

**E78 GROSSETO - FANO**  
**Tratto Nodo di Arezzo – Selci – Lama (E45)**  
**Adeguamento a quattro corsie del tratto**  
**San Zeno – Arezzo – Palazzo del Pero, 1° lotto**

**PROGETTO DEFINITIVO**

**FI 508**

**ANAS - DIREZIONE PROGETTAZIONE E REALIZZAZIONE LAVORI**

<p><b>IL GEOLOGO</b></p> <p><i>Dott. Geol. Roberto Salucci</i></p> <p>Ordine dei geologi della Regione Lazio n. 633</p>	<p><b>I PROGETTISTI SPECIALISTICI</b></p> <p><i>Ing. Ambrogio Signorelli</i></p> <p>Ordine Ingegneri Provincia di Roma n. A35111</p>	<p><b>PROGETTAZIONE ATI:</b> (Mandataria)</p> <p><b>GP INGENGNERIA</b> <i>GESTIONE PROGETTI INGEGNERIA srl</i></p> <p>(Mandante)</p> <p><b>cooprogetti</b></p> <p><b>engeko</b></p> <p><b>AIM</b> <i>Studio di Architettura e Ingegneria Moderna</i></p>
<p><b>COORDINATORE PER LA SICUREZZA IN FASE DI PROGETTAZIONE</b></p> <p><i>Arch. Santo Salvatore Vermiglio</i></p> <p>Ordine Architetti Provincia di Reggio Calabria n. 1270</p>	<p><i>Ing. Moreno Panfili</i></p> <p>Ordine Ingegneri Provincia di Perugia n. A2687</p> <p><i>Ing. Matteo Bordugo</i></p> <p>Ordine Ingegneri Provincia di Pordenone n. 750A</p>	<p>(Mandante)</p> <p>(Mandante)</p>
<p><b>VISTO: IL RESP. DEL PROCEDIMENTO</b></p> <p><i>Ing. Francesco Pisani</i></p>	<p><i>Ing. Giuseppe Festa</i></p> <p>Ordine Ingegneri Provincia di Roma n. 20629</p>	<p><b>IL PROGETTISTA RESPONSABILE DELL'INTEGRAZIONE DELLE PRESTAZIONI SPECIALISTICHE. (DPR207/10 ART 15 COMMA 12):</b></p> <p><b>Dott. Ing. GIORGIO GUIDUCCI</b> ORDINE INGEGNERI ROMA N° 14035</p>

**STUDI ED INDAGINI**  
**Geotecnica**

**Relazione geotecnica: Tabulati di calcolo**

<p><b>CODICE PROGETTO</b></p> <p>PROGETTO      LIV.PROG      ANNO</p>	<p><b>NOME FILE</b></p> <p>T01GE00GETRE02_A</p>	<p><b>REVISIONE</b></p>	<p><b>SCALA</b></p>
<p><b>DPFI508</b>    <b>D</b>    <b>23</b></p>	<p><b>CODICE ELAB.</b>    T 0 1 G E 0 0 G E T R E 0 2</p>	<p><b>A</b></p>	<p>-</p>
<p><b>D</b></p> <p><b>C</b></p> <p><b>B</b></p>			
<p><b>A</b></p>	<p>Emissione a seguito Istruttoria n°U. 0016028.09-01-2024</p>	<p>Gennaio '24</p>	<p>Colleselli      Bordugo      Guiducci</p>
<p><b>REV.</b></p>	<p><b>DESCRIZIONE</b></p>	<p><b>DATA</b></p>	<p><b>REDATTO      VERIFICATO      APPROVATO</b></p>

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PROGETTAZIONE ATI:



0+300 - sisma

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 0+300 - sisma

### Project Summary

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File Name:	0+300 - sisma.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:00.917s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

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Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left

## Design Standard

Selected Type:	Eurocode 7 (User Defined)
Name:	M1+R2 fronti scavo sisma
Type	Partial Factor
Permanent Actions: Unfavourable	1
Permanent Actions: Favourable	1
Variable Actions: Unfavourable	1
Variable Actions: Favourable	1
Effective cohesion	1
Coefficient of shearing resistance	1
Undrained strength	1
Weight density	1
Shear strength (other models)	1
Earth resistance	1.2
Tensile and plate strength	1
Shear strength	1
Compressive strength	1
Bond strength	1
Seismic Coefficient	1

## Analysis Options

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Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

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Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

# Random Numbers

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Pseudo-random Seed:

10116

Random Number Generation Method:

Park and Miller v.3



## Surface Options

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Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

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Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading

---

1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

# Materials

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**LS**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	10
Friction Angle [deg]	26
Water Surface	Water Table
Hu Value	1

**R**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

# Global Minimums

## Method: bishop simplified

	FS	1.053670
Center:		17.668, 41.754
Radius:		20.328
Left Slip Surface Endpoint:		17.241, 21.431
Right Slip Surface Endpoint:		33.298, 28.758
Resisting Moment:		6576.4 kN-m
Driving Moment:		6241.45 kN-m
Total Slice Area:		29.4568 m <sup>2</sup>
Surface Horizontal Width:		16.0569 m
Surface Average Height:		1.83453 m

## Method: janbu simplified

	FS	1.031730
Center:		17.901, 36.277
Radius:		14.861
Left Slip Surface Endpoint:		17.234, 21.431
Right Slip Surface Endpoint:		30.658, 28.655
Resisting Horizontal Force:		179.886 kN
Driving Horizontal Force:		174.353 kN
Total Slice Area:		18.3595 m <sup>2</sup>
Surface Horizontal Width:		13.4234 m
Surface Average Height:		1.36773 m

## Global Minimum Support Data

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No Supports Present

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces:	5246
Number of Invalid Surfaces:	0

### Method: janbu simplified

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Number of Valid Surfaces:	5185
Number of Invalid Surfaces:	61

#### Error Codes

Error Code -112 reported for 61 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.



# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.05367

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.35728	0.0374194	-0.697835	LS	10	26	7.99616	8.42531	0.226308	0	0.226308	0.128914	0.128914
2	0.35728	0.861023	0.309248	LS	10	26	8.85818	9.3336	2.46102	0	2.46102	2.50883	2.50883
3	0.35728	2.52349	1.31643	LS	10	26	10.6428	11.214	7.08745	0	7.08745	7.33202	7.33202
4	0.35728	4.14344	2.32401	LS	10	26	12.3517	13.0146	11.5176	0	11.5176	12.0188	12.0188
5	0.317995	5.01492	3.27683	R	0	35	8.79196	9.26382	15.8761	0	15.8761	16.3795	16.3795
6	0.317995	6.22985	4.17507	R	0	35	10.813	11.3933	19.5256	0	19.5256	20.3149	20.3149
7	0.317995	7.4129	5.07433	R	0	35	12.7388	13.4225	23.0031	0	23.0031	24.1343	24.1343
8	0.317995	8.56392	5.97485	R	0	35	14.5717	15.3538	26.313	0	26.313	27.8381	27.8381
9	0.317995	9.68278	6.87685	R	0	35	16.3139	17.1895	29.4589	0	29.4589	31.4265	31.4265
10	0.317995	10.7693	7.78057	R	0	35	17.9673	18.9316	32.4447	0	32.4447	34.8997	34.8997
11	0.317995	11.8233	8.68624	R	0	35	19.5337	20.5821	35.2731	0	35.2731	38.2574	38.2574
12	0.317995	12.3211	9.5941	R	0	35	20.1584	21.2403	36.4012	0	36.4012	39.8086	39.8086
13	0.317995	11.9721	10.5044	R	0	35	19.3975	20.4386	35.0272	0	35.0272	38.6238	38.6238
14	0.317995	11.5803	11.4174	R	0	35	18.5811	19.5784	33.5531	0	33.5531	37.3056	37.3056
15	0.317995	11.155	12.3333	R	0	35	17.7254	18.6767	32.0076	0	32.0076	35.8832	35.8832
16	0.317995	10.6958	13.2525	R	0	35	16.8309	17.7342	30.3925	0	30.3925	34.3564	34.3564
17	0.317995	10.2022	14.1751	R	0	35	15.8983	16.7516	28.7086	0	28.7086	32.7241	32.7241
18	0.317995	9.91058	15.1015	R	0	35	15.2936	16.1144	27.6165	0	27.6165	31.7434	31.7434
19	0.317995	10.584	16.032	R	0	35	16.1733	17.0413	29.205	0	29.205	33.8524	33.8524
20	0.317995	11.3338	16.9669	R	0	35	17.1493	18.0697	30.9674	0	30.9674	36.1996	36.1996
21	0.317995	12.0475	17.9064	R	0	35	18.0496	19.0183	32.593	0	32.593	38.4251	38.4251
22	0.317995	12.7245	18.8509	R	0	35	18.8748	19.8878	34.0833	0	34.0833	40.5275	40.5275
23	0.317995	13.3641	19.8008	R	0	35	19.6257	20.679	35.4391	0	35.4391	42.5051	42.5051
24	0.317995	13.9658	20.7563	R	0	35	20.3028	21.3925	36.662	0	36.662	44.3566	44.3566
25	0.317995	14.5287	21.718	R	0	35	20.9068	22.0289	37.7526	0	37.7526	46.08	46.08
26	0.317995	15.0522	22.6861	R	0	35	21.438	22.5886	38.712	0	38.712	47.6736	47.6736
27	0.317995	15.5353	23.6611	R	0	35	21.8969	23.0721	39.5405	0	39.5405	49.1349	49.1349
28	0.317995	15.9773	24.6435	R	0	35	22.2837	23.4797	40.239	0	40.239	50.4617	50.4617
29	0.317995	16.3772	25.6336	R	0	35	22.5987	23.8116	40.8076	0	40.8076	51.6514	51.6514
30	0.317995	16.7338	26.6321	R	0	35	22.842	24.0679	41.247	0	41.247	52.7014	52.7014
31	0.317995	17.0461	27.6393	R	0	35	23.0138	24.2489	41.5571	0	41.5571	53.6085	53.6085
32	0.317995	17.313	28.6559	R	0	35	23.1139	24.3544	41.7382	0	41.7382	54.3695	54.3695
33	0.317995	17.5329	29.6824	R	0	35	23.1424	24.3845	41.7897	0	41.7897	54.9805	54.9805
34	0.317995	17.7046	30.7196	R	0	35	23.0994	24.3391	41.7118	0	41.7118	55.4379	55.4379
35	0.317995	17.8265	31.768	R	0	35	22.9842	24.2178	41.504	0	41.504	55.7371	55.7371
36	0.317995	17.8969	32.8285	R	0	35	22.7969	24.0204	41.1658	0	41.1658	55.8734	55.8734
37	0.317995	17.9139	33.9017	R	0	35	22.5371	23.7467	40.6966	0	40.6966	55.8419	55.8419
38	0.317995	17.8755	34.9887	R	0	35	22.2043	23.396	40.0955	0	40.0955	55.6365	55.6365
39	0.317995	17.7796	36.0903	R	0	35	21.798	22.9679	39.362	0	39.362	55.2517	55.2517
40	0.317995	17.6237	37.2076	R	0	35	21.3178	22.4619	38.4947	0	38.4947	54.6802	54.6802
41	0.317995	17.4048	38.3417	R	0	35	20.7625	21.8768	37.4919	0	37.4919	53.9136	53.9136
42	0.317995	16.442	39.4938	R	0	35	19.3341	20.3718	34.9127	0	34.9127	50.847	50.847
43	0.317995	14.7803	40.6654	R	0	35	17.1234	18.0424	30.9206	0	30.9206	45.631	45.631
44	0.317995	13.0461	41.8579	R	0	35	14.8824	15.6811	26.8737	0	26.8737	40.2072	40.2072
45	0.317995	11.2352	43.0731	R	0	35	12.6118	13.2887	22.7738	0	22.7738	34.5646	34.5646
46	0.317995	9.34303	44.313	R	0	35	10.3128	10.8663	18.6224	0	18.6224	28.6908	28.6908
47	0.317995	7.39324	45.5796	R	0	35	9.66156	10.1801	17.4464	0	17.4464	27.3054	27.3054
48	0.317995	5.40476	46.8755	R	0	35	7.6975	8.11062	13.8998	0	13.8998	22.1185	22.1185
49	0.317995	3.31825	48.2035	R	0	35	5.37007	5.65828	9.69702	0	9.69702	15.7039	15.7039
50	0.317995	1.12464	49.5669	R	0	35	3.01678	3.17869	5.44756	0	5.44756	8.98812	8.98812

