	94.8785	50.4009	649.969	62.0466	5.45298
40	95.8706	51.0829	553.064	52.796	5.45298
41	96.8628	51.8173	454.409	43.3783	5.45298
42	97.7739	52.5414	381.135	36.3835	5.45298
43	98.6851	53.3173	309.498	29.5449	5.45297
44	99.5952	54.1488	238.144	22.7334	5.45297
45	100.505	55.0424	171.915	16.4112	5.453
46	101.416	56.0052	113.007	10.7877	5.45296
47	102.326	57.0461	64.1229	6.12123	5.45298
48	103.236	58.1766	28.6631	2.7362	5.45297
49	104.202	59.4916	5.74684	0.548598	5.45298
50	105.168	60.9498	-4.41104	-0.421082	5.45298
51	106.134	62.5882	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.25085

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	56.8494	50.0874	206.826	0	0
2	58.1674	49.286	219.574	38.838	10.0307
3	59.1596	48.7337	323.457	44.6296	7.85589
4	60.1518	48.2226	431.098	53.3567	7.05558
5	61.144	47.7508	535.921	59.5852	6.34425
6	62.1362	47.3165	638.682	66.7091	5.96281
7	63.1283	46.9181	738.186	74.2659	5.74497
8	64.1205	46.5545	833.517	82.0328	5.62082
9	65.1127	46.2245	923.909	89.8792	5.55633
10	66.1049	45.927	1006.7	96.5996	5.48113
11	67.0971	45.6612	1075.7	99.1858	5.26811
12	68.0893	45.4264	1139.09	101.047	5.06935
13	69.0815	45.222	1196.86	102.214	4.88132
14	70.0737	45.0473	1248.96	102.702	4.70086
15	71.0659	44.902	1295.25	102.3	4.5159
16	72.0581	44.7857	1339.52	104.157	4.4462
17	73.0503	44.698	1380.93	108.011	4.47235
18	74.0424	44.6388	1416.28	111.665	4.5081
19	75.0346	44.6079	1445.32	115.065	4.55184
20	76.0268	44.6053	1467.85	118.16	4.60231
21	77.019	44.6309	1484.76	120.881	4.65444
22	78.0112	44.6848	1495.66	120.543	4.6078
23	79.0034	44.7672	1500.47	119.854	4.56695
24	79.9956	44.8782	1498.86	118.705	4.52819
25	80.9878	45.0181	1490.24	113.819	4.36756
26	81.98	45.1873	1474.48	113.011	4.38285
27	82.9722	45.3861	1451.81	114.044	4.49153
28	83.9644	45.6152	1422.07	114.614	4.60788
29	84.9565	45.8752	1385.13	114.687	4.73322
30	85.9487	46.1667	1340.64	115.899	4.94096
31	86.9409	46.4906	1288.29	117.487	5.21074
32	87.9331	46.8479	1228.03	118.213	5.49848
33	88.9253	47.2397	1159.74	117.962	5.80782
34	89.9175	47.6672	1084.57	114.244	6.01312
35	90.9097	48.132	1003.55	109.354	6.21882
36	91.9019	48.6356	918.955	99.2914	6.16678
37	92.8941	49.1801	831.579	88.0068	6.04118
38	93.8863	49.7676	739.14	81.9049	6.32321
39	94.8785	50.4009	643.168	75.5309	6.69789
40	95.8706	51.0829	544.607	68.5477	7.17389
41	96.8628	51.8173	444.437	60.9101	7.80377
42	97.7739	52.5414	370.16	54.4803	8.3727
43	98.6851	53.3173	297.687	47.8058	9.12328
44	99.5952	54.1488	225.708	40.8151	10.2501
45	100.505	55.0424	159.2	33.7269	11.9614
46	101.416	56.0052	100.489	26.6307	14.8428
47	102.326	57.0461	52.4574	19.6336	20.5197
48	103.236	58.1766	18.7529	12.8663	34.4539
49	104.202	59.4916	-1.60579	6.60416	-76.3338
50	105.168	60.9498	-9.5006	2.42833	-14.3377
51	106.134	62.5882	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S7_ALLEGGERIMENTO_SISMA no circ

Project Summary

File Name:	913_S7_ALLEGGERIMENTO_SISMA no circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:04.502s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 11:41:37

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

Random Numbers

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

Surface Options


Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.066
Seismic Load Coefficient (Vertical):	0.033

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	0.911413
Axis Location:	22.425, 78.469
Left Slip Surface Endpoint:	13.229, 35.872
Right Slip Surface Endpoint:	50.985, 45.554
Left Slope Intercept:	13.229 43.788
Right Slope Intercept:	50.985 45.554
Resisting Moment:	46238.5 kN-m
Driving Moment:	50732.7 kN-m
Total Slice Area:	391.669 m ²
Surface Horizontal Width:	37.7562 m
Surface Average Height:	10.3736 m

Method: spencer

FS	0.981838
Axis Location:	22.241, 78.101
Left Slip Surface Endpoint:	13.229, 35.872
Right Slip Surface Endpoint:	50.618, 45.554
Left Slope Intercept:	13.229 43.788
Right Slope Intercept:	50.618 45.554
Resisting Moment:	41684.1 kN-m
Driving Moment:	42455.1 kN-m
Resisting Horizontal Force:	813.997 kN
Driving Horizontal Force:	829.054 kN
Total Slice Area:	347.593 m ²
Surface Horizontal Width:	37.3887 m
Surface Average Height:	9.29673 m

Method: sarma

FS	0.975811
Axis Location:	22.241, 78.101
Left Slip Surface Endpoint:	13.229, 35.872
Right Slip Surface Endpoint:	50.618, 45.554
Left Slope Intercept:	13.229 43.788
Right Slope Intercept:	50.618 45.554
Total Slice Area:	347.593 m ²
Surface Horizontal Width:	37.3887 m
Surface Average Height:	9.29673 m

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 0.911413

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	13.2288	35.8717	307.36	0	0
2	13.8971	35.123	80.2648	0	0
3	14.5654	34.3742	187.296	0	0
4	15.4508	33.6068	320.011	0	0
5	16.3361	32.8749	460.865	0	0
6	16.9863	32.4996	543.566	0	0
7	17.6366	32.1242	629.838	0	0
8	18.2868	31.836	703.204	0	0
9	18.9371	31.5478	778.741	0	0
10	19.7625	31.2606	861.888	0	0
11	20.588	30.9733	946.58	0	0
12	21.5296	30.7168	1029.52	0	0
13	22.4713	30.4603	1113.07	0	0
14	23.5781	30.2827	1184.82	0	0
15	24.685	30.105	1256.08	0	0
16	25.5092	30.0765	1285.97	0	0
17	26.3334	30.0479	1315.27	0	0
18	27.9859	30.1769	1330.28	0	0
19	28.7746	30.4139	1297.97	0	0
20	29.5634	30.651	1265.01	0	0
21	30.3223	30.8791	1232.69	0	0
22	31.0812	31.1071	1199.12	0	0
23	31.8402	31.3352	1162.9	0	0
24	32.5991	31.5633	1127.48	0	0
25	33.3581	31.7914	1092.86	0	0
26	34.117	32.0195	1059.03	0	0
27	34.876	32.2476	1026.01	0	0
28	35.635	32.4757	996.196	0	0
29	36.3939	32.7037	966.47	0	0
30	37.1529	32.9318	936.32	0	0
31	37.9118	33.1599	905.744	0	0
32	38.6708	33.388	874.761	0	0
33	39.3695	33.598	846.247	0	0
34	40.0683	33.808	817.85	0	0
35	41.0001	34.4729	711.714	0	0
36	41.7339	35.0619	619.737	0	0
37	42.4676	35.651	530.349	0	0
38	43.2502	36.3626	425.573	0	0
39	44.0327	37.0743	326.534	0	0
40	44.4517	37.5349	266.373	0	0
41	44.9323	38.0632	213.683	0	0
42	45.7175	39.0349	127.547	0	0
43	45.8185	39.16	117.133	0	0
44	46.7169	40.2718	35.5731	0	0
45	47.5972	41.3612	-25.108	0	0
46	48.4442	42.4093	-65.4412	0	0
47	49.2911	43.4575	-87.6205	0	0
48	49.5579	43.7877	-90.7864	0	0
49	50.1381	44.5056	-93.1363	0	0
50	50.2776	44.6783	-92.9429	0	0
51	50.985	45.5537	0	0	0

Global Minimum Query (spencer) - Safety Factor: 0.981838

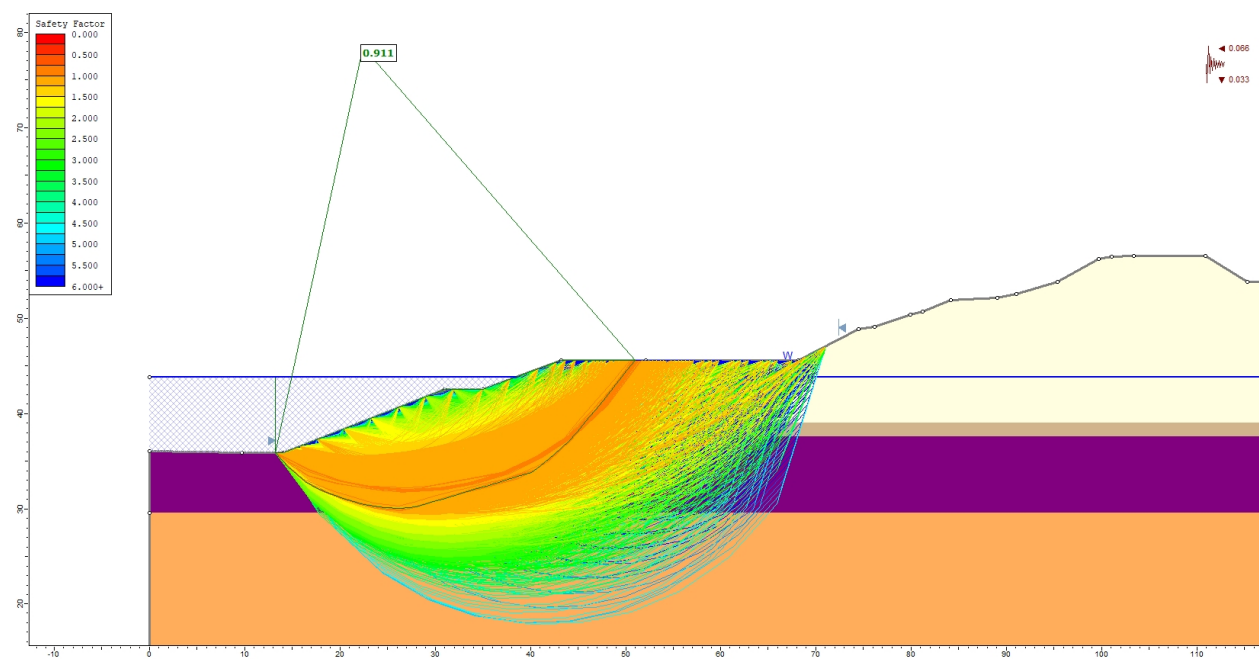
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	13.2288	35.8717	307.36	0	0
2	14.0445	35.3334	63.0946	8.05684	7.27698
3	14.8603	34.7951	161.421	20.6126	7.27698
4	15.6764	34.3825	247.312	31.5804	7.27698
5	16.4925	33.9699	337.936	43.1526	7.27698
6	17.3091	33.6931	409.361	52.2731	7.27697
7	18.1257	33.4164	482.879	61.661	7.27697
8	18.9424	33.178	551.388	70.4093	7.27698
9	19.7591	32.9396	621.4	79.3494	7.27698
10	20.6137	32.7827	677.8	86.5515	7.27699
11	21.4683	32.6259	733.95	93.7215	7.27698
12	22.3331	32.477	788.578	100.697	7.27697
13	23.198	32.3281	842.871	107.63	7.27697
14	24.0931	32.2868	876.447	111.918	7.27701
15	24.9883	32.2456	909.114	116.089	7.27698
16	25.5853	32.2225	929.615	118.707	7.27699
17	26.1822	32.1995	949.782	121.282	7.27698
18	26.7792	32.1765	969.615	123.815	7.277
19	27.6803	32.2461	978.071	124.894	7.27696
20	28.5813	32.3157	985.38	125.828	7.277
21	29.4638	32.4248	983.405	125.576	7.27701
22	30.3463	32.5339	980.282	125.177	7.277
23	31.2237	32.6872	966.076	123.363	7.277
24	32.101	32.8404	948.995	121.182	7.27701
25	32.9784	32.9965	931.736	118.978	7.277
26	33.8558	33.1525	914.84	116.82	7.27697
27	34.7332	33.3187	896.493	114.477	7.27696
28	35.6106	33.485	880.993	112.498	7.27698
29	36.2065	33.612	868.266	110.873	7.27699
30	36.8024	33.7391	855.143	109.197	7.27697
31	37.3983	33.8662	841.624	107.471	7.27699
32	37.9994	34.061	816.247	104.23	7.27696
33	38.6006	34.2558	790.637	100.96	7.27697
34	39.2017	34.4506	765.018	97.6887	7.27698
35	40.0715	34.8745	705.428	90.0794	7.27698
36	40.9412	35.2984	646.525	82.5578	7.27698
37	42.1018	36.0762	538.616	68.7783	7.27697
38	43.2626	36.912	426.692	54.4863	7.27698
39	43.9749	37.5349	348.005	44.4384	7.27699
40	44.4207	37.9247	309.971	39.5817	7.27699
41	45.2655	38.8921	224.381	28.6523	7.27699
42	45.3903	39.0349	212.929	27.1899	7.27698
43	46.1335	39.8859	148.894	19.013	7.27699
44	46.9383	40.8075	92.064	11.7561	7.27699
45	47.7207	41.7174	48.7481	6.22487	7.27698
46	48.4563	42.6148	18.5598	2.36999	7.27699
47	49.1918	43.5133	1.01406	0.12949	7.27698
48	49.3915	43.7877	-1.76166	-0.224954	7.27696
49	49.9046	44.4926	-5.03125	-0.642464	7.27699
50	49.9133	44.5056	-5.04637	-0.644394	7.27698
51	50.6175	45.5537	0	0	0

Global Minimum Query (sarma) - Safety Factor: 0.975811

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	13.2288	35.8717	307.36	0	0
2	14.0445	35.3334	58.8787	3.84571	3.73701
3	14.8603	34.7951	153.602	12.7665	4.75117
4	15.6764	34.3825	237.633	21.3129	5.12505
5	16.4925	33.9699	326.716	30.8403	5.39245
6	17.3091	33.6931	397.834	39.279	5.63866
7	18.1257	33.4164	471.287	48.3719	5.8602
8	18.9424	33.178	540.094	57.4592	6.07271
9	19.7591	32.9396	610.326	66.5811	6.22584
10	20.6137	32.7827	665.836	71.3735	6.11839
11	21.4683	32.6259	721.16	76.2812	6.03805
12	22.3331	32.477	775.075	81.1907	5.98004
13	23.198	32.3281	828.718	86.2022	5.93848
14	24.0931	32.2868	862.185	89.6255	5.93467
15	24.9883	32.2456	895.117	94.3246	6.01545
16	25.5853	32.2225	915.865	97.5671	6.08079
17	26.1822	32.1995	936.305	100.858	6.14815
18	26.7792	32.1765	956.436	104.196	6.21739
19	27.6803	32.2461	965.32	107.432	6.35041
20	28.5813	32.3157	973.072	110.601	6.48451
21	29.4638	32.4248	971.452	112.777	6.62189
22	30.3463	32.5339	968.699	114.932	6.76627
23	31.2237	32.6872	954.702	114.923	6.864
24	32.101	32.8404	937.731	112.14	6.81942
25	32.9784	32.9965	920.578	109.27	6.76917
26	33.8558	33.1525	903.784	106.357	6.71168
27	34.7332	33.3187	885.545	103.246	6.65011
28	35.6106	33.485	870.222	103.069	6.75464
29	36.2065	33.612	857.592	103.528	6.8834
30	36.8024	33.7391	844.568	103.958	7.01725
31	37.3983	33.8662	831.149	104.36	7.15667
32	37.9994	34.061	805.599	103.784	7.34089
33	38.6006	34.2558	779.663	104.728	7.65045
34	39.2017	34.4506	753.738	105.504	7.96817
35	40.0715	34.8745	692.837	103.872	8.52643
36	40.9412	35.2984	632.807	101.598	9.12107
37	42.1018	36.0762	522.786	93.7353	10.1651
38	43.2626	36.912	409.606	82.8876	11.4399
39	43.9749	37.5349	331.52	72.0391	12.2597
40	44.4207	37.9247	293.741	66.8019	12.8122
41	45.2655	38.8921	209.43	53.7911	14.4048
42	45.3903	39.0349	198.195	51.9592	14.6902
43	46.1335	39.8859	135.711	41.2721	16.9154
44	46.9383	40.8075	80.789	30.8448	20.8966
45	47.7207	41.7174	39.6306	21.7085	28.7127
46	48.4563	42.6148	11.9185	13.8548	49.2965
47	49.1918	43.5133	-2.98816	7.31113	-67.7695
48	49.3915	43.7877	-4.83736	5.60897	-49.2244
49	49.9046	44.4926	-5.89509	1.96664	-18.449
50	49.9133	44.5056	-5.87098	1.9117	-18.0362
51	50.6175	45.5537	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S7_ALLEGGERIMENTO_SLU_no circ

Project Summary

File Name:	913_S7_ALLEGGERIMENTO_SLU_no circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:08.69s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 11:41:37

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

Random Numbers

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

Surface Options


Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.006660
Axis Location:	22.145, 77.908
Left Slip Surface Endpoint:	13.229, 35.872
Right Slip Surface Endpoint:	50.424, 45.554
Left Slope Intercept:	13.229 42.456
Right Slope Intercept:	50.424 45.554
Resisting Moment:	41651.5 kN-m
Driving Moment:	41376.2 kN-m
Total Slice Area:	362.378 m ²
Surface Horizontal Width:	37.1953 m
Surface Average Height:	9.74255 m

Method: spencer

FS	1.090410
Axis Location:	22.171, 77.960
Left Slip Surface Endpoint:	13.229, 35.872
Right Slip Surface Endpoint:	50.477, 45.554
Left Slope Intercept:	13.229 42.456
Right Slope Intercept:	50.477 45.554
Resisting Moment:	37731.3 kN-m
Driving Moment:	34603 kN-m
Resisting Horizontal Force:	745.062 kN
Driving Horizontal Force:	683.289 kN
Total Slice Area:	317.478 m ²
Surface Horizontal Width:	37.2477 m
Surface Average Height:	8.52343 m

Method: sarma

FS	1.083500
Axis Location:	22.003, 77.625
Left Slip Surface Endpoint:	13.229, 35.872
Right Slip Surface Endpoint:	50.142, 45.554
Left Slope Intercept:	13.229 42.456
Right Slope Intercept:	50.142 45.554
Total Slice Area:	312.667 m ²
Surface Horizontal Width:	36.9127 m
Surface Average Height:	8.47042 m

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.00666

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	13.2288	35.8717	212.625	0	0
2	13.9545	35.1163	68.5005	0	0
3	14.6801	34.361	164.283	0	0
4	15.4052	33.7538	256.127	0	0
5	16.1304	33.1466	356.92	0	0
6	16.8546	32.7218	438.576	0	0
7	17.5788	32.297	524.954	0	0
8	18.303	32.0017	594.628	0	0
9	19.0272	31.7064	666.817	0	0
10	19.7639	31.5183	723.235	0	0
11	20.5007	31.3302	780.367	0	0
12	21.2276	31.1544	835.448	0	0
13	21.9545	30.9786	890.912	0	0
14	22.8192	30.8997	933.237	0	0
15	23.684	30.8209	975.109	0	0
16	24.4914	30.7402	1015.13	0	0
17	25.2988	30.6596	1055.08	0	0
18	25.961	30.6798	1071.21	0	0
19	26.6233	30.7	1086.98	0	0
20	27.3391	30.725	1103.02	0	0
21	28.0549	30.7499	1118.63	0	0
22	28.7707	30.8035	1128.14	0	0
23	29.4866	30.857	1137.14	0	0
24	30.3214	30.9496	1140.99	0	0
25	31.1562	31.0421	1144.26	0	0
26	31.9911	31.1378	1146.91	0	0
27	32.8259	31.2335	1149.57	0	0
28	33.6608	31.3026	1157.49	0	0
29	34.4957	31.3717	1165.36	0	0
30	36.1656	31.5027	1182.31	0	0
31	37.0001	31.6809	1168.29	0	0
32	37.8346	31.859	1154.04	0	0
33	38.6685	32.2233	1102.89	0	0
34	39.5023	32.5876	1051.65	0	0
35	40.6128	33.4152	920.643	0	0
36	41.7227	34.3497	774.77	0	0
37	42.3108	34.9364	684.691	0	0
38	42.8989	35.5231	596.922	0	0
39	43.6871	36.5397	450.976	0	0
40	44.4121	37.5349	321.092	0	0
41	44.4659	37.6089	313.153	0	0
42	45.2442	38.6739	207.634	0	0
43	45.5099	39.0349	175.636	0	0
44	46.1647	39.9249	103.112	0	0
45	47.064	41.1158	24.7457	0	0
46	47.7551	42.0069	-19.8909	0	0
47	48.4462	42.898	-52.5152	0	0
48	49.0306	43.6311	-70.2805	0	0
49	49.615	44.3642	-79.893	0	0
50	49.8283	44.6318	-81.1112	0	0
51	50.4242	45.5537	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.09041

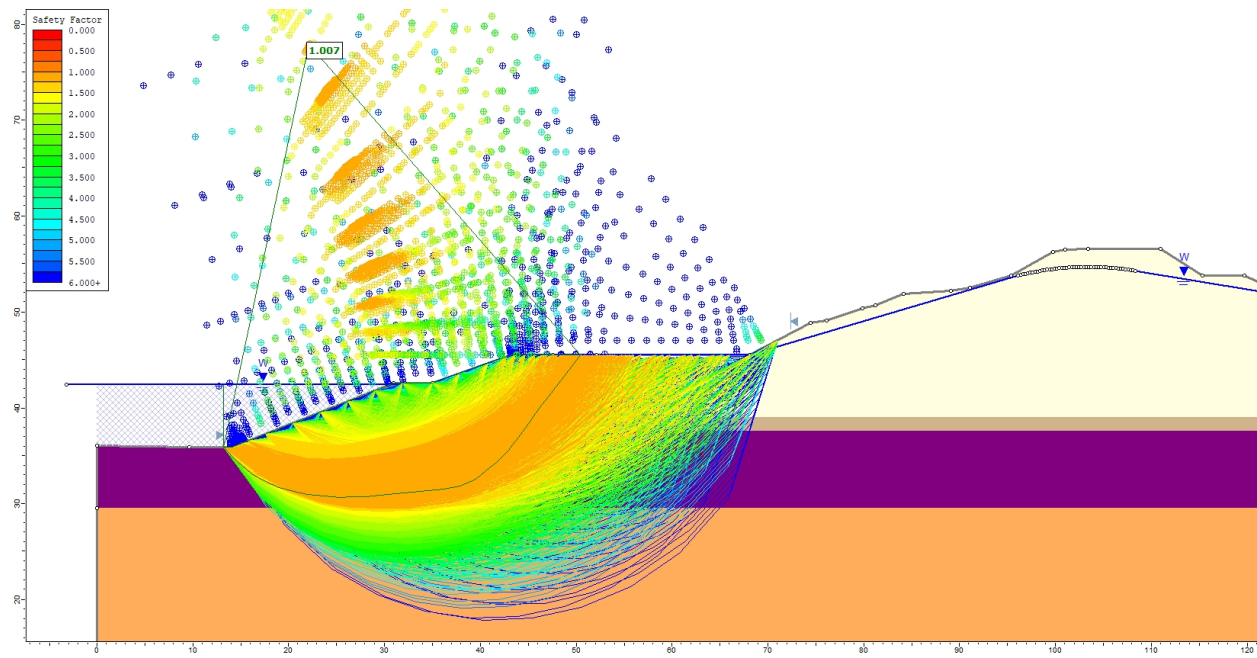
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	13.2288	35.8717	212.625	0	0
2	14.0921	35.3269	54.2478	6.33315	6.65884
3	14.9553	34.7821	139.475	16.283	6.65885
4	15.8187	34.403	210.421	24.5655	6.65883
5	16.682	34.0238	285.65	33.3482	6.65885
6	17.5456	33.708	355.658	41.5212	6.65884
7	18.4092	33.3922	428.742	50.0533	6.65883
8	18.985	33.2342	470.678	54.9492	6.65884
9	19.5608	33.0763	513.424	59.9396	6.65884
10	20.1365	32.9183	556.816	65.0054	6.65884
11	21.0005	32.7753	606.693	70.8282	6.65884
12	21.8644	32.6322	656.492	76.642	6.65884
13	22.8184	32.5091	705.418	82.3538	6.65883
14	23.7724	32.386	753.971	88.0222	6.65884
15	24.4085	32.3296	781.661	91.2548	6.65884
16	25.0445	32.2731	809.238	94.4743	6.65884
17	25.6806	32.2166	836.756	97.6869	6.65884
18	26.2786	32.2305	850.619	99.3053	6.65884
19	26.8766	32.2444	864.171	100.887	6.65881
20	27.4747	32.2582	877.414	102.433	6.65881
21	28.0728	32.3159	882.62	103.041	6.65882
22	28.671	32.3735	887.43	103.603	6.65885
23	29.2691	32.4312	891.844	104.118	6.65883
24	30.1096	32.5372	892.971	104.25	6.65886
25	30.9501	32.6432	893.334	104.292	6.65884
26	31.7906	32.7492	893.625	104.326	6.65884
27	32.6311	32.8551	893.961	104.365	6.65882
28	33.4716	32.9611	894.342	104.41	6.65886
29	34.312	33.0671	894.768	104.459	6.65881
30	35.1526	33.1731	895.137	104.503	6.65887
31	35.9932	33.2791	895.428	104.537	6.65887
32	36.8339	33.4457	885.228	103.346	6.65886
33	37.6746	33.6122	874.794	102.128	6.65886
34	38.5157	33.9285	839.01	97.95	6.65884
35	39.3567	34.2447	802.97	93.7426	6.65884
36	40.0861	34.6001	758.563	88.5583	6.65884
37	40.8155	34.9556	714.197	83.3788	6.65884
38	41.7887	35.6524	622.498	72.6733	6.65883
39	42.9499	36.5966	500.803	58.4661	6.65884
40	43.9803	37.5349	385.72	45.0308	6.65884
41	44.0578	37.6055	378.572	44.1963	6.65884
42	44.8894	38.5717	286.061	33.3961	6.65883
43	45.2881	39.0349	246.319	28.7565	6.65885
44	45.7947	39.6235	199.135	23.248	6.65885
45	46.7	40.6752	127.155	14.8447	6.65885
46	47.4668	41.5734	78.2055	9.13008	6.65884
47	48.3423	42.613	35.9987	4.20267	6.65886
48	49.2179	43.6793	8.90034	1.03907	6.65885
49	49.762	44.4339	-0.37861	-0.0442007	6.65883
50	49.8471	44.5518	-1.03307	-0.120605	6.65881
51	50.4765	45.5537	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.0835