**Global Minimum Query (janbu simplified) - Safety Factor: 1.03173**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.276686	0.0389476	-2.03603	LS	10	26	8.27388	8.53641	0.499663	0	0.499663	0.205523	0.205523
2	0.276686	0.306517	-0.968819	LS	10	26	8.60179	8.87472	1.33202	0	1.33202	1.18656	1.18656
3	0.276686	1.27156	0.0980531	LS	10	26	9.96091	10.277	4.78206	0	4.78206	4.7991	4.7991
4	0.276686	2.27392	1.16496	LS	10	26	11.3513	11.7115	8.31157	0	8.31157	8.5424	8.5424
5	0.276686	3.24861	2.23227	LS	10	26	12.6772	13.0795	11.6772	0	11.6772	12.1714	12.1714
6	0.276686	4.19619	3.30035	LS	10	26	13.9408	14.3832	14.8848	0	14.8848	15.6887	15.6887
7	0.267347	4.92721	4.35152	R	0	35	10.358	10.6867	18.3146	0	18.3146	19.1028	19.1028
8	0.267347	5.75728	5.38608	R	0	35	11.9627	12.3423	21.152	0	21.152	22.2799	22.2799
9	0.267347	6.56128	6.42241	R	0	35	13.4764	13.904	23.8283	0	23.8283	25.3453	25.3453
10	0.267347	7.33906	7.46085	R	0	35	14.9013	15.3741	26.3477	0	26.3477	28.2992	28.2992
11	0.267347	8.09047	8.50177	R	0	35	16.2396	16.7549	28.7141	0	28.7141	31.1417	31.1417
12	0.267347	8.81528	9.54552	R	0	35	17.4933	18.0484	30.931	0	30.931	33.8726	33.8726
13	0.267347	9.51326	10.5925	R	0	35	18.6644	19.2566	33.0015	0	33.0015	36.492	36.492
14	0.267347	10.119	11.643	R	0	35	19.6278	20.2506	34.705	0	34.705	38.7494	38.7494
15	0.267347	9.99943	12.6976	R	0	35	19.1762	19.7847	33.9066	0	33.9066	38.2273	38.2273
16	0.267347	9.6634	13.7565	R	0	35	18.3218	18.9031	32.3957	0	32.3957	36.8812	36.8812
17	0.267347	9.29931	14.8202	R	0	35	17.431	17.9841	30.8208	0	30.8208	35.4328	35.4328
18	0.267347	8.90674	15.8892	R	0	35	16.5048	17.0285	29.1831	0	29.1831	33.8813	33.8813
19	0.267347	8.48525	16.9639	R	0	35	15.5437	16.0369	27.4837	0	27.4837	32.2252	32.2252
20	0.267347	8.03437	18.0448	R	0	35	14.5483	15.0099	25.7236	0	25.7236	30.4632	30.4632
21	0.267347	7.55357	19.1324	R	0	35	13.519	13.948	23.9037	0	23.9037	28.5937	28.5937
22	0.267347	7.41924	20.2272	R	0	35	13.1234	13.5398	23.2042	0	23.2042	28.0397	28.0397
23	0.267347	7.82441	21.3298	R	0	35	13.6767	14.1107	24.1826	0	24.1826	29.5231	29.5231
24	0.267347	8.20359	22.4407	R	0	35	14.1685	14.6181	25.0521	0	25.0521	30.9037	30.9037
25	0.267347	8.55019	23.5606	R	0	35	14.5889	15.0518	25.7954	0	25.7954	32.1572	32.1572
26	0.267347	8.86339	24.6901	R	0	35	14.9383	15.4123	26.4132	0	26.4132	33.2809	33.2809
27	0.267347	9.14228	25.8299	R	0	35	15.217	15.6998	26.906	0	26.906	34.272	34.272
28	0.267347	9.38589	26.9809	R	0	35	15.4254	15.9148	27.2744	0	27.2744	35.1275	35.1275
29	0.267347	9.59314	28.1437	R	0	35	15.5634	16.0572	27.5185	0	27.5185	35.8438	35.8438
30	0.267347	9.76285	29.3194	R	0	35	15.6312	16.1272	27.6384	0	27.6384	36.4171	36.4171
31	0.267347	9.89374	30.5087	R	0	35	15.6287	16.1246	27.634	0	27.634	36.8432	36.8432
32	0.267347	9.9844	31.7128	R	0	35	15.5559	16.0495	27.5052	0	27.5052	37.1175	37.1175
33	0.267347	10.0332	32.9327	R	0	35	15.4125	15.9015	27.2515	0	27.2515	37.2348	37.2348
34	0.267347	10.0386	34.1697	R	0	35	15.1981	15.6803	26.8725	0	26.8725	37.1893	37.1893
35	0.267347	9.99842	35.4251	R	0	35	14.9123	15.3855	26.3672	0	26.3672	36.9747	36.9747
36	0.267347	9.91072	36.7004	R	0	35	14.5547	15.0165	25.735	0	25.735	36.5839	36.5839
37	0.267347	9.77306	37.9973	R	0	35	14.1247	14.5729	24.9747	0	24.9747	36.009	36.009
38	0.267347	9.58279	39.3175	R	0	35	13.6216	14.0538	24.085	0	24.085	35.2411	35.2411
39	0.267347	9.33691	40.6631	R	0	35	13.0445	13.4584	23.0647	0	23.0647	34.2702	34.2702
40	0.267347	9.03201	42.0365	R	0	35	12.3927	12.7859	21.9122	0	21.9122	33.0849	33.0849
41	0.267347	8.66425	43.4403	R	0	35	11.6652	12.0353	20.6257	0	20.6257	31.6725	31.6725
42	0.267347	8.22917	44.8774	R	0	35	10.8608	11.2054	19.2036	0	19.2036	30.018	30.018
43	0.267347	7.72166	46.3515	R	0	35	9.97858	10.2952	17.6437	0	17.6437	28.1045	28.1045
44	0.267347	7.13576	47.8664	R	0	35	9.0174	9.30352	15.9442	0	15.9442	25.9122	25.9122
45	0.267347	6.46443	49.4271	R	0	35	7.97612	8.2292	14.103	0	14.103	23.4178	23.4178
46	0.267347	5.69932	51.0392	R	0	35	6.85371	7.07118	12.1184	0	12.1184	20.5939	20.5939
47	0.267347	4.83035	52.7096	R	0	35	5.64933	5.82858	9.98889	0	9.98889	17.4073	17.4073
48	0.267347	3.84519	54.4467	R	0	35	4.36251	4.50093	7.71359	0	7.71359	13.8176	13.8176
49	0.267347	2.72845	56.2611	R	0	35	2.99343	3.08841	5.29285	0	5.29285	9.77471	9.77471
50	0.267347	1.12653	58.1662	R	0	35	1.19049	1.22826	2.10496	0	2.10496	4.02249	4.02249

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.05367

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	17.2415	21.4309	0	0	0
2	17.5987	21.4265	2.85415	0	0
3	17.956	21.4285	5.93558	0	0
4	18.3133	21.4367	9.44982	0	0
5	18.6706	21.4512	13.3183	0	0
6	18.9886	21.4694	15.3684	0	0
7	19.3066	21.4926	17.7864	0	0
8	19.6246	21.5208	20.5127	0	0
9	19.9426	21.5541	23.4909	0	0
10	20.2606	21.5925	26.6672	0	0
11	20.5786	21.6359	29.9904	0	0
12	20.8965	21.6845	33.4119	0	0
13	21.2145	21.7383	36.7437	0	0
14	21.5325	21.7972	39.7566	0	0
15	21.8505	21.8614	42.4561	0	0
16	22.1685	21.931	44.8516	0	0
17	22.4865	22.0059	46.9537	0	0
18	22.8045	22.0862	48.7746	0	0
19	23.1225	22.172	50.3657	0	0
20	23.4405	22.2634	51.8764	0	0
21	23.7585	22.3604	53.2934	0	0
22	24.0765	22.4631	54.5873	0	0
23	24.3945	22.5717	55.7304	0	0
24	24.7125	22.6862	56.6971	0	0
25	25.0305	22.8067	57.4633	0	0
26	25.3485	22.9334	58.007	0	0
27	25.6665	23.0663	58.3078	0	0
28	25.9845	23.2056	58.3472	0	0
29	26.3025	23.3515	58.1085	0	0
30	26.6205	23.5041	57.577	0	0
31	26.9384	23.6636	56.7397	0	0
32	27.2564	23.8301	55.5859	0	0
33	27.5744	24.0039	54.1066	0	0
34	27.8924	24.1851	52.295	0	0
35	28.2104	24.3741	50.1469	0	0
36	28.5284	24.571	47.6598	0	0
37	28.8464	24.7761	44.8344	0	0
38	29.1644	24.9898	41.6734	0	0
39	29.4824	25.2124	38.1828	0	0
40	29.8004	25.4442	34.3716	0	0
41	30.1184	25.6857	30.2521	0	0
42	30.4364	25.9372	25.8402	0	0
43	30.7544	26.1992	21.3417	0	0
44	31.0724	26.4724	16.9942	0	0
45	31.3904	26.7573	12.8827	0	0
46	31.7084	27.0546	9.09985	0	0
47	32.0264	27.3651	5.74723	0	0
48	32.3444	27.6896	2.58252	0	0
49	32.6624	28.0291	-0.0638911	0	0
50	32.9803	28.3848	-1.99038	0	0
51	33.2983	28.758	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.03173**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	17.2342	21.4309	0	0	0
2	17.5109	21.4211	2.28802	0	0
3	17.7876	21.4164	4.64363	0	0
4	18.0643	21.4169	7.27854	0	0
5	18.341	21.4225	10.162	0	0
6	18.6177	21.4333	13.244	0	0
7	18.8943	21.4493	16.4775	0	0
8	19.1617	21.4696	18.4226	0	0
9	19.429	21.4948	20.56	0	0
10	19.6964	21.5249	22.8446	0	0
11	19.9637	21.5599	25.2335	0	0
12	20.2311	21.5999	27.6864	0	0
13	20.4984	21.6448	30.1651	0	0
14	20.7658	21.6948	32.6336	0	0
15	21.0331	21.7499	35.0424	0	0
16	21.3005	21.8102	37.2108	0	0
17	21.5678	21.8756	39.1038	0	0
18	21.8352	21.9463	40.7322	0	0
19	22.1025	22.0224	42.1082	0	0
20	22.3699	22.104	43.2455	0	0
21	22.6372	22.1911	44.1589	0	0
22	22.9046	22.2838	44.8647	0	0
23	23.1719	22.3824	45.4082	0	0
24	23.4392	22.4867	45.8239	0	0
25	23.7066	22.5972	46.0948	0	0
26	23.9739	22.7137	46.2053	0	0
27	24.2413	22.8367	46.1414	0	0
28	24.5086	22.9661	45.891	0	0
29	24.776	23.1022	45.4438	0	0
30	25.0433	23.2452	44.7914	0	0
31	25.3107	23.3953	43.9274	0	0
32	25.578	23.5529	42.8473	0	0
33	25.8454	23.7181	41.5489	0	0
34	26.1127	23.8912	40.0324	0	0
35	26.3801	24.0727	38.3005	0	0
36	26.6474	24.2629	36.3586	0	0
37	26.9148	24.4622	34.215	0	0
38	27.1821	24.671	31.8815	0	0
39	27.4495	24.89	29.3734	0	0
40	27.7168	25.1196	26.7102	0	0
41	27.9841	25.3607	23.9162	0	0
42	28.2515	25.6138	21.0209	0	0
43	28.5188	25.88	18.0602	0	0
44	28.7862	26.1603	15.0773	0	0
45	29.0535	26.4558	12.124	0	0
46	29.3209	26.7681	9.26246	0	0
47	29.5882	27.0987	6.56759	0	0
48	29.8556	27.4497	4.12988	0	0
49	30.1229	27.8238	2.05951	0	0
50	30.3903	28.2241	0.49196	0	0
51	30.6576	28.6547	0	0	0

## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
External Boundary	76.0589, 21.9961
	75.7698, 22.0066
	72.3341, 21.9729
	68.0222, 24.8482
	66.0222, 24.8479
	58.5257, 29.8469
	56.6757, 29.8296
	47.4255, 29.2518
	45.5254, 29.1332
	42.7, 29.3357
	32.0804, 28.6832
	30.4304, 28.6502
	22.9342, 23.6502
	20.9342, 23.6502
	17.6112, 21.4375
	17.2376, 21.4308
	15.9474, 21.4756
	11.1122, 21.561
	8.93709, 21.6424
	6.29274, 21.6885
	6.19427, 21.689
	5.2008, 21.6914
	4.27085, 21.7402
	4.13531, 21.745
	3.99932, 21.7445
	3.09398, 21.7829
	2.70705, 21.8111
	1.86326, 21.8515
	1.1454, 21.8652
	0.111772, 21.8777
	4.3e-15, 21.8849
	0, 18.8849
	0, 0
94.1283, 0	
94.1283, 18.8849	
94.1283, 22.4355	
80, 22.092	
	17.6112, 21.4375
	18.4712, 21.4529
	19.0023, 21.4483
	20.0385, 21.4461
	27.0265, 23.1073
	27.2046, 23.1521



Material Boundary

27.8331, 23.1726  
28.2016, 23.3156  
28.5732, 23.4495  
28.646, 23.4684  
28.727, 23.4684  
30.0369, 24.143  
30.7844, 24.5862  
31.5562, 24.9787  
31.7922, 25.088  
32.3012, 25.4684  
32.4034, 25.4684  
32.4952, 25.4684  
32.5288, 25.4684  
32.7761, 25.4684  
32.9139, 25.4684  
33.0912, 25.4684  
33.199, 25.4684  
33.3059, 25.4684  
33.3888, 25.4684  
33.4424, 25.4684  
33.4738, 25.4684  
33.5212, 25.4684  
33.5759, 25.4684  
33.6109, 25.4684  
33.6346, 25.4684  
33.667, 25.4684  
33.7003, 25.4684  
33.8153, 25.4595  
33.9413, 25.4593  
35.1447, 25.4569  
37.1451, 25.8923  
37.669, 25.917  
37.8579, 25.9247  
39.0373, 25.9351  
39.8357, 25.9234  
40.0686, 25.9238  
40.643, 25.9297  
41.7734, 25.9423  
42, 25.9327  
42.2645, 25.9214  
42.4844, 25.9161  
42.8091, 25.9167  
43.1387, 25.9185  
43.3692, 25.9239  
46.2345, 25.9178  
46.896, 25.9345  
47.3401, 25.9476  
48.4567, 25.9194  
48.6316, 25.9098  
49.4094, 25.8493  
49.509, 25.5516  
50.4566, 25.5139  
50.6891, 25.4982  
50.9532, 25.4684  
51.0618, 25.4684  
52.2904, 24.7313  
52.7107, 24.5473  
54.7231, 23.4684  
54.7718, 23.4203



	55.0054, 23.0899 55.0547, 23.0055 55.2302, 22.6681 55.3682, 22.5226 55.4624, 22.1644 62.8391, 21.7215 63.0391, 21.7095 63.0477, 21.7229 63.0588, 21.721 63.0967, 21.7077 63.2923, 21.7024 63.3066, 21.7023 63.3287, 21.7022 63.3872, 21.7017 72.3341, 21.9729
Material Boundary	0, 18.8849 94.1283, 18.8849
Material Boundary	20.0385, 21.4461 62.8391, 21.7215 63.0477, 21.7229

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	-7.1e-15, 21.3995 94.1283, 21.3995	Assigned to:  LS  R
Distributed Load	56.6757, 29.8296 47.4255, 29.2518 45.5254, 29.1332 42.7, 29.3357 32.0804, 28.6832	Constant DistributionOrientation: Normal to boundaryMagnitude: 6 kN/m2Creates Excess Pore Pressure: No



0+300

Report Creation Date: 2023/09/13, 14:52:11

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# Settle3 Analysis Information

## 0+300

### Project Settings

---

Document Name	0+300.s3z
Date Created	02/08/2023, 10:45:23
Last saved with Settle3 version	5.020
Stress Computation Method	Boussinesq
Stress Units	Metric, stress as kPa
Settlement Units	millimeters

### Advanced Settings

---

Start of secondary consolidation (% of primary)	95
Min. stress for secondary consolidation (% of initial)	1
Reset time when load changes for secondary consolidation	No
Minimum settlement ratio for subgrade modulus	0.9
Use average poisson's ratio to calculate layered stresses	
Update Cv in each time step (improves consolidation accuracy)	
Ignore negative effective stresses in settlement calculations	
Add field points to load edges	

### Soil Profile

---

Layer Option	Horizontal Soil Layers
Vertical Axis	Elevation
Ground Elevation (m)	0

## Stage Settings

---

	Stage #	Name
1		Stage 1
2		Stage 2
3		Stage 3

## Results (relative to Stage: Stage 2)

---

Time taken to compute: 0 seconds

### Stage: Stage 1

---

Data Type	Minimum	Maximum
Total Settlement [mm]	0	0
Total Consolidation Settlement [mm]	0	0
Virgin Consolidation Settlement [mm]	0	0
Recompression Consolidation Settlement [mm]	0	0
Immediate Settlement [mm]	0	0
Loading Stress ZZ [kPa]	0	0
Loading Stress XX [kPa]	0	0
Loading Stress YY [kPa]	0	0
Effective Stress ZZ [kPa]	0	0
Effective Stress XX [kPa]	0	0
Effective Stress YY [kPa]	0	0
Total Stress ZZ [kPa]	0	0
Total Stress XX [kPa]	0	0
Total Stress YY [kPa]	0	0
Modulus of Subgrade Reaction (Total) [kPa/m]	0	0
Modulus of Subgrade Reaction (Immediate) [kPa/m]	0	0
Modulus of Subgrade Reaction (Consolidation) [kPa/m]	0	0
Total Strain	0	0
Pore Water Pressure [kPa]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [kPa]	0	0
Over-consolidation Ratio	0	0
Void Ratio	0	0
Hydroconsolidation Settlement [mm]	0	0
Undrained Shear Strength	0	0

### Stage: Stage 2

---



<b>Data Type</b>	<b>Minimum</b>	<b>Maximum</b>
Total Settlement [mm]	0	0
Total Consolidation Settlement [mm]	0	0
Virgin Consolidation Settlement [mm]	0	0
Recompression Consolidation Settlement [mm]	0	0
Immediate Settlement [mm]	0	0
Loading Stress ZZ [kPa]	0	0
Loading Stress XX [kPa]	0	0
Loading Stress YY [kPa]	0	0
Effective Stress ZZ [kPa]	0	0
Effective Stress XX [kPa]	0	0
Effective Stress YY [kPa]	0	0
Total Stress ZZ [kPa]	0	0
Total Stress XX [kPa]	0	0
Total Stress YY [kPa]	0	0
Modulus of Subgrade Reaction (Total) [kPa/m]	0	0
Modulus of Subgrade Reaction (Immediate) [kPa/m]	0	0
Modulus of Subgrade Reaction (Consolidation) [kPa/m]	0	0
Total Strain	0	0
Pore Water Pressure [kPa]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [kPa]	0	0
Over-consolidation Ratio	0	0
Void Ratio	0	0
Hydroconsolidation Settlement [mm]	0	0
Undrained Shear Strength	0	0

### Stage: Stage 3

---

<b>Data Type</b>	<b>Minimum</b>	<b>Maximum</b>
Total Settlement [mm]	0	133.006
Total Consolidation Settlement [mm]	0	0
Virgin Consolidation Settlement [mm]	0	0
Recompression Consolidation Settlement [mm]	0	0
Immediate Settlement [mm]	0	133.006
Loading Stress ZZ [kPa]	-0.124816	149.567
Loading Stress XX [kPa]	-28.668	125.208
Loading Stress YY [kPa]	-47.4394	213.497
Effective Stress ZZ [kPa]	-0.124816	149.567
Effective Stress XX [kPa]	-28.668	125.208
Effective Stress YY [kPa]	-47.4394	213.497
Total Stress ZZ [kPa]	-0.124816	149.567
Total Stress XX [kPa]	-28.668	125.208
Total Stress YY [kPa]	-47.4394	213.497
Modulus of Subgrade Reaction (Total) [kPa/m]	0	0
Modulus of Subgrade Reaction (Immediate) [kPa/m]	0	0
Modulus of Subgrade Reaction (Consolidation) [kPa/m]	0	0
Total Strain	-5.09464e-07	0.0186907
Pore Water Pressure [kPa]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [kPa]	0	149.525
Over-consolidation Ratio	-0.0143963	0.0168671
Void Ratio	0	0
Hydroconsolidation Settlement [mm]	0	0
Undrained Shear Strength	-5.23021e-07	3.20844

# Embankments

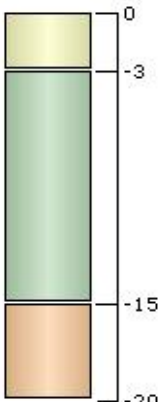
---

## **1. Embankment: "Embankment Load 1"**





Label	Embankment Load 1		
Center Line	(0, 0) to (50.2, 0)		
Near End Angle	90 degrees		
Far End Angle	90 degrees		
Number of Layers	2		
	<b>Layer</b>	<b>Stage</b>	<b>Unit Weight (kN/m3)</b>
1		Stage 3	19
2		Stage 1	19