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	13.2288	35.8717	212.625	0	0
2	14.0306	35.3046	52.8414	3.42991	3.71383
3	14.8324	34.7374	136.503	10.9832	4.60018
4	15.6343	34.3231	209.433	18.1905	4.96402
5	16.4362	33.9088	287.599	26.2951	5.22401
6	17.2379	33.617	352.708	33.8125	5.47595
7	18.0396	33.3252	420.675	42.0062	5.70233
8	18.8413	33.1481	473.301	49.3276	5.94991
9	19.643	32.971	527.125	57.1172	6.18422
10	20.5636	32.7676	588.265	62.8069	6.09417
11	21.4842	32.5642	649.836	68.6374	6.02938
12	22.1577	32.4645	686.787	72.3177	6.01101
13	22.8313	32.3648	723.65	76.0589	6.00002
14	23.5048	32.2651	760.425	79.8608	5.9953
15	24.5095	32.2219	796.871	84.6571	6.06418
16	25.5141	32.1787	833.012	90.6315	6.20934
17	26.4112	32.2683	842.508	94.3938	6.39271
18	27.3084	32.3579	851.125	98.211	6.58223
19	28.1341	32.4727	852.721	101.332	6.77689
20	28.9598	32.5874	853.521	104.302	6.96712
21	29.7415	32.6972	853.366	107.07	7.15141
22	30.5233	32.8069	852.506	109.86	7.34307
23	31.305	32.9166	851.131	111.053	7.43379
24	32.0868	33.0263	849.732	110.267	7.39377
25	32.8686	33.136	848.394	109.334	7.34333
26	33.6503	33.2458	847.118	108.25	7.28214
27	34.4321	33.3555	845.872	106.444	7.17236
28	35.2139	33.4652	844.566	104.152	7.03023
29	35.9468	33.5681	843.284	102.476	6.92862
30	36.6797	33.6709	841.919	100.703	6.82082
31	37.3668	33.7674	840.563	98.9549	6.71422
32	38.0539	33.8638	839.147	97.3806	6.6194
33	38.8204	34.1611	805.267	94.616	6.70132
34	39.5868	34.4584	771.279	91.3342	6.75347
35	40.353	34.9278	710.505	85.3776	6.85207
36	41.1191	35.3972	650.572	78.7839	6.90486
37	41.7432	35.8544	591.838	72.022	6.93833
38	42.3673	36.3115	534.254	64.7601	6.91144
39	43.03	36.9087	460.159	55.1412	6.83321
40	43.6927	37.5059	387.849	47.0791	6.921
41	43.717	37.5349	384.445	46.7387	6.93169
42	44.6963	38.7052	271.788	36.0483	7.55526
43	44.9723	39.0349	243.609	33.1814	7.75639
44	45.7343	39.9456	172.406	25.538	8.42579
45	46.5715	40.946	108.174	18.1479	9.52359
46	47.373	41.9038	60.4075	12.064	11.294
47	48.0739	42.7414	29.6299	7.59653	14.3798
48	48.7748	43.579	9.14374	4.0048	23.6526
49	49.2287	44.1811	0.829041	1.96494	67.1243
50	49.4582	44.4855	-1.29965	1.39976	-47.1239
51	50.1415	45.5537	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S7_PG_SISMA_circ

Project Summary

File Name:	913_S7_PG_SISMA_circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:00.904s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 11:41:37

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $m_{\alpha} < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
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:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.066
Seismic Load Coefficient (Vertical):	0.033

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	10
Friction Angle [deg]	45
Water Surface	Water Table
Hu Value	1

Support

PALO CA

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.5 m
Failure Mode	Shear
Pile Shear Strength	161.21 kN

Global Minimums

Method: bishop simplified

FS	1.199790
Center:	36.261, 72.485
Radius:	42.651
Left Slip Surface Endpoint:	15.620, 35.161
Right Slip Surface Endpoint:	70.866, 47.553
Left Slope Intercept:	15.620 43.788
Right Slope Intercept:	70.866 47.553
Resisting Moment:	84442.1 kN-m
Driving Moment:	70380.7 kN-m
Passive Support Moment:	13750.1 kN-m
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	620.351 m ²
Surface Horizontal Width:	55.2463 m
Surface Average Height:	11.2288 m

Method: spencer

FS	1.195070
Center:	36.261, 72.485
Radius:	42.651
Left Slip Surface Endpoint:	15.620, 35.161
Right Slip Surface Endpoint:	70.866, 47.553
Left Slope Intercept:	15.620 43.788
Right Slope Intercept:	70.866 47.553
Resisting Moment:	84109.5 kN-m
Driving Moment:	70380.7 kN-m
Resisting Horizontal Force:	1765.48 kN
Driving Horizontal Force:	1477.31 kN
Passive Support Moment:	13750.1 kN-m
Passive Horizontal Support Force:	282.72 kN
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	620.351 m ²
Surface Horizontal Width:	55.2463 m
Surface Average Height:	11.2288 m

Method: sarma

FS		1.189110
Center:	36.261, 72.485	
Radius:	42.651	
Left Slip Surface Endpoint:	15.620, 35.161	
Right Slip Surface Endpoint:	70.866, 47.553	
Left Slope Intercept:	15.620 43.788	
Right Slope Intercept:	70.866 47.553	
Passive Support Moment:	13750.1 kN-m	
Passive Horizontal Support Force:	282.72 kN	
Maximum Single Support Force:	322.42 kN	
Total Support Force:	322.42 kN	
Total Slice Area:	620.351 m2	
Surface Horizontal Width:	55.2463 m	
Surface Average Height:	11.2288 m	

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.19979

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6201	35.1607	365.055	0	0
2	16.7473	34.5592	119.432	0	0
3	17.8745	34.0001	241.548	0	0
4	19.0017	33.4816	364.598	0	0
5	20.1288	33.002	487.018	0	0
6	21.256	32.56	606.131	0	0
7	22.3832	32.1544	719.606	0	0
8	23.5104	31.784	826.629	0	0
9	24.6376	31.4479	926.469	0	0
10	25.7648	31.1452	1019.04	0	0
11	26.892	30.8753	1092.68	0	0
12	28.0192	30.6374	1154.86	0	0
13	29.1463	30.4311	1210.34	0	0
14	30.2735	30.2559	1259.04	0	0
15	31.4007	30.1113	1300.89	0	0
16	32.5279	29.9972	1347.36	0	0
17	33.6551	29.9132	1388.85	0	0
18	34.7823	29.8592	1416.54	0	0
19	35.9095	29.835	1434.35	0	0
20	37.0366	29.8406	1443.37	0	0
21	38.1638	29.876	1444.71	0	0
22	39.291	29.9413	1440.39	0	0
23	40.4182	30.0366	1429.92	0	0
24	41.5454	30.1622	1411.78	0	0
25	42.6726	30.3182	1386.42	0	0
26	43.7998	30.5051	1354.55	0	0
27	44.9269	30.7232	1316.95	0	0
28	46.0541	30.9731	1274.42	0	0
29	47.1813	31.2553	1225.35	0	0
30	48.3085	31.5704	1168.95	0	0
31	49.4357	31.9194	1104.3	0	0
32	50.5629	32.3029	1032.14	0	0
33	51.6901	32.7221	952.333	0	0
34	52.8173	33.1781	864.763	0	0
35	53.9444	33.6721	769.611	0	0
36	55.0716	34.2057	666.972	0	0
37	56.1988	34.7805	556.932	0	0
38	57.326	35.3985	719.483	0	0
39	58.4532	36.0618	599.339	0	0
40	59.5804	36.773	477.236	0	0
41	60.7076	37.5349	354.293	0	0
42	61.7152	38.2619	267.99	0	0
43	62.7229	39.0349	184.503	0	0
44	63.7412	39.8663	100.792	0	0
45	64.7594	40.7521	23.7281	0	0
46	65.7777	41.6969	-44.4354	0	0
47	66.7959	42.7065	-101.028	0	0
48	67.8141	43.7877	-142.842	0	0
49	68.8316	44.9478	-170.219	0	0
50	69.849	46.1984	-183.893	0	0
51	70.8664	47.553	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.19507

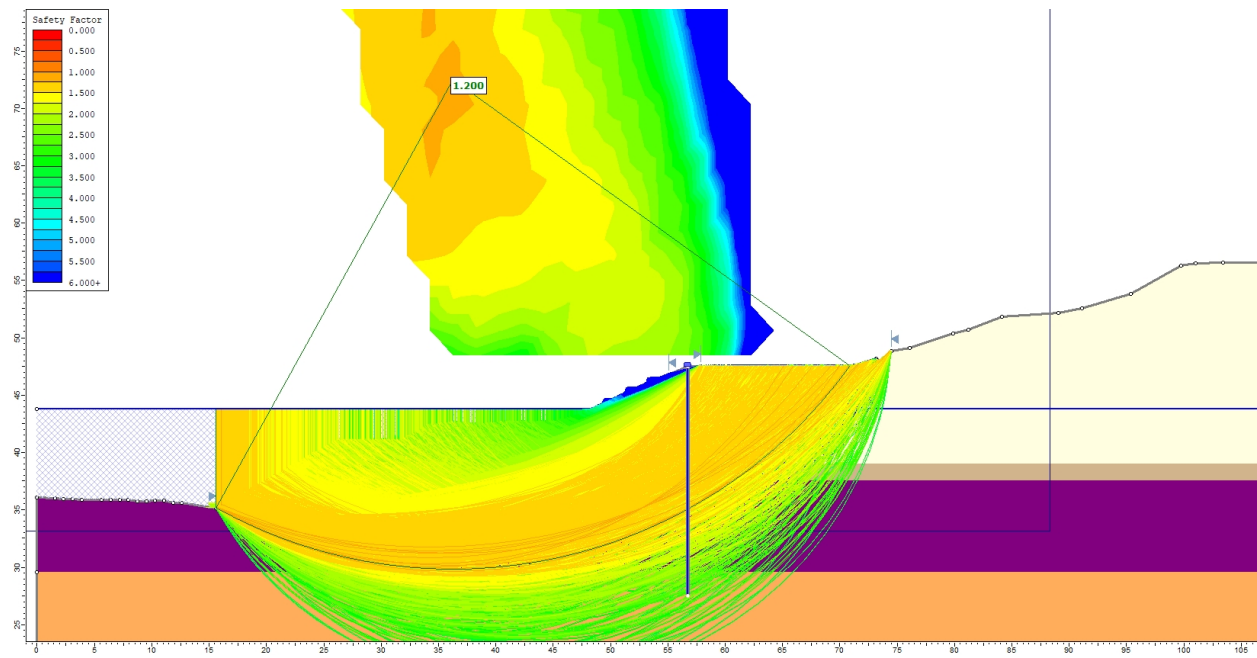
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6201	35.1607	365.055	0	0
2	16.7473	34.5592	133.478	17.807	7.59883
3	17.8745	34.0001	269.022	35.8896	7.59883
4	19.0017	33.4816	404.727	53.9936	7.59882
5	20.1288	33.002	538.922	71.8963	7.59883
6	21.256	32.56	668.747	89.2159	7.59882
7	22.3832	32.1544	791.754	105.626	7.59882
8	23.5104	31.784	907.168	121.023	7.59882
9	24.6376	31.4479	1014.31	135.316	7.59879
10	25.7648	31.1452	1113.18	148.506	7.59879
11	26.892	30.8753	1191.5	158.955	7.59882
12	28.0192	30.6374	1257.35	167.74	7.59882
13	29.1463	30.4311	1315.86	175.546	7.59884
14	30.2735	30.2559	1367.01	182.369	7.5988
15	31.4007	30.1113	1410.81	188.212	7.59879
16	32.5279	29.9972	1459.22	194.671	7.59882
17	33.6551	29.9132	1502.3	200.419	7.59885
18	34.7823	29.8592	1530.99	204.246	7.59884
19	35.9095	29.835	1549.42	206.704	7.59881
20	37.0366	29.8406	1558.78	207.952	7.59878
21	38.1638	29.876	1560.27	208.151	7.59879
22	39.291	29.9413	1556	207.582	7.59882
23	40.4182	30.0366	1545.52	206.184	7.59882
24	41.5454	30.1622	1527.33	203.758	7.59885
25	42.6726	30.3182	1501.96	200.373	7.59883
26	43.7998	30.5051	1470.15	196.13	7.59886
27	44.9269	30.7232	1432.75	191.14	7.59883
28	46.0541	30.9731	1390.58	185.513	7.59879
29	47.1813	31.2553	1342.07	179.042	7.59881
30	48.3085	31.5704	1286.51	171.63	7.59881
31	49.4357	31.9194	1223.04	163.163	7.59883
32	50.5629	32.3029	1152.46	153.747	7.59883
33	51.6901	32.7221	1074.68	143.37	7.5988
34	52.8173	33.1781	989.658	132.028	7.59883
35	53.9444	33.6721	897.629	119.75	7.59879
36	55.0716	34.2057	798.75	106.559	7.5988
37	56.1988	34.7805	693.171	92.4743	7.59883
38	57.326	35.3985	849.864	113.378	7.5988
39	58.4532	36.0618	735.569	98.1305	7.59882
40	59.5804	36.773	619.933	82.7038	7.59883
41	60.7076	37.5349	504.048	67.2438	7.59882
42	61.7152	38.2619	421.371	56.2141	7.59882
43	62.7229	39.0349	341.725	45.5887	7.59882
44	63.7412	39.8663	262.549	35.026	7.59882
45	64.7594	40.7521	190.006	25.3482	7.59881
46	65.7777	41.6969	126.168	16.8318	7.59884
47	66.7959	42.7065	73.4614	9.8003	7.59882
48	67.8141	43.7877	34.7635	4.63772	7.59883
49	68.8316	44.9478	9.60968	1.282	7.5988
50	69.849	46.1984	-2.83888	-0.378728	7.59882
51	70.8664	47.553	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.18911