## Soil Layers

Layer #	Type	Thickness [m]	Elevation [m]
1	LS_1	3	0
2	LS_2	12	-3
3	LS_3	5	-15
4	LS_4	0	-20



## Soil Properties

Property	LS_1	LS_2	LS_3	LS_4
Color				
Unit Weight [kN/m <sup>3</sup> ]	19.5	19.5	19.5	19.5
Saturated Unit Weight [kN/m <sup>3</sup> ]	19.5	19.5	19.5	19.5
K <sub>0</sub>	1	1	1	1
Immediate Settlement	Enabled	Enabled	Enabled	Enabled
Es [kPa]	8000	20000	25000	24000
E <sub>sur</sub> [kPa]	8000	20000	25000	24000
Undrained Su A [kN/m <sup>2</sup> ]	0	0	0	0
Undrained Su S	0.2	0.2	0.2	0.2
Undrained Su m	0.8	0.8	0.8	0.8
Piezo Line ID	1	0	0	0

# Groundwater

---

Groundwater method  
Water Unit Weight

Piezometric Lines  
9.81 kN/m<sup>3</sup>

## Piezometric Line Entities

---

ID	Elevation (m)
1	0 m

# Query

---

## Field Point Grid

---

Number of points 483  
Expansion Factor 2

### **Grid Coordinates**

	X [m]	Y [m]
75.3	22.76	
75.3	-68.2	
-25.1	-68.2	
-25.1	22.76	



0+650

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027



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# Slide2 Analysis Information

## 0+650

### Project Summary

---

File Name:	0+650.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:02.806s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

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Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

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Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

# Random Numbers

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Pseudo-random Seed:

10116

Random Number Generation Method:

Park and Miller v.3

## Surface Options

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Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined






## Seismic Loading

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Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Materials

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<b>AC</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>AC alt</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>LS</b>	
Color	
Strength Type	Undrained
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Cohesion Type	Constant
Water Surface	Water Table
Hu Value	1

# Global Minimums

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## Method: bishop simplified

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FS	1.935460
Center:	109.790, 92.858
Radius:	13.027
Left Slip Surface Endpoint:	109.082, 79.850
Right Slip Surface Endpoint:	120.952, 86.141
Resisting Moment:	4807.48 kN-m
Driving Moment:	2483.89 kN-m
Total Slice Area:	22.2507 m <sup>2</sup>
Surface Horizontal Width:	11.8699 m
Surface Average Height:	1.87455 m

## Method: janbu simplified

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FS	1.903520
Center:	173.315, 119.685
Radius:	22.319
Left Slip Surface Endpoint:	168.277, 97.942
Right Slip Surface Endpoint:	191.742, 107.092
Resisting Horizontal Force:	867.99 kN
Driving Horizontal Force:	455.992 kN
Total Slice Area:	73.9424 m <sup>2</sup>
Surface Horizontal Width:	23.4652 m
Surface Average Height:	3.15116 m

## Global Minimum Support Data

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No Supports Present

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces: 14467

Number of Invalid Surfaces: 121

#### Error Codes

Error Code -112 reported for 121 surfaces

### Method: janbu simplified

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Number of Valid Surfaces: 14512

Number of Invalid Surfaces: 76

#### Error Codes

Error Code -108 reported for 50 surfaces

Error Code -111 reported for 26 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.93546

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.237397	0.372659	-2.59171	AC alt	16	24.7913	7.94152	15.3705	1.96479	0	1.96479	1.60532	1.60532
2	0.237397	1.10794	-1.54687	AC alt	16	24.7913	8.58302	16.6121	4.92177	0	4.92177	4.68999	4.68999
3	0.237397	1.82318	-0.502538	AC alt	16	24.7913	9.20062	17.8074	7.76854	0	7.76854	7.68784	7.68784
4	0.237397	2.51838	0.541624	AC alt	16	24.7913	9.79462	18.9571	10.5065	0	10.5065	10.5991	10.5991
5	0.237397	3.19354	1.58597	AC alt	16	24.7913	10.3653	20.0616	13.1369	0	13.1369	13.4239	13.4239
6	0.237397	3.84865	2.63084	AC alt	16	24.7913	10.9128	21.1213	15.6608	0	15.6608	16.1623	16.1623
7	0.237397	4.48367	3.67658	AC alt	16	24.7913	11.4375	22.1368	18.0792	0	18.0792	18.8141	18.8141
8	0.237397	5.09853	4.72356	AC alt	16	24.7913	11.9394	23.1082	20.3927	0	20.3927	21.3792	21.3792
9	0.237397	5.69316	5.77211	AC alt	16	24.7913	12.4187	24.0359	22.6021	0	22.6021	23.8574	23.8574
10	0.237397	6.26745	6.82262	AC alt	16	24.7913	12.8755	24.9201	24.7079	0	24.7079	26.2483	26.2483
11	0.237397	6.82127	7.87543	AC alt	16	24.7913	13.31	25.761	26.7104	0	26.7104	28.5515	28.5515
12	0.237397	7.35449	8.93093	AC alt	16	24.7913	13.7221	26.5586	28.61	0	28.61	30.7664	30.7664
13	0.237397	7.86693	9.98949	AC alt	16	24.7913	14.1119	27.313	30.4068	0	30.4068	32.8924	32.8924
14	0.237397	8.35839	11.0515	AC alt	16	24.7913	14.4794	28.0243	32.1007	0	32.1007	34.9288	34.9288
15	0.237397	8.82867	12.1174	AC alt	16	24.7913	14.8246	28.6924	33.6918	0	33.6918	36.8746	36.8746
16	0.237397	9.27752	13.1875	AC alt	16	24.7913	15.1474	29.3172	35.1798	0	35.1798	38.7291	38.7291
17	0.237397	9.70466	14.2624	AC alt	16	24.7913	15.4477	29.8985	36.5643	0	36.5643	40.4911	40.4911
18	0.237397	10.1098	15.3424	AC alt	16	24.7913	15.7256	30.4362	37.8447	0	37.8447	42.1593	42.1593
19	0.237397	10.4926	16.4281	AC alt	16	24.7913	15.9806	30.9299	39.0206	0	39.0206	43.7325	43.7325
20	0.237397	10.8527	17.5198	AC alt	16	24.7913	16.2129	31.3794	40.0911	0	40.0911	45.2091	45.2091
21	0.237397	11.1897	18.6181	AC alt	16	24.7913	16.4221	31.7843	41.0552	0	41.0552	46.5876	46.5876
22	0.237397	11.5032	19.7236	AC alt	16	24.7913	16.6079	32.144	41.9123	0	41.9123	47.8666	47.8666
23	0.237397	11.7926	20.8368	AC alt	16	24.7913	16.7703	32.4582	42.6605	0	42.6605	49.0433	49.0433
24	0.237397	12.0575	21.9583	AC alt	16	24.7913	16.9088	32.7263	43.2987	0	43.2987	50.116	50.116
25	0.237397	12.2973	23.0887	AC alt	16	24.7913	17.0231	32.9475	43.8255	0	43.8255	51.0825	51.0825
26	0.237397	12.5113	24.2287	AC alt	16	24.7913	17.1128	33.1212	44.2391	0	44.2391	51.9403	51.9403
27	0.237397	12.6989	25.379	AC alt	16	24.7913	17.1776	33.2465	44.5377	0	44.5377	52.6865	52.6865
28	0.237397	12.8594	26.5404	AC alt	16	24.7913	17.2168	33.3225	44.7187	0	44.7187	53.3179	53.3179
29	0.237397	12.9919	27.7137	AC alt	16	24.7913	17.2301	33.3482	44.78	0	44.78	53.8313	53.8313
30	0.237397	13.0955	28.8997	AC alt	16	24.7913	17.2168	33.3225	44.7187	0	44.7187	54.2228	54.2228
31	0.237397	13.1401	30.0995	AC alt	16	24.7913	17.153	33.1989	44.4245	0	44.4245	54.3675	54.3675
32	0.237397	13.0894	31.314	AC alt	16	24.7913	17.0101	32.9224	43.7658	0	43.7658	54.1138	54.1138
33	0.237397	13.0043	32.5444	AC alt	16	24.7913	16.8377	32.5886	42.9709	0	42.9709	53.716	53.716
34	0.237397	12.8857	33.7919	AC alt	16	24.7913	16.6366	32.1994	42.0441	0	42.0441	53.1779	53.1779
35	0.237397	12.7322	35.0578	AC alt	16	24.7913	16.406	31.7532	40.9812	0	40.9812	52.4935	52.4935
36	0.237397	12.5421	36.3437	AC alt	16	24.7913	16.145	31.248	39.7782	0	39.7782	51.6569	51.6569
37	0.237397	12.3136	37.6513	AC alt	16	24.7913	15.8523	30.6815	38.429	0	38.429	50.6596	50.6596
38	0.237397	12.0448	38.9823	AC alt	16	24.7913	15.5268	30.0515	36.9287	0	36.9287	49.4941	49.4941
39	0.237397	11.6766	40.3388	AC alt	16	24.7913	15.1239	29.2718	35.0717	0	35.0717	47.9153	47.9153
40	0.237397	11.0811	41.7232	AC alt	16	24.7913	14.5489	28.1589	32.4212	0	32.4212	45.3944	45.3944
41	0.237397	10.4237	43.1381	AC alt	16	24.7913	13.9294	26.9597	29.5653	0	29.5653	42.6175	42.6175
42	0.237397	9.71471	44.5866	AC alt	16	24.7913	13.2739	25.6911	26.544	0	26.544	39.6277	39.6277
43	0.237397	8.95012	46.0721	AC alt	16	24.7913	12.5807	24.3494	23.3487	0	23.3487	36.4093	36.4093
44	0.237397	8.12114	47.5989	AC alt	16	24.7913	11.8445	22.9246	19.9553	0	19.9553	32.9262	32.9262
45	0.237397	7.22303	49.1716	AC alt	16	24.7913	11.0635	21.4129	16.3552	0	16.3552	29.1595	29.1595
46	0.237397	6.24453	50.7961	AC alt	16	24.7913	10.2315	19.8026	12.5202	0	12.5202	25.0635	25.0635
47	0.237397	4.97945	52.4792	AC alt	16	24.7913	9.20727	17.8203	7.79915	0	7.79915	19.7893	19.7893
48	0.237397	3.62256	54.2296	AC alt	16	24.7913	8.13408	15.7432	2.85238	0	2.85238	14.1428	14.1428
49	0.237397	2.2555	56.0577	AC alt	16	24.7913	7.07159	13.6868	-2.0451	0	-2.0451	8.46178	8.46178
50	0.237397	0.772554	57.9773	AC alt	16	24.7913	5.95232	11.5205	-7.20431	0	-7.20431	2.313	2.313

## Global Minimum Query (janbu simplified) - Safety Factor: 1.90352

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.469303	0.930074	-12.4277	AC alt	16	24.7913	8.5349	16.2464	4.05072	0	4.05072	2.16988	2.16988
2	0.469303	3.44164	-11.1968	AC alt	16	24.7913	9.7262	18.514	9.45128	0	9.45128	7.52601	7.52601
3	0.469303	6.39743	-9.9711	AC alt	16	24.7913	11.1228	21.1725	15.7828	0	15.7828	13.8273	13.8273
4	0.469303	9.27815	-8.75001	AC alt	16	24.7913	12.468	23.7331	21.8809	0	21.8809	19.9619	19.9619
5	0.469303	11.9082	-7.53291	AC alt	16	24.7913	13.6774	26.0352	27.3636	0	27.3636	25.5549	25.5549
6	0.469303	14.9728	-6.31922	AC alt	16	24.7913	15.0844	28.7134	33.7419	0	33.7419	32.0715	32.0715
7	0.469303	17.7523	-5.10838	AC alt	16	24.7913	16.3399	31.1033	39.4336	0	39.4336	37.9729	37.9729
8	0.469303	20.8334	-3.89982	AC alt	16	24.7913	17.7269	33.7435	45.7214	0	45.7214	44.513	44.513
9	0.469303	23.6948	-2.69299	AC alt	16	24.7913	18.9954	36.1582	51.4721	0	51.4721	50.5786	50.5786
10	0.469303	25.0784	-1.48736	AC alt	16	24.7913	19.5521	37.2179	53.9959	0	53.9959	53.4883	53.4883
11	0.469303	26.0562	-0.282392	AC alt	16	24.7913	19.9124	37.9036	55.6291	0	55.6291	55.5309	55.5309
12	0.469303	27.0097	0.922454	AC alt	16	24.7913	20.2576	38.5608	57.194	0	57.194	57.5202	57.5202
13	0.469303	28.0867	2.12771	AC alt	16	24.7913	20.6568	39.3206	59.0034	0	59.0034	59.7709	59.7709
14	0.469303	28.973	3.33391	AC alt	16	24.7913	20.9633	39.904	60.3929	0	60.3929	61.614	61.614
15	0.469303	29.8658	4.54158	AC alt	16	24.7913	21.2693	40.4865	61.7803	0	61.7803	63.4698	63.4698
16	0.469303	30.6578	5.75129	AC alt	16	24.7913	21.5254	40.9741	62.9415	0	62.9415	65.1095	65.1095
17	0.469303	31.3115	6.96357	AC alt	16	24.7913	21.7152	41.3353	63.8018	0	63.8018	66.4541	66.4541
18	0.469303	32.0562	8.179	AC alt	16	24.7913	21.9435	41.7698	64.8366	0	64.8366	67.9905	67.9905
19	0.469303	32.7707	9.39815	AC alt	16	24.7913	22.1548	42.1721	65.7948	0	65.7948	69.4618	69.4618
20	0.469303	33.435	10.6216	AC alt	16	24.7913	22.3402	42.5251	66.6353	0	66.6353	70.8249	70.8249
21	0.469303	33.9	11.85	AC alt	16	24.7913	22.4333	42.7022	67.0572	0	67.0572	71.7641	71.7641
22	0.469303	34.2576	13.0839	AC alt	16	24.7913	22.476	42.7835	67.2508	0	67.2508	72.4745	72.4745
23	0.469303	34.5219	14.3241	AC alt	16	24.7913	22.4752	42.782	67.2472	0	67.2472	72.9861	72.9861
24	0.469303	34.8765	15.5711	AC alt	16	24.7913	22.5122	42.8525	67.415	0	67.415	73.6883	73.6883
25	0.469303	36.2764	16.8258	AC alt	16	24.7913	23.0044	43.7893	69.6461	0	69.6461	76.6029	76.6029
26	0.469303	37.8482	18.0888	AC alt	16	24.7913	23.5636	44.8538	72.1814	0	72.1814	79.878	79.878
27	0.469303	39.3343	19.361	AC alt	16	24.7913	24.0768	45.8307	74.508	0	74.508	82.9684	82.9684
28	0.469303	40.7619	20.6432	AC alt	16	24.7913	24.556	46.7428	76.6802	0	76.6802	85.9313	85.9313
29	0.469303	42.0816	21.9363	AC alt	16	24.7913	24.9799	47.5498	78.6022	0	78.6022	88.6624	88.6624
30	0.469303	43.2685	23.2413	AC alt	16	24.7913	25.3385	48.2324	80.2278	0	80.2278	91.1095	91.1095
31	0.469303	43.8001	24.5591	AC alt	16	24.7913	25.4111	48.3706	80.5568	0	80.5568	92.169	92.169
32	0.469303	43.9682	25.891	AC alt	16	24.7913	25.3251	48.2069	80.167	0	80.167	92.4594	92.4594
33	0.469303	43.9331	27.2381	AC alt	16	24.7913	25.1499	47.8733	79.3724	0	79.3724	92.3188	92.3188
34	0.469303	43.6531	28.6018	AC alt	16	24.7913	24.8693	47.3393	78.1009	0	78.1009	91.6611	91.6611
35	0.469303	43.2386	29.9833	AC alt	16	24.7913	24.5307	46.6946	76.5653	0	76.5653	90.7185	90.7185
36	0.469303	42.7012	31.3844	AC alt	16	24.7913	24.1392	45.9494	74.7905	0	74.7905	89.5161	89.5161
37	0.469303	42.0376	32.8067	AC alt	16	24.7913	23.6943	45.1025	72.7737	0	72.7737	88.0475	88.0475
38	0.469303	41.1259	34.2522	AC alt	16	24.7913	23.1473	44.0614	70.2941	0	70.2941	86.0559	86.0559
39	0.469303	40.0233	35.723	AC alt	16	24.7913	22.5232	42.8733	67.4646	0	67.4646	83.6628	83.6628
40	0.469303	38.048	37.2214	AC alt	16	24.7913	21.5525	41.0257	63.0644	0	63.0644	79.4364	79.4364
41	0.469303	35.583	38.7503	AC alt	16	24.7913	20.3947	38.8217	57.8155	0	57.8155	74.1842	74.1842
42	0.469303	32.9272	40.3127	AC alt	16	24.7913	19.1714	36.4931	52.2697	0	52.2697	68.5356	68.5356
43	0.469303	30.0674	41.9122	AC alt	16	24.7913	17.8797	34.0344	46.4141	0	46.4141	62.4635	62.4635
44	0.469303	26.988	43.5529	AC alt	16	24.7913	16.5165	31.4394	40.234	0	40.234	55.9365	55.9365
45	0.469303	23.6707	45.2395	AC alt	16	24.7913	15.078	28.7013	33.713	0	33.713	48.9177	48.9177
46	0.469303	20.094	46.9779	AC alt	16	24.7913	13.5604	25.8125	26.8332	0	26.8332	41.3637	41.3637
47	0.469303	16.2319	48.7749	AC alt	16	24.7913	11.9591	22.7644	19.5738	0	19.5738	33.2225	33.2225
48	0.469303	12.0529	50.6389	AC alt	16	24.7913	10.269	19.5472	11.9119	0	11.9119	24.4308	24.4308
49	0.469303	7.51804	52.5801	AC alt	16	24.7913	8.48439	16.1502	3.82172	0	3.82172	14.9108	14.9108
50	0.469303	2.57812	54.6116	AC alt	16	24.7913	6.59907	12.5615	-4.7251	0	-4.7251	4.56469	4.56469

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.93546

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	109.082	79.8498	0	0	0
2	109.32	79.839	1.90453	0	0
3	109.557	79.8326	3.97164	0	0
4	109.794	79.8306	6.16984	0	0
5	110.032	79.8328	8.46916	0	0
6	110.269	79.8394	10.841	0	0
7	110.506	79.8503	13.2583	0	0
8	110.744	79.8655	15.695	0	0
9	110.981	79.8852	18.1266	0	0
10	111.219	79.9091	20.5294	0	0
11	111.456	79.9376	22.8812	0	0
12	111.693	79.9704	25.1607	0	0
13	111.931	80.0077	27.3477	0	0
14	112.168	80.0495	29.4231	0	0
15	112.406	80.0959	31.3686	0	0
16	112.643	80.1468	33.1672	0	0
17	112.88	80.2025	34.8026	0	0
18	113.118	80.2628	36.2597	0	0
19	113.355	80.328	37.5242	0	0
20	113.593	80.3979	38.5829	0	0
21	113.83	80.4729	39.4235	0	0
22	114.067	80.5529	40.0347	0	0
23	114.305	80.638	40.4063	0	0
24	114.542	80.7283	40.529	0	0
25	114.78	80.824	40.3948	0	0
26	115.017	80.9252	39.9968	0	0
27	115.254	81.0321	39.329	0	0
28	115.492	81.1447	38.3871	0	0
29	115.729	81.2633	37.1679	0	0
30	115.967	81.388	35.6698	0	0
31	116.204	81.519	33.8926	0	0
32	116.441	81.6566	31.8473	0	0
33	116.679	81.8011	29.5608	0	0
34	116.916	81.9526	27.0441	0	0
35	117.154	82.1114	24.3099	0	0
36	117.391	82.278	21.3739	0	0
37	117.628	82.4527	18.255	0	0
38	117.866	82.6358	14.9759	0	0
39	118.103	82.828	11.5636	0	0
40	118.341	83.0296	8.07981	0	0
41	118.578	83.2412	4.66714	0	0
42	118.815	83.4637	1.39387	0	0
43	119.053	83.6977	-1.66927	0	0
44	119.29	83.9441	-4.43997	0	0
45	119.528	84.2041	-6.81876	0	0
46	119.765	84.4789	-8.68857	0	0
47	120.002	84.7699	-9.90592	0	0
48	120.24	85.0791	-10.1334	0	0
49	120.477	85.4086	-9.14425	0	0
50	120.715	85.7613	-6.7458	0	0
51	120.952	86.1409	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.90352**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	168.277	97.9419	0	0	0
2	168.746	97.8385	4.42433	0	0
3	169.215	97.7456	9.8668	0	0
4	169.685	97.6631	16.3889	0	0
5	170.154	97.5909	23.8206	0	0
6	170.623	97.5288	31.9376	0	0
7	171.093	97.4768	40.7702	0	0
8	171.562	97.4349	50.0928	0	0
9	172.031	97.4029	59.8748	0	0
10	172.501	97.3808	69.9255	0	0
11	172.97	97.3686	79.7592	0	0
12	173.439	97.3663	89.2327	0	0
13	173.908	97.3739	98.3074	0	0
14	174.378	97.3913	106.973	0	0
15	174.847	97.4187	115.16	0	0
16	175.316	97.4559	122.838	0	0
17	175.786	97.5032	129.965	0	0
18	176.255	97.5605	136.499	0	0
19	176.724	97.628	142.424	0	0
20	177.194	97.7057	147.71	0	0
21	177.663	97.7937	152.33	0	0
22	178.132	97.8921	156.254	0	0
23	178.602	98.0012	159.467	0	0
24	179.071	98.121	161.956	0	0
25	179.54	98.2518	163.705	0	0
26	180.009	98.3937	164.616	0	0
27	180.479	98.547	164.61	0	0
28	180.948	98.7119	163.622	0	0
29	181.417	98.8887	161.589	0	0
30	181.887	99.0777	158.456	0	0
31	182.356	99.2793	154.178	0	0
32	182.825	99.4937	148.827	0	0
33	183.295	99.7215	142.451	0	0
34	183.764	99.9631	135.079	0	0
35	184.233	100.219	126.764	0	0
36	184.702	100.49	117.545	0	0
37	185.172	100.776	107.462	0	0
38	185.641	101.079	96.5657	0	0
39	186.11	101.398	84.9652	0	0
40	186.58	101.736	72.7651	0	0
41	187.049	102.092	60.3973	0	0
42	187.518	102.469	48.1917	0	0
43	187.988	102.867	36.3761	0	0
44	188.457	103.288	25.2145	0	0
45	188.926	103.734	15.0142	0	0
46	189.395	104.208	6.13582	0	0
47	189.865	104.711	-0.994135	0	0
48	190.334	105.246	-5.86564	0	0
49	190.803	105.818	-7.86157	0	0
50	191.273	106.432	-6.22404	0	0
51	191.742	107.092	0	0	0



## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	0, 55.7424
	0, 55.649
	0, 0
	236.947, 0
	236.947, 110.724
	236.947, 114.452
	236.947, 124.64
	234.831, 124.015
	234.779, 124
	231.315, 122.538
	230.034, 122
	225.015, 120.331
	224.487, 120.157
	224.027, 120
	223.323, 119.693
	219.586, 118
	214.91, 116.195
	214.402, 116
	214.368, 115.987
	214.351, 115.982
	211.746, 115.064
	211.044, 114.826
	210.178, 114.533
	209.871, 114.434
	208.532, 114
	208.151, 113.719
	208.005, 113.593
	207.287, 112.987
	206.413, 112.254
	206.289, 112.142
	206.129, 112
	205.805, 111.814
	204.623, 111.105
	202.766, 110
	202.461, 109.858
	201.332, 109.36
	199.077, 108.956
	198.711, 108.88
	198.27, 108.756
	196.026, 108
	194.497, 107.666
	192.594, 107.269
	186.469, 106
	186.323, 105.934




External Boundary

186.266, 105.907  
185.362, 105.502  
184.83, 105.247  
183.342, 104.556  
182.252, 104  
180.6, 102.849  
179.353, 102  
178.93, 101.861  
177.38, 101.39  
176.611, 101.13  
176.41, 101.076  
175.928, 100.922  
175.403, 100.794  
174.734, 100.6  
174.202, 100.469  
173.893, 100.383  
173.569, 100.29  
172.759, 100.122  
172.252, 100  
171.643, 99.5924  
171.148, 99.2829  
170.937, 99.1843  
170.672, 99.0402  
170.444, 98.874  
170.073, 98.7176  
169.431, 98.3981  
169.179, 98.2504  
168.721, 98.0597  
168.595, 98  
165.874, 97.5031  
159.345, 96  
153.912, 94.9207  
153.47, 94.8267  
152.549, 94.646  
151.856, 94.5167  
149.357, 94  
149.352, 94  
147.99, 93.3771  
144.846, 92  
143.133, 91.392  
142.263, 91.0785  
141.208, 90.6651  
140.261, 90.2243  
139.755, 90  
137.278, 89.4549  
133.683, 88.6688  
132.525, 88.42  
129.961, 87.8675  
125.534, 86.9981  
123.965, 86.7185  
123.552, 86.6426  
120.222, 86  
120.074, 86  
120.014, 86  
120.004, 86  
119.971, 86  
119.752, 85.9345  
119.28, 85.7886  
118.181, 85.4413

	116.256, 84.3907
	108.345, 79.383
	106.541, 79.2873
	99.7953, 75.0526
	84.1482, 75.1709
	71.424, 74.8544
	70.6121, 74.6728
	67.2215, 74.0901
	66.6905, 74
	64.4578, 73.3435
	59.8857, 72
	59.7801, 72
	59.6326, 72
	59.5347, 72
	57.547, 71.8035
	55.7966, 71.6594
	54.5812, 71.5562
	50.3608, 71.0485
	44.3175, 70.356
	43.8526, 70.2335
	43.3826, 70.1254
	43.0247, 70.0452
	42.7985, 70
	42.7863, 70
	42.77, 70
	42.761, 70
	42.7495, 70
	40.8092, 69.7209
	29.071, 68.0515
	28.7087, 68
	28.5546, 67.955
	27.9975, 67.8026
	27.0593, 67.5372
	25.1438, 66.9714
	24.0024, 66.8764
	22.8583, 66.7817
	21.4851, 66.4705
	21.2516, 66.4251
	20.8291, 66.3479
	20.643, 66.312
	18.9392, 66
	18.9327, 66
	18.5958, 65.9837
	17.7539, 65.9484
	17.6153, 65.9424
	17.429, 65.9329
	9.44001, 65.5336
	8.26013, 65.4736
	7.74498, 65.4469
	6.46976, 65.3793
	0, 65.0595
Material Boundary	0, 55.7424
	2.6465, 55.8441
	8.14848, 57.0797
	13.9287, 58.9023
	20.0488, 61.3735
	23.6344, 63.6903
	27.2509, 66.4086
	29.071, 68.0515

	20.0488, 61.3735
	27.8373, 62.8946
	42.605, 66.3601
	47.0942, 67.2808
	47.4767, 67.3223
	58.1957, 68.3601
	58.527, 68.3601
	59.4745, 68.5412
	60.2763, 68.743
	63.0809, 69.3685
	66.7553, 70.3601
	78.7311, 72.3601
	82.9224, 72.3601
	83.6561, 72.1094
	84.6118, 71.7523
	85.235, 71.5339
	87.7822, 70.5637
	92.1469, 70.5763
	95.0929, 70.5944
	95.9469, 70.3601
	97.1339, 70.3601
	99.2226, 72.1352
	99.4572, 72.3601
	100, 72.9966
	101.183, 74.3601
Material Boundary	102.554, 75.6858
	103.277, 76.3601
	103.462, 76.6823
	103.556, 76.905
	103.758, 77.2132
	103.837, 77.2924
	103.877, 77.345
	107.072, 78.3601
	113.47, 80.3601
	119.95, 82.3601
	120.228, 82.3601
	124.196, 83.1151
	125.55, 83.3509
	130.728, 84.3601
	135, 85.3181
	139.714, 86.3601
	142.811, 87.4897
	145.501, 88.3601
	146.426, 88.7908
	148.107, 89.743
	148.919, 90.1779
	149.204, 90.3601
	155.343, 91.7061
	156.274, 91.9013
	158.662, 92.3589
	236.947, 114.452

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 55.649 40.5924, 62.7763 53.1976, 64.387 57.975, 64.3583 70, 65.8837 87.7822, 65.8837 98.769, 67.425 104.151, 71.045 112.309, 76.4739 119.081, 78.2703 131.801, 81.5467 140, 83.5684 149.903, 86.3894 160.872, 88.0988 189.721, 96.6974 236.947, 110.724	Assigned to:  AC  AC alt  LS



0+650 - SISMA

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 0+650 - SISMA

### Project Summary

---

File Name:	0+650 - SISMA.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:02.362s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31



## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	M1+R2 fronti scavo sisma	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1	
Variable Actions: Favourable	1	
Effective cohesion	1	
Coefficient of shearing resistance	1	
Undrained strength	1	
Weight density	1	
Shear strength (other models)	1	
Earth resistance	1.2	
Tensile and plate strength	1	
Shear strength	1	
Compressive strength	1	
Bond strength	1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Materials

<b>AC</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>AC alt</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>LS</b>	
Color	
Strength Type	Undrained
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Cohesion Type	Constant
Water Surface	Water Table
Hu Value	1



# Global Minimums

## Method: bishop simplified

	FS	1.774670
Center:		124.830, 150.365
Radius:		84.690
Left Slip Surface Endpoint:		85.892, 75.158
Right Slip Surface Endpoint:		198.654, 108.864
Resisting Moment:		2.0496e+06 kN-m
Driving Moment:		1.15492e+06 kN-m
Total Slice Area:		1818.38 m <sup>2</sup>
Surface Horizontal Width:		112.762 m
Surface Average Height:		16.1257 m

## Method: janbu simplified

	FS	1.634040
Center:		129.815, 136.587
Radius:		74.254
Left Slip Surface Endpoint:		88.124, 75.141
Right Slip Surface Endpoint:		198.706, 108.879
Resisting Horizontal Force:		24166.3 kN
Driving Horizontal Force:		14789.3 kN
Total Slice Area:		2156.34 m <sup>2</sup>
Surface Horizontal Width:		110.582 m
Surface Average Height:		19.5 m

## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 11888

Number of Invalid Surfaces: 16

#### Error Codes

Error Code -112 reported for 16 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 11748