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6201	35.1607	365.055	0	0
2	16.7473	34.5592	132.649	16.8707	7.24814
3	17.8745	34.0001	269.76	37.1761	7.84661
4	19.0017	33.4816	408.917	60.3184	8.39106
5	20.1288	33.002	548.019	85.766	8.89475
6	21.256	32.56	675.679	99.0873	8.34287
7	22.3832	32.1544	796.815	111.831	7.98914
8	23.5104	31.784	910.784	124.15	7.76221
9	24.6376	31.4479	1016.9	136.014	7.6183
10	25.7648	31.1452	1116.48	150.338	7.66895
11	26.892	30.8753	1192.31	154.594	7.38771
12	28.0192	30.6374	1254.06	152.736	6.94404
13	29.1463	30.4311	1308.31	148.653	6.48227
14	30.2735	30.2559	1355.37	143.039	6.02441
15	31.4007	30.1113	1395.32	136.113	5.57156
16	32.5279	29.9972	1443.33	140.585	5.56324
17	33.6551	29.9132	1487.23	148.869	5.71616
18	34.7823	29.8592	1516.41	154.115	5.80313
19	35.9095	29.835	1535.15	157.318	5.85109
20	37.0366	29.8406	1544.72	158.849	5.87129
21	38.1638	29.876	1546.43	159.439	5.88647
22	39.291	29.9413	1542.49	160.28	5.93231
23	40.4182	30.0366	1532.37	161.079	6.00076
24	41.5454	30.1622	1514.48	160.814	6.0612
25	42.6726	30.3182	1489.35	159.657	6.11869
26	43.7998	30.5051	1457.73	157.966	6.18469
27	44.9269	30.7232	1420.43	156.178	6.27454
28	46.0541	30.9731	1378.22	155.023	6.41769
29	47.1813	31.2553	1329.5	153.786	6.5982
30	48.3085	31.5704	1273.49	152.728	6.83875
31	49.4357	31.9194	1209.31	151.286	7.13072
32	50.5629	32.3029	1137.86	148.749	7.44787
33	51.6901	32.7221	1059.05	144.995	7.79592
34	52.8173	33.1781	972.928	139.796	8.17663
35	53.9444	33.6721	879.777	133.006	8.59696
36	55.0716	34.2057	779.773	124.721	9.08722
37	56.1988	34.7805	673.146	114.804	9.67858
38	57.326	35.3985	824.512	156.126	10.7223
39	58.4532	36.0618	709.942	142.234	11.329
40	59.5804	36.773	594.276	127.442	12.1037
41	60.7076	37.5349	478.747	111.7	13.1332
42	61.7152	38.2619	396.871	98.9717	14.0028
43	62.7229	39.0349	318.249	86.1169	15.1414
44	63.7412	39.8663	240.423	72.8641	16.8603
45	64.7594	40.7521	169.644	59.7657	19.4074
46	65.7777	41.6969	108.101	46.9881	23.4931
47	66.7959	42.7065	58.3677	34.7206	30.7467
48	67.8141	43.7877	23.5154	23.1813	44.5901
49	68.8316	44.9478	2.71849	13.0801	78.2591
50	69.849	46.1984	-5.47603	5.29703	-44.0481
51	70.8664	47.553	0	0	0

Report Views

1: Master Scenario - Bishop simplified method



Slide Analysis Information

913_S7_PG_SISMA_no circ

Project Summary

File Name:	913_S7_PG_SISMA_no circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:02.459s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 11:41:37

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

Random Numbers

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

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.066
Seismic Load Coefficient (Vertical):	0.033

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	10
Friction Angle [deg]	45
Water Surface	Water Table
Hu Value	1

Support

PALO CA

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.5 m
Failure Mode	Shear
Pile Shear Strength	161.21 kN

Global Minimums

Method: bishop simplified

FS	1.201870
Axis Location:	36.569, 77.672
Left Slip Surface Endpoint:	15.623, 35.162
Right Slip Surface Endpoint:	73.531, 48.014
Left Slope Intercept:	15.623 43.788
Right Slope Intercept:	73.531 48.014
Resisting Moment:	96725.9 kN-m
Driving Moment:	80479.8 kN-m
Passive Support Moment:	15251.6 kN-m
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	625.605 m ²
Surface Horizontal Width:	57.9078 m
Surface Average Height:	10.8035 m

Method: spencer

FS	1.199130
Axis Location:	36.569, 77.672
Left Slip Surface Endpoint:	15.623, 35.162
Right Slip Surface Endpoint:	73.531, 48.014
Left Slope Intercept:	15.623 43.788
Right Slope Intercept:	73.531 48.014
Resisting Moment:	96326.9 kN-m
Driving Moment:	80330.8 kN-m
Resisting Horizontal Force:	1854.02 kN
Driving Horizontal Force:	1546.14 kN
Passive Support Moment:	15251.6 kN-m
Passive Horizontal Support Force:	296.633 kN
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	625.605 m ²
Surface Horizontal Width:	57.9078 m
Surface Average Height:	10.8035 m

Method: sarma

FS	1.194820
Axis Location:	36.569, 77.672
Left Slip Surface Endpoint:	15.623, 35.162
Right Slip Surface Endpoint:	73.531, 48.014
Left Slope Intercept:	15.623 43.788
Right Slope Intercept:	73.531 48.014
Passive Support Moment:	15251.6 kN-m
Passive Horizontal Support Force:	296.633 kN
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	625.605 m ²
Surface Horizontal Width:	57.9078 m
Surface Average Height:	10.8035 m

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.20187

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6231	35.1624	364.909	0	0
2	16.9392	34.6098	123.864	0	0
3	18.2553	34.0572	253.938	0	0
4	19.5714	33.5046	390.222	0	0
5	20.8875	32.952	532.113	0	0
6	21.9403	32.6498	622.798	0	0
7	22.9932	32.3477	712.728	0	0
8	24.0461	32.0456	801.905	0	0
9	25.099	31.7435	890.4	0	0
10	26.1518	31.4414	978.192	0	0
11	27.2047	31.2657	1024.48	0	0
12	28.2576	31.0901	1070.92	0	0
13	29.3104	30.9145	1117.5	0	0
14	30.3633	30.7389	1164.23	0	0
15	31.4162	30.5633	1211.12	0	0
16	32.7323	30.4931	1251.18	0	0
17	34.0483	30.4228	1291.67	0	0
18	35.3644	30.3526	1321.98	0	0
19	36.6805	30.2824	1351.38	0	0
20	37.7334	30.3436	1346.39	0	0
21	38.7863	30.4048	1341.78	0	0
22	39.8391	30.4659	1338.96	0	0
23	40.892	30.5271	1336.09	0	0
24	41.9449	30.5882	1332.12	0	0
25	43.2609	30.8142	1294.11	0	0
26	44.577	31.0403	1256.88	0	0
27	45.8931	31.2663	1222.55	0	0
28	47.2092	31.4923	1188.57	0	0
29	48.2621	31.8	1134.16	0	0
30	49.3149	32.1078	1078.73	0	0
31	50.3678	32.4155	1023.12	0	0
32	51.4207	32.7232	967.365	0	0
33	52.4735	33.0309	911.452	0	0
34	53.5264	33.4794	825.039	0	0
35	54.5793	33.9279	739.249	0	0
36	55.6322	34.3763	654.081	0	0
37	56.685	34.8248	569.535	0	0
38	57.7379	35.2732	757.864	0	0
39	59.0323	36.0271	620.419	0	0
40	60.3268	36.781	491.528	0	0
41	61.6212	37.5349	371.195	0	0
42	63.0022	38.3393	282.063	0	0
43	63.8945	39.0349	207.046	0	0
44	64.9875	39.8871	121.908	0	0
45	66.0805	40.7393	49.0036	0	0
46	67.1736	41.5914	-11.6667	0	0
47	68.2666	42.4436	-60.103	0	0
48	69.5368	43.7877	-115.181	0	0
49	70.8682	45.1964	-146.451	0	0
50	72.1996	46.6052	-158.53	0	0
51	73.5309	48.014	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.19913

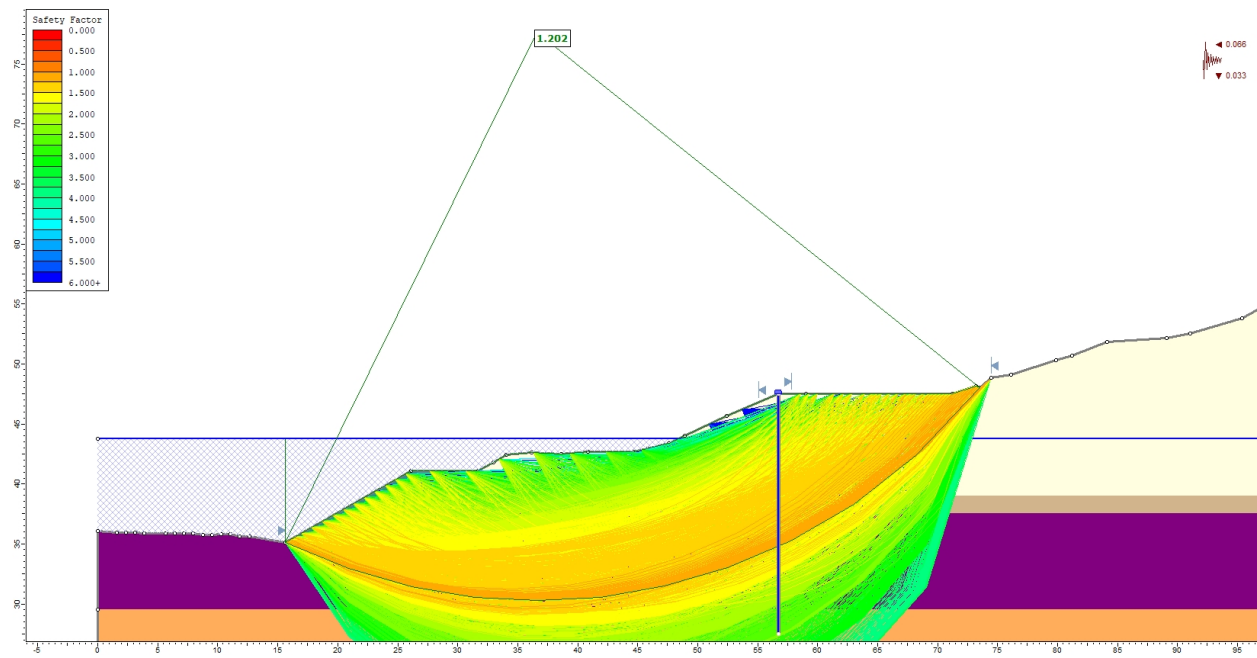
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6231	35.1624	364.909	0	0
2	16.9392	34.6098	135.691	18.2922	7.67763
3	18.2553	34.0572	278.211	37.5048	7.67759
4	19.5714	33.5046	427.558	57.638	7.67761
5	20.8875	32.952	583.074	78.6025	7.67759
6	21.9403	32.6498	680.278	91.7064	7.6776
7	22.9932	32.3477	776.684	104.703	7.67763
8	24.0461	32.0456	872.292	117.591	7.67758
9	25.099	31.7435	967.18	130.383	7.67761
10	26.1518	31.4414	1061.33	143.074	7.67755
11	27.2047	31.2657	1110.09	149.649	7.67764
12	28.2576	31.0901	1159.02	156.244	7.67759
13	29.3104	30.9145	1208.1	162.86	7.67757
14	30.3633	30.7389	1257.33	169.497	7.67759
15	31.4162	30.5633	1306.72	176.155	7.67759
16	32.7323	30.4931	1348.27	181.756	7.67758
17	34.0483	30.4228	1390.26	187.417	7.6776
18	35.3644	30.3526	1421.75	191.663	7.67763
19	36.6805	30.2824	1452.32	195.783	7.67759
20	37.7334	30.3436	1447.39	195.119	7.67761
21	38.7863	30.4048	1442.86	194.508	7.6776
22	39.8391	30.4659	1440.15	194.143	7.67761
23	40.892	30.5271	1437.38	193.769	7.67759
24	41.9449	30.5882	1433.5	193.247	7.67763
25	43.2609	30.8142	1395.64	188.142	7.67759
26	44.577	31.0403	1358.56	183.144	7.67761
27	45.8931	31.2663	1324.38	178.536	7.6776
28	47.2092	31.4923	1290.57	173.978	7.67759
29	48.2621	31.8	1237.09	166.769	7.67762
30	49.3149	32.1078	1182.61	159.425	7.67763
31	50.3678	32.4155	1127.97	152.059	7.67762
32	51.4207	32.7232	1073.19	144.674	7.67761
33	52.4735	33.0309	1018.26	137.269	7.67761
34	53.5264	33.4794	934.644	125.997	7.67761
35	54.5793	33.9279	851.635	114.807	7.67763
36	55.6322	34.3763	769.235	103.698	7.67757
37	56.685	34.8248	687.446	92.6726	7.67759
38	57.7379	35.2732	870.886	117.402	7.67762
39	59.0323	36.0271	740.174	99.7808	7.6776
40	60.3268	36.781	617.607	83.2579	7.6776
41	61.6212	37.5349	503.189	67.8335	7.6776
42	63.0022	38.3393	416.835	56.1924	7.6776
43	63.8945	39.0349	345.445	46.5685	7.6776
44	64.9875	39.8871	264.771	35.693	7.67759
45	66.0805	40.7393	195.711	26.3832	7.67758
46	67.1736	41.5914	138.265	18.6391	7.67759
47	68.2666	42.4436	92.4326	12.4606	7.67761
48	69.5368	43.7877	41.5376	5.59957	7.6776
49	70.8682	45.1964	12.7164	1.71426	7.67759
50	72.1996	46.6052	1.65641	0.223296	7.6776
51	73.5309	48.014	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.19482