Number of Invalid Surfaces: 156

#### Error Codes

Error Code -108 reported for 151 surfaces

Error Code -111 reported for 4 surfaces

Error Code -112 reported for 1 surface

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.77467

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	2.23234	23.8876	-26.5286	AC alt	20	30	14.8257	26.3107	20.0448	0	20.0448	12.6437	12.6437
2	2.23234	69.9123	-24.8523	AC alt	20	30	21.4963	38.1489	44.6498	0	44.6498	34.6933	34.6933
3	2.23234	112.505	-23.1985	AC alt	20	30	27.4949	48.7943	66.7761	0	66.7761	54.9927	54.9927
4	2.23234	151.796	-21.5649	AC alt	20	30	32.8738	58.3401	86.6166	0	86.6166	73.6242	73.6242
5	2.23234	187.9	-19.9496	AC alt	20	30	37.6776	66.8653	104.336	0	104.336	90.66	90.66
6	2.06221	211.338	-18.411	AC	100	30	85.1974	151.197	141.052	0	141.052	112.693	112.693
7	2.06221	268.16	-16.9465	AC	100	30	92.9961	165.037	169.819	0	169.819	141.482	141.482
8	2.29143	407.461	-15.4131	AC	100	30	103.729	184.084	220.065	10.6584	209.407	191.468	180.81
9	2.29143	519.896	-13.8109	AC	100	30	111.571	198.001	269.94	31.6075	238.332	242.513	210.905
10	2.29143	605.431	-12.2195	AC	100	30	115.928	205.733	306.169	51.7638	254.405	281.063	229.299
11	2.29143	667.041	-10.6377	AC	100	30	117.257	208.092	330.575	71.2681	259.307	308.551	237.283
12	2.29143	758.08	-9.06406	AC	100	30	122.598	217.571	369.141	90.1314	279.009	349.583	259.451
13	2.29143	846.194	-7.49729	AC	100	30	129.291	229.449	406.279	102.584	303.695	389.264	286.68
14	2.29143	930.115	-5.93614	AC	100	30	136.414	242.089	441.161	111.194	329.967	426.977	315.783
15	2.29143	1000.12	-4.3794	AC	100	30	141.824	251.69	469.11	119.186	349.924	458.248	339.062
16	2.29143	1040.91	-2.8259	AC	100	30	143.675	254.976	483.197	126.445	356.752	476.105	349.66
17	2.29143	1068.07	-1.27448	AC	100	30	143.982	255.521	490.926	133.04	357.886	487.722	354.682
18	2.29143	1091.41	0.27601	AC	100	30	143.981	255.518	496.907	139.026	357.881	497.6	358.574
19	2.29143	1112.44	1.8267	AC	100	30	143.858	255.301	501.833	144.403	357.43	506.421	362.018
20	2.29143	1130.83	3.37873	AC	100	30	143.577	254.801	505.559	149.171	356.388	514.035	364.864
21	2.29143	1147.71	4.93325	AC	100	30	143.283	254.28	508.602	153.294	355.308	520.97	367.676
22	2.29143	1161.89	6.49142	AC	100	30	142.88	253.565	510.408	156.588	353.82	526.665	370.077
23	2.29143	1172.94	8.05443	AC	100	30	142.264	252.471	510.807	159.262	351.545	530.939	371.677
24	2.29143	1181.06	9.62351	AC	100	30	141.461	251.047	509.897	161.308	348.589	533.883	372.575
25	2.29143	1202.04	11.1999	AC	100	30	142.19	252.34	514.475	163.2	351.275	542.629	379.429
26	2.29143	1221.8	12.785	AC	100	30	142.812	253.443	518.393	164.827	353.566	550.8	385.973
27	2.29143	1239.35	14.38	AC	100	30	143.31	254.327	521.204	165.798	355.406	557.946	392.148
28	2.29143	1261.4	15.9866	AC	100	30	144.448	256.347	525.702	166.1	359.602	567.085	400.985
29	2.29143	1266.3	17.6061	AC	100	30	143.949	255.461	522.795	165.033	357.762	568.475	403.442
30	2.29143	1250.66	19.2404	AC	100	30	141.851	251.739	511.073	161.046	350.027	560.583	399.537
31	2.29143	1230.99	20.8911	AC	100	30	139.485	247.54	497.634	156.337	341.297	550.873	394.536
32	2.29143	1206.93	22.5601	AC	100	30	136.821	242.812	482.351	150.881	331.47	539.192	388.311
33	2.29143	1179.82	24.2497	AC	100	30	134.013	237.829	465.764	144.652	321.112	526.132	381.48
34	2.29143	1151.73	25.962	AC	100	30	130.955	232.402	448.889	139.055	309.834	512.653	373.598
35	2.29143	1119.39	27.6996	AC	100	30	127.237	225.804	430.502	134.381	296.121	497.302	362.921
36	2.29143	1080.9	29.4654	AC	100	30	123.093	218.449	409.666	128.831	280.835	479.21	350.379
37	2.29143	1039.03	31.2626	AC	100	30	118.828	210.881	387.459	122.357	265.102	459.602	337.245
38	2.29143	1018.36	33.0946	AC	100	30	116.964	207.573	373.134	114.908	258.226	449.367	334.459
39	2.29143	986.341	34.9658	AC	100	30	114.141	202.562	354.235	106.423	247.812	434.056	327.633
40	2.29143	930.799	36.8808	AC	100	30	109.191	193.778	326.385	96.8298	229.555	408.311	311.481
41	2.29143	873.344	38.8451	AC	100	30	104.331	185.153	297.675	86.0456	211.629	381.695	295.649
42	2.29143	824.473	40.8654	AC	100	30	100.587	178.509	271.789	73.9702	197.819	358.814	284.844
43	2.29143	788.259	42.9494	AC	100	30	98.3091	174.466	249.9	60.4838	189.416	341.413	280.929
44	2.29143	727.38	45.1068	AC	100	30	93.9541	166.738	218.793	45.4399	173.353	313.098	267.658
45	2.29143	645.557	47.3492	AC	100	30	87.9927	156.158	180.021	28.6575	151.363	275.542	246.885
46	2.29143	535.846	49.6916	AC	100	30	79.9324	141.854	131.539	9.90724	121.632	225.765	215.857
47	2.08816	382.164	52.0383	AC	100	30	69.7738	123.825	84.1614	0	84.1614	173.591	173.591
48	2.08816	269.837	54.4002	AC	100	30	57.4951	102.035	38.8707	0	38.8707	119.179	119.179
49	1.96701	149.704	56.8299	AC alt	20	30	20.6813	36.7025	41.6437	0	41.6437	73.284	73.284
50	1.96701	51.7074	59.3515	AC alt	20	30	10.8786	19.306	5.4856	0	5.4856	23.8449	23.8449

**Global Minimum Query (janbu simplified) - Safety Factor: 1.63404**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	2.02717	25.9379	-33.2219	AC alt	20	30	18.3926	30.0543	27.8257	0	27.8257	15.7798	15.7798
2	2.02717	76.0018	-31.371	AC alt	20	30	27.7033	45.2683	59.4474	0	59.4474	42.5565	42.5565
3	2.02717	122.545	-29.5558	AC alt	20	30	36.0157	58.8511	87.6789	0	87.6789	67.2558	67.2558
4	2.02717	165.76	-27.7727	AC alt	20	30	43.4424	70.9866	112.902	0	112.902	90.0237	90.0237
5	2.03145	211.711	-26.0166	AC	100	30	100.374	164.016	167.695	0	167.695	118.703	118.703
6	2.03145	268.777	-24.2846	AC	100	30	109.1	178.274	197.331	0	197.331	148.106	148.106
7	2.20885	397.987	-22.5022	AC	100	30	120.626	197.107	248.25	11.7756	236.474	198.279	186.504
8	2.20885	519.64	-20.6689	AC	100	30	130.493	213.23	304.912	34.9264	269.986	255.684	220.758
9	2.20885	627.845	-18.8575	AC	100	30	138.313	226.009	353.719	57.1724	296.546	306.478	249.306
10	2.20885	696.879	-17.0655	AC	100	30	140.122	228.964	381.308	78.6189	302.689	338.293	259.674
11	2.20885	783.561	-15.2905	AC	100	30	144.897	236.768	418.235	99.3271	318.908	378.621	279.294
12	2.20885	877.958	-13.5304	AC	100	30	151.175	247.026	459.011	118.783	340.228	422.632	303.849
13	2.20885	968.685	-11.7833	AC	100	30	159.597	260.788	498.231	129.398	368.833	464.938	335.54
14	2.20885	1053.33	-10.0472	AC	100	30	167.167	273.158	533.871	139.326	394.545	504.253	364.927
15	2.20885	1119.77	-8.32044	AC	100	30	172.127	281.262	559.966	148.577	411.389	534.792	386.215
16	2.20885	1159.19	-6.60124	AC	100	30	173.331	283.23	572.478	156.998	415.48	552.419	395.421
17	2.20885	1191.96	-4.88799	AC	100	30	173.774	283.954	581.745	164.759	416.986	566.884	402.125
18	2.20885	1220.49	-3.17912	AC	100	30	173.817	284.023	588.995	171.869	417.126	579.341	407.472
19	2.20885	1246.88	-1.47307	AC	100	30	173.757	283.925	595.252	178.331	416.921	590.784	412.453
20	2.20885	1270.41	-0.231664	AC	100	30	173.497	283.5	600.184	184.147	416.037	600.886	416.739
21	2.20885	1292.3	1.93661	AC	100	30	173.217	283.044	604.353	189.262	415.091	610.21	420.948
22	2.20885	1311.25	3.64327	AC	100	30	172.777	282.324	607.145	193.549	413.596	618.146	424.597
23	2.20885	1327.01	5.35317	AC	100	30	172.091	281.204	608.452	197.187	411.265	624.578	427.391
24	2.20885	1339.69	7.06788	AC	100	30	171.178	279.711	608.334	200.172	408.162	629.558	429.386
25	2.20885	1363.73	8.78898	AC	100	30	171.825	280.769	613.293	202.932	410.361	639.859	436.927
26	2.20885	1387.29	10.5181	AC	100	30	172.449	281.789	617.902	205.417	412.485	649.92	444.503
27	2.20885	1407.12	12.257	AC	100	30	172.734	282.254	620.675	207.224	413.451	658.201	450.977
28	2.20885	1431.35	14.0075	AC	100	30	173.727	283.876	625.161	208.34	416.821	668.5	460.16
29	2.20885	1444.69	15.7714	AC	100	30	173.497	283.501	624.674	208.634	416.04	673.675	465.041
30	2.20885	1434.73	17.5508	AC	100	30	171.208	279.76	613.792	205.524	408.268	667.941	462.417
31	2.20885	1419.93	19.3479	AC	100	30	168.506	275.346	600.765	201.671	399.094	659.933	458.262
32	2.20885	1401.04	21.165	AC	100	30	165.501	270.435	585.934	197.049	388.885	650.011	452.962
33	2.20885	1378.05	23.0047	AC	100	30	162.202	265.044	569.31	191.631	377.679	638.176	446.545
34	2.20885	1353.99	24.8699	AC	100	30	158.925	259.689	552.166	185.619	366.547	625.835	440.216
35	2.20885	1326.41	26.7637	AC	100	30	154.726	252.828	533.878	181.591	352.287	611.913	430.322
36	2.20885	1293.91	28.6897	AC	100	30	150.184	245.406	513.519	176.656	336.863	595.707	419.051
37	2.20885	1253.31	30.6519	AC	100	30	144.951	236.855	489.855	170.765	319.09	575.756	404.991
38	2.20885	1222.77	32.6547	AC	100	30	141.126	230.605	469.957	163.859	306.098	560.401	396.542
39	2.20885	1203.95	34.7036	AC	100	30	138.84	226.869	454.203	155.871	298.332	550.353	394.482
40	2.20885	1157.37	36.8047	AC	100	30	133.677	218.434	427.522	146.72	280.802	527.542	380.822
41	2.20885	1101.48	38.9652	AC	100	30	127.782	208.801	397.09	136.31	260.78	500.438	364.128
42	2.20885	1042.26	41.1938	AC	100	30	121.84	199.091	365.121	124.523	240.598	471.761	347.238
43	2.20885	998.876	43.5013	AC	100	30	117.871	192.605	338.334	111.217	227.117	450.194	338.977
44	2.20885	951.273	45.901	AC	100	30	113.717	185.818	309.225	96.2125	213.012	426.576	330.363
45	2.20885	880.058	48.4096	AC	100	30	107.464	175.601	271.058	79.2833	191.775	392.139	312.855
46	2.20885	784.114	51.0492	AC	100	30	99.1724	162.052	223.745	60.1317	163.613	346.428	286.296
47	2.20885	662.431	53.8497	AC	100	30	88.9574	145.36	167.277	38.3567	128.92	289.043	250.686
48	2.20885	524.243	56.8532	AC	100	30	77.9267	127.335	104.828	13.372	91.4565	224.155	210.783
49	2.91673	442.308	60.7129	AC	100	30	59.915	97.9035	30.2836	0	30.2836	137.107	137.107
50	2.72176	135.74	65.5519	AC alt	20	30	14.374	23.4877	14.1773	0	14.1773	45.7941	45.7941