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6231	35.1624	364.909	0	0
2	16.9392	34.6098	134.704	17.3363	7.33361
3	18.2553	34.0572	278.522	39.3032	8.03217
4	19.5714	33.5046	431.464	65.9199	8.68659
5	20.8875	32.952	588.014	88.5833	8.56709
6	21.9403	32.6498	683.805	98.2908	8.17972
7	22.9932	32.3477	779.06	108.518	7.92991
8	24.0461	32.0456	873.763	119.195	7.7681
9	25.099	31.7435	968.409	131.212	7.71615
10	26.1518	31.4414	1063.2	145.027	7.76756
11	27.2047	31.2657	1109.36	143.603	7.37574
12	28.2576	31.0901	1155.21	140.943	6.95607
13	29.3104	30.9145	1200.81	137.189	6.51761
14	30.3633	30.7389	1246.26	132.642	6.07524
15	31.4162	30.5633	1291.59	127.369	5.63196
16	32.7323	30.4931	1333.1	132.301	5.66765
17	34.0483	30.4228	1375.98	141.293	5.86289
18	35.3644	30.3526	1407.69	145.915	5.9179
19	36.6805	30.2824	1438.35	149.926	5.95072
20	37.7334	30.3436	1433.6	149.953	5.97136
21	38.7863	30.4048	1429.27	150.201	5.99915
22	39.8391	30.4659	1426.85	151.498	6.06076
23	40.892	30.5271	1424.37	152.795	6.12282
24	41.9449	30.5882	1420.71	153.345	6.1604
25	43.2609	30.8142	1382.98	151.267	6.24206
26	44.577	31.0403	1346.03	149.241	6.32683
27	45.8931	31.2663	1311.99	148.93	6.47619
28	47.2092	31.4923	1278.32	149.369	6.66467
29	48.2621	31.8	1224.29	148.153	6.89989
30	49.3149	32.1078	1169.22	147.17	7.1741
31	50.3678	32.4155	1114.03	145.855	7.45906
32	51.4207	32.7232	1058.73	144.191	7.75553
33	52.4735	33.0309	1003.34	142.158	8.06426
34	53.5264	33.4794	918.602	136.275	8.43831
35	54.5793	33.9279	834.611	129.906	8.84702
36	55.6322	34.3763	751.367	123.039	9.29985
37	56.685	34.8248	668.871	115.663	9.81072
38	57.7379	35.2732	849.08	159.223	10.621
39	59.0323	36.0271	717.882	143.409	11.2971
40	60.3268	36.781	595.17	127.748	12.1142
41	61.6212	37.5349	480.966	112.201	13.1313
42	63.0022	38.3393	395.145	99.1032	14.0795
43	63.8945	39.0349	324.582	87.5105	15.0887
44	64.9875	39.8871	245.086	73.9683	16.7941
45	66.0805	40.7393	177.402	61.4498	19.1054
46	67.1736	41.5914	121.528	49.9549	22.3454
47	68.2666	42.4436	77.4654	39.4836	27.0076
48	69.5368	43.7877	31.0706	24.8469	38.649
49	70.8682	45.1964	6.93784	12.8267	61.5915
50	72.1996	46.6052	-0.94433	5.84471	-80.822
51	73.5309	48.014	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S7_PG_SLU_circ

Project Summary

File Name:	913_S7_PG_SLU_circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:01.265s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 11:41:37

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $m\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
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:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Support

PALO CA

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.5 m
Failure Mode	Shear
Pile Shear Strength	161.21 kN

Global Minimums

Method: bishop simplified

FS	1.342870
Center:	36.261, 72.485
Radius:	42.651
Left Slip Surface Endpoint:	15.620, 35.161
Right Slip Surface Endpoint:	70.866, 47.553
Left Slope Intercept:	15.620 42.456
Right Slope Intercept:	70.866 47.553
Resisting Moment:	76776.1 kN-m
Driving Moment:	57173 kN-m
Passive Support Moment:	13750.1 kN-m
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	581.26 m ²
Surface Horizontal Width:	55.2463 m
Surface Average Height:	10.5212 m

Method: spencer

FS	1.333580
Center:	36.261, 70.300
Radius:	40.753
Left Slip Surface Endpoint:	15.620, 35.161
Right Slip Surface Endpoint:	70.074, 47.552
Left Slope Intercept:	15.620 42.456
Right Slope Intercept:	70.074 47.552
Resisting Moment:	72576.3 kN-m
Driving Moment:	54422.2 kN-m
Resisting Horizontal Force:	1596.19 kN
Driving Horizontal Force:	1196.93 kN
Passive Support Moment:	13137.8 kN-m
Passive Horizontal Support Force:	279.528 kN
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	583.946 m ²
Surface Horizontal Width:	54.4536 m
Surface Average Height:	10.7237 m

Method: sarma

FS		1.335390
Center:	36.261, 72.485	
Radius:	42.651	
Left Slip Surface Endpoint:	15.620, 35.161	
Right Slip Surface Endpoint:	70.866, 47.553	
Left Slope Intercept:	15.620 42.456	
Right Slope Intercept:	70.866 47.553	
Passive Support Moment:	13750.1 kN-m	
Passive Horizontal Support Force:	282.72 kN	
Maximum Single Support Force:	322.42 kN	
Total Support Force:	322.42 kN	
Total Slice Area:	581.26 m2	
Surface Horizontal Width:	55.2463 m	
Surface Average Height:	10.5212 m	

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.34287

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6201	35.1607	261.03	0	0
2	16.7473	34.5592	102.347	0	0
3	17.8745	34.0001	208.74	0	0
4	19.0017	33.4816	317.477	0	0
5	20.1288	33.002	427.032	0	0
6	21.256	32.56	534.714	0	0
7	22.3832	32.1544	638.152	0	0
8	23.5104	31.784	736.536	0	0
9	24.6376	31.4479	829.135	0	0
10	25.7648	31.1452	915.893	0	0
11	26.892	30.8753	991.034	0	0
12	28.0192	30.6374	1058	0	0
13	29.1463	30.4311	1119.06	0	0
14	30.2735	30.2559	1174.09	0	0
15	31.4007	30.1113	1223.02	0	0
16	32.5279	29.9972	1271.4	0	0
17	33.6551	29.9132	1313.89	0	0
18	34.7823	29.8592	1348.29	0	0
19	35.9095	29.835	1376.38	0	0
20	37.0366	29.8406	1398.06	0	0
21	38.1638	29.876	1412.99	0	0
22	39.291	29.9413	1421.35	0	0
23	40.4182	30.0366	1423.37	0	0
24	41.5454	30.1622	1419.06	0	0
25	42.6726	30.3182	1408.42	0	0
26	43.7998	30.5051	1391.58	0	0
27	44.9269	30.7232	1368.7	0	0
28	46.0541	30.9731	1339.42	0	0
29	47.1813	31.2553	1303.52	0	0
30	48.3085	31.5704	1260.66	0	0
31	49.4357	31.9194	1209.73	0	0
32	50.5629	32.3029	1150.36	0	0
33	51.6901	32.7221	1082.23	0	0
34	52.8173	33.1781	1005.06	0	0
35	53.9444	33.6721	918.776	0	0
36	55.0716	34.2057	823.3	0	0
37	56.1988	34.7805	719.726	0	0
38	57.326	35.3985	860.601	0	0
39	58.4532	36.0618	744.912	0	0
40	59.5804	36.773	625.802	0	0
41	60.7076	37.5349	504.228	0	0
42	61.7152	38.2619	411.425	0	0
43	62.7229	39.0349	319.645	0	0
44	63.8843	39.9874	213.938	0	0
45	65.0456	41.0114	114.321	0	0
46	66.2069	42.1143	23.8918	0	0
47	67.3683	43.3049	-53.5624	0	0
48	68.5296	44.5946	-113.329	0	0
49	69.6909	45.9977	-149.418	0	0
50	70.8522	47.5334	-154.011	0	0
51	70.8664	47.553	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.33358

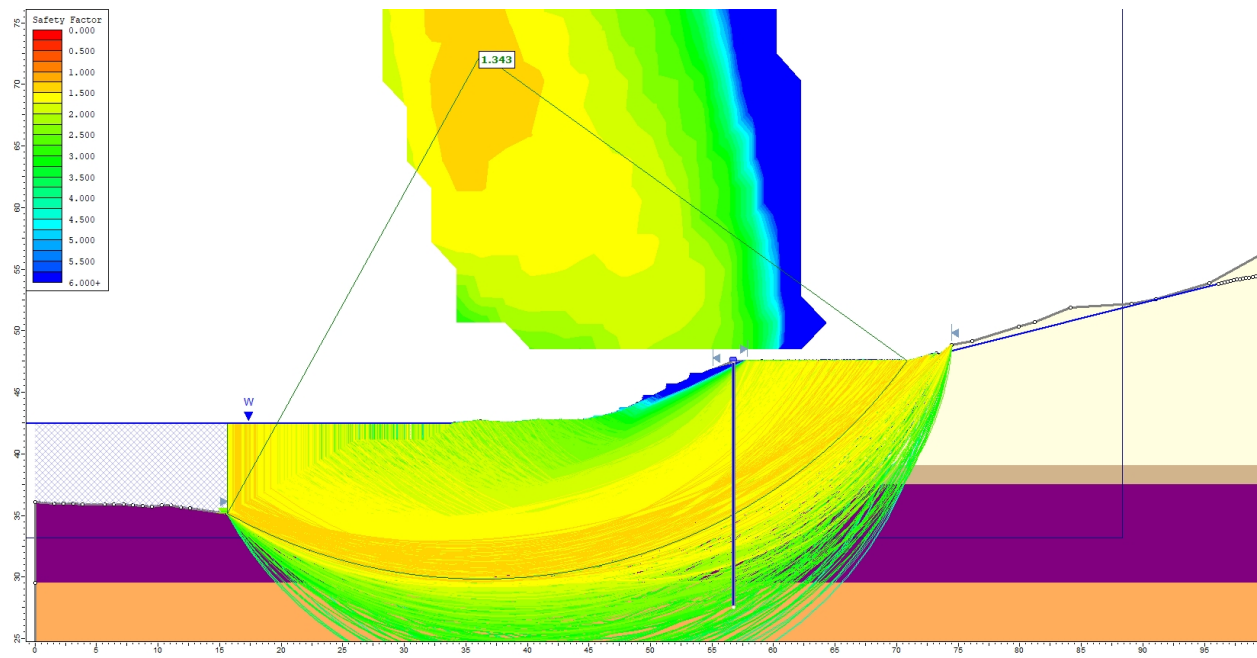
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6201	35.1607	261.03	0	0
2	16.742	34.5253	115.677	12.8879	6.35727
3	17.8638	33.9357	235.731	26.2634	6.35725
4	18.9857	33.3895	358.119	39.8989	6.35724
5	20.1075	32.885	481.057	53.5957	6.35724
6	21.2294	32.4203	601.562	67.0214	6.35724
7	22.3512	31.9941	716.954	79.8776	6.35725
8	23.4731	31.6052	826.38	92.0689	6.35724
9	24.595	31.2523	929.086	103.512	6.35726
10	25.7168	30.9345	1025.01	114.199	6.35725
11	26.8387	30.651	1108.55	123.507	6.35728
12	27.9605	30.4011	1182.5	131.746	6.35728
13	29.0824	30.1841	1249.67	139.229	6.35726
14	30.2042	29.9994	1309.98	145.948	6.35724
15	31.3261	29.8467	1363.38	151.898	6.35727
16	32.448	29.7256	1415.18	157.668	6.35722
17	33.5698	29.6358	1461.05	162.779	6.35724
18	34.6917	29.5771	1498.06	166.902	6.35723
19	35.8135	29.5493	1528.05	170.244	6.35725
20	36.9354	29.5524	1551.09	172.811	6.35726
21	38.0572	29.5865	1566.82	174.563	6.35724
22	39.1791	29.6515	1575.46	175.526	6.35725
23	40.301	29.7476	1577.3	175.73	6.35722
24	41.4228	29.8751	1572.4	175.185	6.35725
25	42.5447	30.0342	1560.81	173.893	6.35722
26	43.6665	30.2254	1542.7	171.875	6.35721
27	44.7884	30.449	1518.28	169.156	6.35727
28	45.9102	30.7057	1487.31	165.705	6.35725
29	47.0321	30.9961	1449.54	161.497	6.35725
30	48.154	31.3209	1404.78	156.51	6.35725
31	49.2758	31.681	1351.9	150.619	6.35727
32	50.3977	32.0774	1290.54	143.783	6.35728
33	51.5195	32.5112	1220.45	135.973	6.35723
34	52.6414	32.9839	1141.38	127.163	6.3572
35	53.7632	33.4967	1053.32	117.353	6.35725
36	54.8851	34.0515	956.283	106.542	6.35726
37	56.007	34.6502	851.242	94.8389	6.35724
38	57.1288	35.2951	984.043	109.635	6.35727
39	58.2507	35.9887	867.117	96.6075	6.35724
40	59.3725	36.7342	747.276	83.2557	6.35723
41	60.4944	37.5349	625.569	69.6962	6.35725
42	61.4477	38.262	535.751	59.6893	6.35724
43	62.401	39.0349	447.416	49.8477	6.35724
44	63.4909	39.9794	347.497	38.7154	6.35723
45	64.5807	40.9948	253.823	28.279	6.35724
46	65.6706	42.0887	169.177	18.8484	6.35724
47	66.7604	43.2707	96.9481	10.8012	6.35723
48	67.8503	44.5528	41.3436	4.60619	6.35724
49	68.9401	45.951	7.70924	0.858904	6.35724
50	70.03	47.4866	3.04012	0.338707	6.35724
51	70.0737	47.5515	0	0	0

Global Minimum Query (sarma) - Safety Factor: 1.33539

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6201	35.1607	261.03	0	0
2	16.7473	34.5592	111.163	11.6177	5.96635
3	17.8745	34.0001	227.73	25.8692	6.48079
4	19.0017	33.4816	347.553	42.3819	6.95253
5	20.1288	33.002	468.742	60.8205	7.39297
6	21.256	32.56	583.845	73.1729	7.14359
7	22.3832	32.1544	694.023	85.1381	6.99372
8	23.5104	31.784	798.583	96.8445	6.91452
9	24.6376	31.4479	896.829	108.289	6.88494
10	25.7648	31.1452	989.884	122.047	7.02877
11	26.892	30.8753	1068.15	129.188	6.89617
12	28.0192	30.6374	1136.32	131.915	6.62181
13	29.1463	30.4311	1197.82	132.73	6.32313
14	30.2735	30.2559	1252.83	132.184	6.0229
15	31.4007	30.1113	1301.39	130.418	5.72275
16	32.5279	29.9972	1351.59	136.769	5.77816
17	33.6551	29.9132	1396.42	146.007	5.96905
18	34.7823	29.8592	1432.27	152.243	6.06747
19	35.9095	29.835	1461.29	156.482	6.11222
20	37.0366	29.8406	1483.55	159.215	6.12555
21	38.1638	29.876	1498.87	161.083	6.13401
22	39.291	29.9413	1507.59	163.248	6.18014
23	40.4182	30.0366	1509.93	165.464	6.25374
24	41.5454	30.1622	1505.83	166.744	6.31875
25	42.6726	30.3182	1495.35	167.222	6.38076
26	43.7998	30.5051	1478.66	167.245	6.45306
27	44.9269	30.7232	1455.97	166.028	6.50548
28	46.0541	30.9731	1427.06	162.369	6.49112
29	47.1813	31.2553	1391.63	158.677	6.50491
30	48.3085	31.5704	1349.69	152.116	6.43035
31	49.4357	31.9194	1300.19	143.248	6.28719
32	50.5629	32.3029	1242.67	133.402	6.1273
33	51.6901	32.7221	1176.94	122.33	5.93396
34	52.8173	33.1781	1102.81	109.889	5.69043
35	53.9444	33.6721	1020.33	96.0042	5.37521
36	55.0716	34.2057	928.267	84.9792	5.23062
37	56.1988	34.7805	827.172	77.957	5.38395
38	57.326	35.3985	957.039	112.974	6.73234
39	58.4532	36.0618	845.594	102.697	6.92463
40	59.5804	36.773	731.392	91.7389	7.1493
41	60.7076	37.5349	615.475	80.0735	7.41256
42	61.7152	38.2619	526.153	70.6985	7.65292
43	62.7229	39.0349	438.169	61.2808	7.96155
44	63.8843	39.9874	337.647	50.2716	8.46845
45	65.0456	41.0114	243.532	39.5606	9.22683
46	66.2069	42.1143	158.802	29.3796	10.4816
47	67.3683	43.3049	87.0677	19.9997	12.9366
48	68.5296	44.5946	32.7897	11.7425	19.7032
49	69.6909	45.9977	1.59564	4.9964	72.2887
50	70.8522	47.5334	0.780075	0.240591	17.1408
51	70.8664	47.553	0	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Slide Analysis Information

913_S7_PG_SLU_no circ

Project Summary

File Name:	913_S7_PG_SLU_no circ.slmd
Slide Modeler Version:	9.02
Compute Time:	00h:00m:03.229s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	24/10/2023, 11:41:37

General Settings

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

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Spencer
	Sarma
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check $\alpha < 0.2$:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Sarma Interslice Strength Option:	Computed Average Value

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m3]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

Random Numbers

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

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading


Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials


A- LIMO ARGILLOSO- SABBIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	17
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1


B- LIMO ARGILLOSO GHIAIOSO

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	18
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	8
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

C- ARGILLA TORBOSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	13.19
Saturated Unit Weight [kN/m3]	15
Cohesion [kPa]	7.6
Friction Angle [deg]	12
Water Surface	Water Table
Hu Value	1

D- SABBIA MEDIO GROSSA

Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [kN/m3]	19.7
Saturated Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	33.8
Water Surface	Water Table
Hu Value	1

SCOGLIERA

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	22
Cohesion [kPa]	8
Friction Angle [deg]	38.66
Water Surface	Water Table
Hu Value	1

Support

PALO CA

Color	
Type	Pile/Micro Pile
Force Application	Passive (Method B)
Force Orientation	Parallel to surface
Out-Of-Plane Spacing	0.5 m
Failure Mode	Shear
Pile Shear Strength	161.21 kN

Global Minimums

Method: bishop simplified

FS	1.343690
Axis Location:	36.569, 77.678
Left Slip Surface Endpoint:	15.623, 35.162
Right Slip Surface Endpoint:	73.536, 48.017
Left Slope Intercept:	15.623 42.456
Right Slope Intercept:	73.536 48.138
Resisting Moment:	87455.8 kN-m
Driving Moment:	65086.2 kN-m
Passive Support Moment:	15253.4 kN-m
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	586.544 m ²
Surface Horizontal Width:	57.9126 m
Surface Average Height:	10.1281 m

Method: spencer

FS	1.337720
Axis Location:	36.569, 77.678
Left Slip Surface Endpoint:	15.623, 35.162
Right Slip Surface Endpoint:	73.536, 48.017
Left Slope Intercept:	15.623 42.456
Right Slope Intercept:	73.536 48.138
Resisting Moment:	86904.9 kN-m
Driving Moment:	64965.1 kN-m
Resisting Horizontal Force:	1685.35 kN
Driving Horizontal Force:	1259.87 kN
Passive Support Moment:	15253.4 kN-m
Passive Horizontal Support Force:	296.63 kN
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	586.544 m ²
Surface Horizontal Width:	57.9126 m
Surface Average Height:	10.1281 m

Method: sarma

FS	1.338310
Axis Location:	36.566, 77.673
Left Slip Surface Endpoint:	15.623, 35.162
Right Slip Surface Endpoint:	73.528, 48.016
Left Slope Intercept:	15.623 42.456
Right Slope Intercept:	73.528 48.136
Passive Support Moment:	15251.3 kN-m
Passive Horizontal Support Force:	296.629 kN
Maximum Single Support Force:	322.42 kN
Total Support Force:	322.42 kN
Total Slice Area:	586.42 m2
Surface Horizontal Width:	57.9045 m
Surface Average Height:	10.1274 m

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.34369

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6231	35.1624	260.906	0	0
2	16.6761	34.7203	84.365	0	0
3	17.729	34.2783	173.38	0	0
4	18.782	33.8362	267.045	0	0
5	19.835	33.3942	365.36	0	0
6	20.8879	32.9521	467.703	0	0
7	22.2041	32.5745	570.634	0	0
8	23.5203	32.1969	673.342	0	0
9	24.8365	31.8193	775.832	0	0
10	26.1527	31.4416	878.815	0	0
11	27.4689	31.2221	943.033	0	0
12	28.7851	31.0027	1007.63	0	0
13	30.1013	30.7832	1072.59	0	0
14	31.4175	30.5637	1137.94	0	0
15	32.4704	30.5075	1171.99	0	0
16	33.5234	30.4514	1206.22	0	0
17	34.5763	30.3953	1238.75	0	0
18	35.6293	30.3391	1271.4	0	0
19	36.6822	30.283	1304.43	0	0
20	37.9984	30.3595	1314.3	0	0
21	39.3146	30.436	1324.03	0	0
22	40.6308	30.5125	1333.92	0	0
23	41.947	30.589	1343.94	0	0
24	43	30.7699	1327.42	0	0
25	44.0529	30.9507	1311.19	0	0
26	45.1059	31.1316	1295.24	0	0
27	46.1588	31.3124	1279.18	0	0
28	47.2118	31.4933	1262.99	0	0
29	48.2648	31.8011	1221.11	0	0
30	49.3177	32.1089	1178.24	0	0
31	50.3707	32.4167	1134.36	0	0
32	51.4236	32.7245	1089.46	0	0
33	52.4766	33.0322	1043.56	0	0
34	53.7928	33.5929	946.469	0	0
35	55.109	34.1536	848.384	0	0
36	56.4252	34.7142	750.763	0	0
37	57.7414	35.2749	899.059	0	0
38	59.0348	36.0282	766.957	0	0
39	60.3282	36.7816	642.07	0	0
40	61.6216	37.5349	524.403	0	0
41	63.0061	38.3413	428.145	0	0
42	63.8957	39.0349	345.579	0	0
43	64.9895	39.8877	250.741	0	0
44	66.0833	40.7405	166.69	0	0
45	67.1771	41.5933	93.4237	0	0
46	68.2709	42.4461	30.9439	0	0
47	69.3239	43.5604	-37.4025	0	0
48	70.3768	44.6746	-86.667	0	0
49	71.4298	45.7888	-116.938	0	0
50	72.4827	46.903	-131.554	0	0
51	73.5357	48.0172	0.071152	0	0

Global Minimum Query (spencer) - Safety Factor: 1.33772

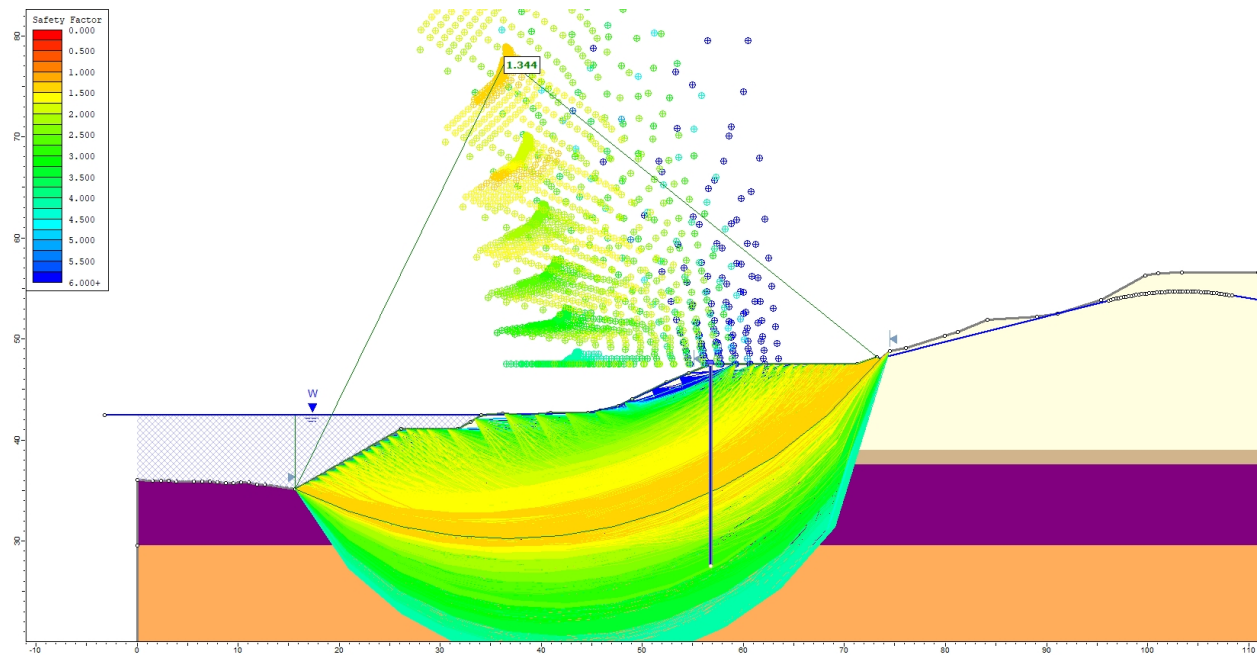
Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6231	35.1624	260.906	0	0
2	16.6761	34.7203	90.6792	10.1127	6.36343
3	17.729	34.2783	186.369	20.7842	6.36343
4	18.782	33.8362	287.071	32.0146	6.36342
5	19.835	33.3942	392.783	43.8038	6.36342
6	20.8879	32.9521	502.836	56.0772	6.36344
7	22.2041	32.5745	611.571	68.2034	6.36343
8	23.5203	32.1969	720.082	80.3048	6.36343
9	24.8365	31.8193	828.375	92.3818	6.36343
10	26.1527	31.4416	937.203	104.519	6.36346
11	27.4689	31.2221	1004.09	111.978	6.36344
12	28.7851	31.0027	1071.37	119.481	6.36343
13	30.1013	30.7832	1139.03	127.027	6.36345
14	31.4175	30.5637	1207.09	134.617	6.36344
15	32.4704	30.5075	1242.11	138.522	6.36342
16	33.5234	30.4514	1277.31	142.448	6.36344
17	34.5763	30.3953	1310.79	146.181	6.36341
18	35.6293	30.3391	1344.39	149.929	6.36344
19	36.6822	30.283	1378.39	153.72	6.36341
20	37.9984	30.3595	1388.55	154.853	6.36341
21	39.3146	30.436	1398.57	155.971	6.36343
22	40.6308	30.5125	1408.74	157.105	6.36343
23	41.947	30.589	1419.06	158.256	6.36343
24	43	30.7699	1402.7	156.432	6.36345
25	44.0529	30.9507	1386.63	154.64	6.36346
26	45.1059	31.1316	1370.85	152.879	6.36341
27	46.1588	31.3124	1354.94	151.105	6.36342
28	47.2118	31.4933	1338.91	149.318	6.36345
29	48.2648	31.8011	1297.77	144.729	6.36341
30	49.3177	32.1089	1255.64	140.031	6.36342
31	50.3707	32.4167	1212.52	135.223	6.36346
32	51.4236	32.7245	1168.41	130.304	6.36347
33	52.4766	33.0322	1123.31	125.274	6.36346
34	53.7928	33.5929	1029.06	114.763	6.36346
35	55.109	34.1536	933.849	104.144	6.3634
36	56.4252	34.7142	839.096	93.5775	6.36343
37	57.7414	35.2749	984.622	109.807	6.36344
38	59.0348	36.0282	858.218	95.7099	6.36343
39	60.3282	36.7816	738.724	82.3837	6.36342
40	61.6216	37.5349	626.144	69.8286	6.36342
41	63.0061	38.3413	532.703	59.408	6.36343
42	63.8957	39.0349	453.756	50.6036	6.36342
43	64.9895	39.8877	363.37	40.5237	6.36344
44	66.0833	40.7405	283.271	31.5909	6.36344
45	67.1771	41.5933	213.458	23.8052	6.36343
46	68.2709	42.4461	153.932	17.1668	6.36344
47	69.3239	43.5604	90.0905	10.047	6.3634
48	70.3768	44.6746	44.0921	4.91722	6.36342
49	71.4298	45.7888	15.8541	1.76808	6.36344
50	72.4827	46.903	2.25785	0.251799	6.36342
51	73.5357	48.0172	0.071152	0	0

Global Minimum Query (sarma) - Safety Factor: 1.33831

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	15.6231	35.1624	260.906	0	0
2	16.9391	34.6099	113.38	11.7589	5.92111
3	18.2552	34.0574	236.168	27.0132	6.52521
4	19.5712	33.5049	368.366	45.7711	7.08295
5	20.8872	32.9524	506.694	63.4167	7.13392
6	21.94	32.6504	593.515	72.635	6.97722
7	22.9928	32.3483	680.366	82.2369	6.892
8	24.0456	32.0463	767.247	92.212	6.85325
9	25.0984	31.7443	854.597	103.353	6.89573
10	26.1512	31.4422	943.196	116.251	7.0264
11	27.204	31.2666	995.581	118.825	6.80619
12	28.2568	31.0911	1047.85	120.34	6.55141
13	29.3096	30.9155	1100.04	120.889	6.27136
14	30.3625	30.7399	1152.22	120.73	5.98164
15	31.4153	30.5644	1204.42	119.907	5.68539
16	32.7313	30.4942	1248.81	126.714	5.79385
17	34.0473	30.4241	1293.01	136.677	6.03402
18	35.3633	30.3539	1334.98	142.179	6.07924
19	36.6793	30.2838	1377.48	147.159	6.0979
20	37.7321	30.345	1385.67	148.422	6.11376
21	38.7849	30.4062	1393.74	149.865	6.13728
22	39.8377	30.4674	1401.97	152.301	6.19993
23	40.8905	30.5286	1410.34	154.763	6.26227
24	41.9433	30.5898	1418.68	156.526	6.2961
25	43.2594	30.8158	1398.27	156.452	6.38425
26	44.5754	31.0418	1378.32	156.412	6.47424
27	45.8914	31.2679	1358.52	153.263	6.43667
28	47.2074	31.4939	1338.54	150.618	6.42015
29	48.2602	31.8017	1297.61	144.551	6.35642
30	49.313	32.1094	1255.9	136.842	6.21838
31	50.3658	32.4172	1213.22	128.785	6.05934
32	51.4186	32.7249	1169.61	120.173	5.86634
33	52.4714	33.0327	1125.07	110.995	5.63434
34	53.7874	33.5933	1032.1	95.5601	5.28982
35	55.1034	34.1538	937.261	83.6609	5.10076
36	56.4195	34.7144	841.415	77.6806	5.27467
37	57.7355	35.275	982.339	112.237	6.51806
38	59.0288	36.0283	854.929	100.828	6.72624
39	60.3222	36.7816	734.664	89.5821	6.95211
40	61.6155	37.5349	621.555	78.4769	7.19603
41	62.9995	38.3411	527.916	69.1518	7.46269
42	63.8895	39.0349	448.733	60.8984	7.7285
43	64.983	39.8875	358.186	51.291	8.14916
44	66.0765	40.7401	278.052	42.5153	8.69343
45	67.17	41.5927	208.329	34.5713	9.42213
46	68.2636	42.4453	149.018	27.459	10.4406
47	69.3164	43.5594	85.7854	19.2987	12.6785
48	70.3692	44.6734	40.7429	12.5534	17.1247
49	71.422	45.7875	13.7396	7.33755	28.1042
50	72.4748	46.9016	1.35244	3.85116	70.6499
51	73.5276	48.0156	0.0706554	0	0

Report Views

1: Group 1 - Master Scenario - Bishop simplified method



Progetto: FICAROLO
Ditta:
Comune:
Progettista:
Direttore dei Lavori:
Impresa:

Normative di riferimento

- Legge nr. 1086 del 05/11/1971.
Norme per la disciplina delle opere in conglomerato cementizio, normale e precompresso ed a struttura metallica.
- Legge nr. 64 del 02/02/1974.
Provvedimenti per le costruzioni con particolari prescrizioni per le zone sismiche.
- D.M. LL.PP. del 11/03/1988.
Norme tecniche riguardanti le indagini sui terreni e sulle rocce, la stabilità dei pendii naturali e delle scarpate, i criteri generali e le prescrizioni per la progettazione, l'esecuzione e il collaudo delle opere di sostegno delle terre e delle opere di fondazione.
- D.M. LL.PP. del 14/02/1992.
Norme tecniche per l'esecuzione delle opere in cemento armato normale e precompresso e per le strutture metalliche.
- D.M. 9 Gennaio 1996
Norme Tecniche per il calcolo, l'esecuzione ed il collaudo delle strutture in cemento armato normale e precompresso e per le strutture metalliche.
- D.M. 16 Gennaio 1996
Norme Tecniche relative ai 'Criteri generali per la verifica di sicurezza delle costruzioni e dei carichi e sovraccarichi'.
- D.M. 16 Gennaio 1996
Norme Tecniche per le costruzioni in zone sismiche.
- Circolare Ministero LL.PP. 15 Ottobre 1996 N. 252 AA.GG./S.T.C.
Istruzioni per l'applicazione delle Norme Tecniche di cui al D.M. 9 Gennaio 1996.
- Circolare Ministero LL.PP. 10 Aprile 1997 N. 65/AA.GG.
Istruzioni per l'applicazione delle Norme Tecniche per le costruzioni in zone sismiche di cui al D.M. 16 Gennaio 1996.
- Norme Tecniche per le Costruzioni 2018 (D.M. 17 Gennaio 2018).
- Circolare C.S.LL.PP. 21/01/2019 n.7 - Istruzioni per l'applicazione dell'Aggiornamento delle Norme tecniche per le costruzioni di cui al D.M. 17 gennaio 2018

Geometria paratia

Tipo paratia: **Paratia di pali**

Altezza fuori terra	0.80	[m]
Profondità di infissione	19.20	[m]
Altezza totale della paratia	20.00	[m]
Lunghezza paratia	180.00	[m]

Numero di file di pali	2	
Interasse fra le file di pali	0.50	[m]
Interasse fra i pali della fila	1.10	[m]
Diametro dei pali	40.00	[cm]
Numero totale di pali	327	
Numero di pali per metro lineare	1.82	

Descrizione terreni

Simbologia adottata

n°	numero d'ordine
Descrizione	Descrizione del terreno
γ	peso di volume del terreno espresso in [kN/mc]
γ_{sat}	peso di volume saturo del terreno espresso [kN/mc]
ϕ	angolo d'attrito interno del terreno espresso in [°]
δ	angolo d'attrito terreno/paratia espresso in [°]
c	coesione del terreno espressa in [kPa]
ca	adesione terreno/paratia espressa in [kPa]
Cesp	coeff. di espansione laterale minimo e medio del tirante nello strato
τ_1	tensione tangenziale minima e media lungo il tirante espresso in [kPa]

I parametri per il calcolo dei tiranti secondo il metodo di Bustamante-Doix

I parametri medi e minimi vengono usati per il calcolo di portanza di progetto dei pali e per la resistenza di progetto a sfilamento dei tiranti

N°	Descrizione	γ [kN/mc]	γ_{sat} [kN/mc]	ϕ [°]	δ [°]	c [kPa]	ca [kPa]	Cesp	τ_1 [kPa]	
1	Terreno 1	17.000	20.000	20.00 20.00 20.00	10.00 10.00 10.00	8.0 8.0 8.0	2.0 2.0 2.0	1.00	100.0 100.0 100.0	CAR MIN MED
2	Terreno 2	18.000	20.000	22.00 22.00 22.00	11.00 11.00 11.00	8.0 8.0 8.0	8.0 8.0 8.0	1.00	150.0 150.0 150.0	CAR MIN MED
3	Terreno 3	13.190	15.000	12.00 12.00 12.00	6.00 6.00 6.00	7.6 7.6 7.6	7.6 7.6 7.6	1.00	80.0 80.0 80.0	CAR MIN MED
4	Terreno 4	19.700	20.000	33.80 33.80 33.80	16.00 16.00 16.00	0.0 0.0 0.0	0.0 0.0 0.0	1.00	250.0 250.0 250.0	CAR MIN MED

Descrizione stratigrafia

Simbologia adottata

n°	numero d'ordine dello strato a partire dalla sommità della paratia
sp	spessore dello strato in corrispondenza dell'asse della paratia espresso in [m]
kw	costante di Winkler orizzontale espressa in [Kg/cm ² /cm]
α	inclinazione dello strato espressa in [°] (M: strato di monte, V: strato di valle)
Terreno	Terreno associato allo strato (M: strato di monte, V: strato di valle)

N°	sp [m]	α_M [°]	α_V [°]	K _{WM} [kg/cm ² /cm]	K _{WV} [kg/cm ² /cm]	Terreno M	Terreno V
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N°	sp [m]	α_M [°]	α_V [°]	K _{WM} [kg/cm²/cm]	K _{WV} [kg/cm²/cm]	Terreno M	Terreno V
1	8.49	0.00	0.00	0.99	0.99	Terreno 1	Terreno 1
2	1.50	0.00	0.00	2.10	2.10	Terreno 2	Terreno 2
3	8.00	0.00	0.00	1.54	1.54	Terreno 3	Terreno 3
4	29.00	0.00	0.00	12.32	12.32	Terreno 4	Terreno 4

Falda

Profondità della falda a monte rispetto alla sommità della paratia

0.00

[m]

Profondità della falda a valle rispetto alla sommità della paratia

2.00

[m]

Regime delle pressioni neutre:

Idrostatico**Impostazioni di analisi****Analisi per Combinazioni di Carico.**Rottura del terreno:

Pressione passiva

Applicata diminuzione quota valle secondo NTC2018 - par 6.5.2.2

Influenza δ (angolo di attrito terreno-paratia): Nel calcolo del coefficiente di spinta attiva K_a e nell'inclinazione della spinta attiva (non viene considerato per la spinta passiva)

Stabilità globale:

Metodo:

Metodo di Bishop

Maglia dei centri

Passo maglia **Automatica**

Resistenza a taglio paratia

V_{Rd}Opzioni calcolo portanzaPortanza verticale

Metodo di calcolo della portanza alla laterale

Bustamante-Doix

Metodo di calcolo della portanza alla punta

15.00 % della portanza laterale

Tecnologia costruttiva: Trivellato

Contributo portanza palo: Punta

Impostazioni analisi sismica**Combinazioni/Fase****SLU****SLE**Accelerazione al suolo [m/s²]

1.500

0.638

Massimo fattore amplificazione spettro orizzontale F_0

2.585

2.512

Valore di riferimento per la determinazione del periodo di inizio del tratto a velocità costante

dello spettro in accelerazione T_c^* [sec]

0.303

0.298

Coefficiente di amplificazione topografica (S_t)

1.000

1.000

Tipo di sottosuolo

D

Coefficiente di amplificazione per tipo di sottosuolo (S_s)

1.800

1.800

Coefficiente di riduzione per tipo di sottosuolo (α)

0.300

0.300

Spostamento massimo senza riduzione di resistenza U_s [m]

0.100

0.100

Coefficiente di riduzione per spostamento massimo (β)

0.520

0.520

Prodotto $\alpha \beta$

0.156 < 0.2

0.156 < 0.2

Coefficiente di intensità sismica [%]

5.505

2.340

Rapporto intensità sismica verticale/orizzontale (kv)

0.50

Coefficiente di riduzione (β_s)

0.240

0.240

Coefficiente di intensità sismica nella verifica di stabilità [%]

6.606

2.808

Inerzia massa strutturale **Non considerata**

Influenza sisma nelle spinte attiva e passiva

Forma diagramma incremento sismico: Triangolare con vertice in alto.

Forze agenti sulla paratia

Tutte le forze si intendono positive se dirette da monte verso valle. Esse sono riferite ad un metro di larghezza della paratia. Le Y hanno come origine la testa della paratia, e sono espresse in [m]

Simbologia adottata

n° Indice della Combinazione/Fase

Tipo Tipo della Combinazione/Fase
 Pa Spinta attiva, espressa in [kN]
 Pw Spinta della falda, espressa in [kN]
 Pp Resistenza passiva, espressa in [kN]
 Pc Controspinta, espressa in [kN]

n°	Tipo	Pa [kN]	Y _{Pa} [m]	Pw [kN]	Y _{Pw} [m]	Pp [kN]	Y _{Pp} [m]	Pc [kN]	Y _{Pc} [m]
1	SLU - STR	0.00	0.00	372.66	10.49	-373.30	10.52	0.64	19.94
2	SLU - GEO	0.00	0.00	372.66	10.49	-376.88	10.59	4.22	19.87
3	SLV - GEO	0.21	0.53	372.66	10.49	-391.32	10.90	18.46	19.82
4	SLV - GEO	0.13	0.53	372.66	10.49	-403.57	11.07	30.79	19.79
5	SLE - Rara	0.00	0.00	372.66	10.49	-372.98	10.51	0.32	19.96
6	SLE - Frequente	0.00	0.00	372.66	10.49	-372.98	10.51	0.32	19.96
7	SLE - Quasi permanente	0.00	0.00	372.66	10.49	-372.98	10.51	0.32	19.96

Simbologia adottata

n° Indice della Combinazione/Fase
 Tipo Tipo della Combinazione/Fase
 Rc Risultante carichi esterni applicati, espressa in [kN]
 Rt Risultante delle reazioni dei tiranti (componente orizzontale), espressa in [kN]
 Rv Risultante delle reazioni dei vincoli, espressa in [kN]
 Rp Risultante delle reazioni dei puntoni, espressa in [kN]

n°	Tipo	Rc [kN]	Y _{Rc} [m]	Rt [kN]	Y _{Rt} [m]	Rv [kN]	Y _{Rv} [m]	Rp [kN]	Y _{Rp} [m]
1	SLU - STR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	SLU - GEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	SLV - GEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	SLV - GEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	SLE - Rara	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	SLE - Frequente	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	SLE - Quasi permanente	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Valori massimi e minimi sollecitazioni per metro di paratia

Simbologia adottata

n° Indice della combinazione/fase
 Tipo Tipo della combinazione/fase
 Y ordinata della sezione rispetto alla testa espressa in [m]
 M momento flettente massimo e minimo espresso in [kNm]
 N sforzo normale massimo e minimo espresso in [kN] (positivo di compressione)
 T taglio massimo e minimo espresso in [kN]

n°	Tipo	M [kNm]	Y _M [m]	T [kN]	Y _T [m]	N [kN]	Y _N [m]	
1	SLU - STR	14.36	8.99	19.94	17.94	111.94	20.00	MAX
		-42.58	13.29	-24.81	12.04	0.00	0.00	MIN
2	SLU - GEO	19.91	8.64	26.32	17.94	111.94	20.00	MAX
		-70.39	13.24	-31.55	11.59	0.00	0.00	MIN
3	SLV - GEO	48.07	7.79	77.61	17.89	111.94	20.00	MAX
		-153.81	13.94	-64.45	9.99	0.00	0.00	MIN
4	SLV - GEO	52.66	1.20	86.78	17.89	111.94	20.00	MAX
		-177.54	13.49	-68.17	9.99	0.00	0.00	MIN
5	SLE - Rara	16.67	9.24	20.52	17.94	111.94	20.00	MAX
		-38.62	13.59	-22.27	12.44	0.00	0.00	MIN
6	SLE - Frequente	16.67	9.24	20.52	17.94	111.94	20.00	MAX
		-38.62	13.59	-22.27	12.44	0.00	0.00	MIN
7	SLE - Quasi permanente	16.67	9.24	20.52	17.94	111.94	20.00	MAX
		-38.62	13.59	-22.27	12.44	0.00	0.00	MIN

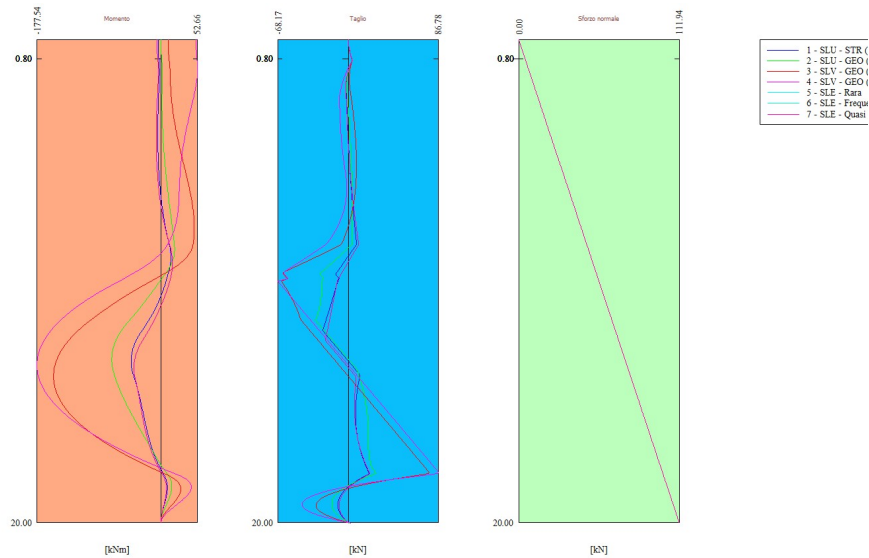


Fig. 1 - Sollecitazioni (Inviluppo)

Spostamenti massimi e minimi della paratia

Simbologia adottata

- n° Indice della combinazione/fase
Tipo Tipo della combinazione/fase
Y ordinata della sezione rispetto alla testa della paratia espressa in [m]
U spostamento orizzontale massimo e minimo espresso in [cm] positivo verso valle
V spostamento verticale massimo e minimo espresso in [cm] positivo verso il basso

n°	Tipo	U [cm]	Yu [m]	V [cm]	Yv [m]	
1	SLU - STR	0.1952	0.00	0.0162	0.00	MAX
		-0.0056	20.00	0.0000	0.00	MIN
2	SLU - GEO	0.2541	12.29	0.0162	0.00	MAX
		-0.0175	20.00	0.0000	0.00	MIN
3	SLV - GEO	0.4903	12.99	0.0162	0.00	MAX
		-0.0559	20.00	0.0000	0.00	MIN
4	SLV - GEO	0.6961	12.29	0.0162	0.00	MAX
		-0.0817	20.00	0.0000	0.00	MIN
5	SLE - Rara	0.1970	0.00	0.0162	0.00	MAX
		-0.0038	20.00	0.0000	0.00	MIN
6	SLE - Frequente	0.1970	0.00	0.0162	0.00	MAX
		-0.0038	20.00	0.0000	0.00	MIN
7	SLE - Quasi permanente	0.1970	0.00	0.0162	0.00	MAX
		-0.0038	20.00	0.0000	0.00	MIN

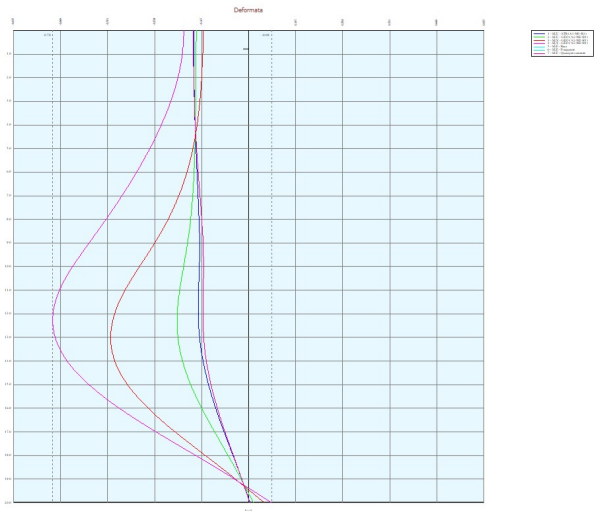


Fig. 2 - Spostamenti (Inviluppo)

Stabilità globale

Simbologia adottata

n°	Indice della combinazione/fase
Tipo	Tipo della combinazione/fase
(X _c ; Y _c)	Coordinate centro cerchio superficie di scorrimento, espresse in [m]
R	Raggio cerchio superficie di scorrimento, espresso in [m]
(X _v ; Y _v)	Coordinate intersezione del cerchio con il pendio a valle, espresse in [m]
(X _m ; Y _m)	Coordinate intersezione del cerchio con il pendio a monte, espresse in [m]
FS	Coefficiente di sicurezza
R	Coefficiente di sicurezza richiesto

Numero di cerchi analizzati 100

n°	Tipo	X _c , Y _c [m]	R [m]	X _v , Y _v [m]	X _m , Y _m [m]	FS	R
2	SLU - GEO	-16.00; 18.00	35.42	-37.16; -10.40	14.52; 0.01	1.259	1.100
3	SLV - GEO	-16.00; 18.00	35.42	-37.16; -10.40	14.52; 0.01	1.054	1.200
4	SLV - GEO	-16.00; 18.00	35.42	-37.16; -10.40	14.52; 0.01	1.006	1.200

Risultati vincoli

Simbologia adottata

n°	Indice del vincolo
R _x	reazione in direzione orizzontale a metro lineare, positiva verso valle, espressa in [kN]
R _θ	reazione momento a metro lineare, positiva antioraria, espressa in [kNm]
u	spostamento orizzontale, positivo verso valle, espresso in [cm]

Combinazione n° 1 - SLU - STR

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	-3.75	0.19525

Combinazione n° 2 - SLU - GEO

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	0.46	0.18669

Combinazione n° 3 - SLV - GEO

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	10.85	0.16226

Combinazione n° 4 - SLV - GEO

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	50.86	0.23070

Combinazione n° 5 - SLE - Rara

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	-5.30	0.19701

Combinazione n° 6 - SLE - Frequente

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	-5.30	0.19701

Combinazione n° 7 - SLE - Quasi permanente

n°	R _x [kN]	R _θ [kNm]	u [cm]
1	--	-5.30	0.19701

Verifica a flessione

Simbologia adottata

n°	numero d'ordine della sezione
Y	ordinata della sezione rispetto alla testa espressa in [m]
A _r	area di armatura del palo espressa in [cmq]
M	momento flettente agente sul palo espresso in [kNm]
N	sforzo normale agente sul palo espresso in [kN] (positivo di compressione)
M _u	momento ultimo di riferimento espresso in [kNm]
N _u	sforzo normale ultimo di riferimento espresso in [kN]
FS	coefficiente di sicurezza (rapporto fra la sollecitazione ultima e la sollecitazione di esercizio)

n° - Tipo	Y	A _r	M	N	M _u	N _u	FS
	[m]	[cmq]	[kNm]	[kN]	[kNm]	[kN]	
4 - SLV - GEO	13.44	24.13	-97.73	41.41	-108.49	45.97	1.110

Verifica a taglio

Simbologia adottata

n°	numero d'ordine della sezione
Tipo	Tipo della Combinazione/Fase
Y	ordinata della sezione rispetto alla testa, espressa in [m]
A _{sw}	area dell'armatura trasversale, espressa in [cmq]
s	interasse tra due armature trasversali consecutive, espressa in [cm]
V _{Ed}	taglio agente sul palo, espresso in [kN]
V _{Rd}	taglio resistente, espresso in [kN]
FS	coefficiente di sicurezza (rapporto tra V _{Rd} / V _{Ed})
cotgθ	inclinazione delle bielle compresse, θ inclinazione dei puntoni di calcestruzzo

La verifica a taglio del palo è stata eseguita considerando una sezione quadrata equivalente di lato B = 34.14 cm

n° - Tipo	Y	A _{sw}	s	V _{Ed}	V _{Rd}	FS	cotgθ
	[m]	[cmq]	[cm]	[kN]	[kN]		
4 - SLV - GEO	17.89	1.57	25.00	47.77	161.21	3.375	2.50

Verifica tensioni

Simbologia adottata

n°	numero d'ordine della sezione
Y	ordinata della sezione rispetto alla testa espressa in [m]
A _r	area di armatura espressa in [cmq]
σ _c	tensione nel calcestruzzo espressa in [kPa]
σ _f	tensione nell'acciaio espressa in [kPa]

A _r	σ _c	cmb	σ _f	cmb
[cmq]	[kPa]		[kPa]	
24.13	4639	7	77948	5

Verifica fessurazione

Simbologia adottata

Tipo	Tipo della Combinazione/Fase
Oggetto	Muro/Paratia
Y	Ordinata sezione, espresso in [m]
M	Momento agente, espresso in [kNm]
M _f	Momento prima fessurazione, espresso in [kNm]
s	Distanza media tra le fessure, espressa in [mm]
ε _{sm}	Deformazione nelle fessure, espressa in [%]
W _{lim}	Apertura limite fessure, espressa in [mm]
W _k	Ampiezza fessure, espressa in [mm]

Oggetto	n° - Tipo	Y	M	M _f	s	ε _{sm}	W _{lim}	W _k
		[m]	[kNm]	[kNm]	[mm]	[%]	[mm]	[mm]
Paratia	6 - SLE - Frequente	13.59	-21.26	-23.17	0.000	0.0000	0.400	0.000

Dichiarazioni secondo N.T.C. 2018 (punto 10.2)

Analisi e verifiche svolte con l'ausilio di codici di calcolo

Il sottoscritto, in qualità di calcolatore delle opere in progetto, dichiara quanto segue.

Tipo di analisi svolta

L'analisi strutturale e le verifiche sono condotte con l'ausilio di un codice di calcolo automatico. La verifica della sicurezza degli elementi strutturali è stata valutata con i metodi della scienza delle costruzioni. L'analisi strutturale è condotta con l'analisi statica non-lineare, utilizzando il metodo degli spostamenti per la valutazione dello stato limite indotto dai carichi statici. L'analisi strutturale sotto le azioni sismiche è condotta con il metodo dell'analisi statica equivalente secondo le disposizioni del capitolo 7 del DM 17/01/2018.

L'analisi strutturale viene effettuata con il metodo degli elementi finiti, schematizzando la struttura in elementi lineari e nodi. Le incognite del problema sono le componenti di spostamento in corrispondenza di ogni nodo (2 spostamenti e 1 rotazioni).

La verifica delle sezioni degli elementi strutturali è eseguita con il metodo degli Stati Limite. Le combinazioni di carico adottate sono esaustive relativamente agli scenari di carico più gravosi cui l'opera sarà soggetta.

Origine e caratteristiche dei codici di calcolo

Titolo	PAC - Analisi e Calcolo Paratie
Versione	16.0
Produttore	Aztec Informatica srl, Casali del Manco - Loc. Casole Bruzio (CS)
Utente	EDILTECNO SERVICE S.R.L.
Licenza	AIU6889A3

Affidabilità dei codici di calcolo

Un attento esame preliminare della documentazione a corredo del software ha consentito di valutarne l'affidabilità. La documentazione fornita dal produttore del software contiene un'esauriente descrizione delle basi teoriche, degli algoritmi impiegati e l'individuazione dei campi d'impiego. La società produttrice Aztec Informatica srl ha verificato l'affidabilità e la robustezza del codice di calcolo attraverso un numero significativo di casi prova in cui i risultati dell'analisi numerica sono stati confrontati con soluzioni teoriche.

Modalità di presentazione dei risultati

La relazione di calcolo strutturale presenta i dati di calcolo tale da garantirne la leggibilità, la corretta interpretazione e la riproducibilità. La relazione di calcolo illustra in modo esaustivo i dati in ingresso ed i risultati delle analisi in forma tabellare.

Informazioni generali sull'elaborazione

Il software prevede una serie di controlli automatici che consentono l'individuazione di errori di modellazione, di non rispetto di limitazioni geometriche e di armatura e di presenza di elementi non verificati. Il codice di calcolo consente di visualizzare e controllare, sia in forma grafica che tabellare, i dati del modello strutturale, in modo da avere una visione consapevole del comportamento corretto del modello strutturale.

Giudizio motivato di accettabilità dei risultati

I risultati delle elaborazioni sono stati sottoposti a controlli dal sottoscritto utente del software. Tale valutazione ha compreso il confronto con i risultati di semplici calcoli, eseguiti con metodi tradizionali. Inoltre sulla base di considerazioni riguardanti gli stati tensionali e deformativi determinati, si è valutata la validità delle scelte operate in sede di schematizzazione e di modellazione della struttura e delle azioni.

In base a quanto sopra, io sottoscritto asserisco che l'elaborazione è corretta ed idonea al caso specifico, pertanto i risultati di calcolo sono da ritenersi validi ed accettabili.

Luogo e data

Il progettista
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