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.77467

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	85.8916	75.1577	0	0	0
2	88.124	74.0433	53.1901	0	0
3	90.3563	73.0094	140.88	0	0
4	92.5886	72.0527	255.776	0	0
5	94.821	71.1704	391.612	0	0
6	97.0533	70.3601	542.986	0	0
7	99.1155	69.6737	795.904	0	0
8	101.178	69.0453	1069.58	0	0
9	103.469	68.4136	1408.71	0	0
10	105.761	67.8503	1768.57	0	0
11	108.052	67.354	2130.49	0	0
12	110.343	66.9236	2480.19	0	0
13	112.635	66.5581	2826.48	0	0
14	114.926	66.2565	3167.63	0	0
15	117.218	66.0183	3500.02	0	0
16	119.509	65.8428	3815.62	0	0
17	121.801	65.7297	4104.08	0	0
18	124.092	65.6787	4361.14	0	0
19	126.383	65.6897	4585.56	0	0
20	128.675	65.7628	4776.6	0	0
21	130.966	65.8981	4933.61	0	0
22	133.258	66.0959	5056.2	0	0
23	135.549	66.3566	5144.1	0	0
24	137.841	66.6809	5197.03	0	0
25	140.132	67.0694	5214.91	0	0
26	142.423	67.5231	5197.23	0	0
27	144.715	68.0431	5143.05	0	0
28	147.006	68.6306	5051.76	0	0
29	149.298	69.287	4922.15	0	0
30	151.589	70.0142	4755.92	0	0
31	153.881	70.814	4557.73	0	0
32	156.172	71.6886	4329.42	0	0
33	158.463	72.6405	4073.26	0	0
34	160.755	73.6727	3791.57	0	0
35	163.046	74.7884	3485.37	0	0
36	165.338	75.9915	3156.55	0	0
37	167.629	77.2861	2809.3	0	0
38	169.921	78.6772	2447.44	0	0
39	172.212	80.1707	2064.95	0	0
40	174.504	81.7731	1668.55	0	0
41	176.795	83.4924	1272.39	0	0
42	179.086	85.3377	882.166	0	0
43	181.378	87.3202	498.325	0	0
44	183.669	89.4532	118.346	0	0
45	185.961	91.7532	-236.23	0	0
46	188.252	94.2407	-541.57	0	0
47	190.544	96.9418	-762.868	0	0
48	192.632	99.6182	-877.504	0	0
49	194.72	102.535	-895.628	0	0
50	196.687	105.544	-993.976	0	0
51	198.654	108.864	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.63404**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	88.1241	75.1408	0	0	0
2	90.1513	73.8132	71.8667	0	0
3	92.1785	72.5772	194.585	0	0
4	94.2056	71.4277	357.23	0	0
5	96.2328	70.3601	550.74	0	0
6	98.2643	69.3686	901.652	0	0
7	100.296	68.452	1279.69	0	0
8	102.505	67.537	1737.07	0	0
9	104.713	66.7037	2232.1	0	0
10	106.922	65.9492	2747.33	0	0
11	109.131	65.2712	3251.97	0	0
12	111.34	64.6673	3753.28	0	0
13	113.549	64.1357	4251.28	0	0
14	115.758	63.675	4745.23	0	0
15	117.967	63.2836	5227.55	0	0
16	120.175	62.9606	5686.74	0	0
17	122.384	62.7049	6110.45	0	0
18	124.593	62.516	6495.71	0	0
19	126.802	62.3934	6840.83	0	0
20	129.011	62.3366	7144.97	0	0
21	131.22	62.3455	7407.23	0	0
22	133.429	62.4202	7627.09	0	0
23	135.637	62.5608	7804.01	0	0
24	137.846	62.7678	7937.43	0	0
25	140.055	63.0417	8027.02	0	0
26	142.264	63.3832	8073	0	0
27	144.473	63.7933	8074.26	0	0
28	146.682	64.2732	8029.9	0	0
29	148.891	64.8242	7938.89	0	0
30	151.099	65.4481	7800.94	0	0
31	153.308	66.1467	7619.75	0	0
32	155.517	66.9223	7396.79	0	0
33	157.726	67.7775	7133.76	0	0
34	159.935	68.7153	6832.72	0	0
35	162.144	69.7392	6495.18	0	0
36	164.352	70.8532	6121.48	0	0
37	166.561	72.062	5714.72	0	0
38	168.77	73.371	5279.62	0	0
39	170.979	74.7866	4814.79	0	0
40	173.188	76.3163	4317.11	0	0
41	175.397	77.969	3800.49	0	0
42	177.606	79.7555	3273.11	0	0
43	179.814	81.6888	2741.5	0	0
44	182.023	83.785	2201.73	0	0
45	184.232	86.0644	1661.49	0	0
46	186.441	88.5532	1144.18	0	0
47	188.65	91.2857	680.497	0	0
48	190.859	94.3092	310.942	0	0
49	193.068	97.6915	80.7963	0	0
50	195.984	102.892	57.8152	0	0
51	198.706	108.879	0	0	0

## Discharge Sections

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### Entity Information

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#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
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	0, 55.649
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	234.831, 124.015
	234.779, 124
	231.315, 122.538
	230.034, 122
	225.015, 120.331
	224.487, 120.157
	224.027, 120
	223.323, 119.693
	219.586, 118
	214.91, 116.195
	214.402, 116
	214.368, 115.987
	214.351, 115.982
	211.746, 115.064
	211.044, 114.826
	210.178, 114.533
	209.871, 114.434
	208.532, 114
	208.151, 113.719
	208.005, 113.593
	207.287, 112.987
	206.413, 112.254
	206.289, 112.142
	206.129, 112
	205.805, 111.814
	204.623, 111.105
	202.766, 110
	202.461, 109.858
	201.332, 109.36
	199.077, 108.956
	198.711, 108.88
	198.27, 108.756
	196.026, 108
	194.497, 107.666
	192.594, 107.269
	186.469, 106
	186.323, 105.934

External Boundary




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179.353, 102  
178.93, 101.861  
177.38, 101.39  
176.611, 101.13  
176.41, 101.076  
175.928, 100.922  
175.403, 100.794  
174.734, 100.6  
174.202, 100.469  
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172.759, 100.122  
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171.148, 99.2829  
170.937, 99.1843  
170.672, 99.0402  
170.444, 98.874  
170.073, 98.7176  
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169.179, 98.2504  
168.721, 98.0597  
168.595, 98  
165.874, 97.5031  
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153.912, 94.9207  
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151.856, 94.5167  
149.357, 94  
149.352, 94  
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	18.5958, 65.9837
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	17.6153, 65.9424
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	85.235, 71.5339
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	97.1339, 70.3601
	99.2226, 72.1352
	99.4572, 72.3601
	100, 72.9966
	101.183, 74.3601
Material Boundary	102.554, 75.6858
	103.277, 76.3601
	103.462, 76.6823
	103.556, 76.905
	103.758, 77.2132
	103.837, 77.2924
	103.877, 77.345
	107.072, 78.3601
	113.47, 80.3601
	119.95, 82.3601
	120.228, 82.3601
	124.196, 83.1151
	125.55, 83.3509
	130.728, 84.3601
	135, 85.3181
	139.714, 86.3601
	142.811, 87.4897
	145.501, 88.3601
	146.426, 88.7908
	148.107, 89.743
	148.919, 90.1779
	149.204, 90.3601
	155.343, 91.7061
	156.274, 91.9013
	158.662, 92.3589
	236.947, 114.452

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 55.649 40.5924, 62.7763 53.1976, 64.387 57.975, 64.3583 70, 65.8837 87.7822, 65.8837 98.769, 67.425 104.151, 71.045 112.309, 76.4739 119.081, 78.2703 131.801, 81.5467 140, 83.5684 149.903, 86.3894 160.872, 88.0988 189.721, 96.6974 236.947, 110.724	Assigned to:  AC  AC alt  LS



1+000 - sisma

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 1+000 - sisma

### Project Summary

---

File Name:	1+000 - sisma.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.313s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

# General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	M1+R2 fronti scavo sisma	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1	
Variable Actions: Favourable	1	
Effective cohesion	1	
Coefficient of shearing resistance	1	
Undrained strength	1	
Weight density	1	
Shear strength (other models)	1	
Earth resistance	1.2	
Tensile and plate strength	1	
Shear strength	1	
Compressive strength	1	
Bond strength	1	
Seismic Coefficient	1	



## Analysis Options

---

Slices Type:	Vertical
<b>Analysis Methods Used</b>	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	5
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading

---

2 Distributed Loads present





## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

## Distributed Load 2

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

# Materials

<b>AC</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>AC alt</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>R</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1
<b>GS</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	0
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

# Global Minimums

## Method: bishop simplified

	FS	1.020890
Center:		122.859, 198.107
Radius:		26.998
Left Slip Surface Endpoint:		117.078, 171.735
Right Slip Surface Endpoint:		145.210, 182.962
Resisting Moment:		22054.6 kN-m
Driving Moment:		21603.3 kN-m
Total Slice Area:		80.2381 m <sup>2</sup>
Surface Horizontal Width:		28.1317 m
Surface Average Height:		2.85223 m

## Method: janbu simplified

	FS	0.977208
Center:		124.532, 191.983
Radius:		20.662
Left Slip Surface Endpoint:		119.896, 171.848
Right Slip Surface Endpoint:		143.144, 183.009
Resisting Horizontal Force:		583.375 kN
Driving Horizontal Force:		596.981 kN
Total Slice Area:		66.3534 m <sup>2</sup>
Surface Horizontal Width:		23.2477 m
Surface Average Height:		2.85419 m



## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces:	4667
Number of Invalid Surfaces:	0

### Method: janbu simplified

---

Number of Valid Surfaces:	4548
Number of Invalid Surfaces:	119

#### Error Codes

Error Code -112 reported for 119 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.02089

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.560146	0.718028	-11.7581	GS	0	30	0.715906	0.730861	1.51907	0	1.51907	1.37005	1.37005
2	0.560146	2.11511	-10.5463	GS	0	30	2.07944	2.12288	4.41233	0	4.41233	4.02519	4.02519
3	0.560146	3.45578	-9.33937	GS	0	30	3.35129	3.4213	7.11104	0	7.11104	6.55988	6.55988
4	0.560146	4.66867	-8.13657	GS	0	30	4.4674	4.56072	9.47929	0	9.47929	8.84057	8.84057
5	0.560146	5.75067	-6.93736	GS	0	30	5.43127	5.54473	11.5245	0	11.5245	10.8637	10.8637
6	0.560146	6.70286	-5.74121	GS	0	30	6.25001	6.38057	13.2618	0	13.2618	12.6334	12.6334
7	0.560146	7.52614	-4.54756	GS	0	30	6.93003	7.0748	14.7047	0	14.7047	14.1535	14.1535
8	0.560146	8.22123	-3.35588	GS	0	30	7.47715	7.63335	15.8656	0	15.8656	15.4272	15.4272
9	0.560146	8.99104	-2.16566	GS	0	30	8.0785	8.24726	17.1416	0	17.1416	16.8361	16.8361
10	0.560146	12.438	-0.976375	GS	0	30	11.0425	11.2732	23.4308	0	23.4308	23.2426	23.2426
11	0.560146	16.6568	0.212491	GS	0	30	14.6141	14.9194	31.0094	0	31.0094	31.0636	31.0636
12	0.560146	20.6636	1.40145	GS	0	30	17.9189	18.2932	38.0216	0	38.0216	38.4599	38.4599
13	0.560146	21.7462	2.59101	GS	0	30	18.6406	19.03	39.5531	0	39.5531	40.3967	40.3967
14	0.560146	21.4156	3.78169	GS	0	30	18.1478	18.5269	38.5075	0	38.5075	39.7071	39.7071
15	0.560146	20.9584	4.97401	GS	0	30	17.5592	17.926	37.2585	0	37.2585	38.7867	38.7867
16	0.560146	22.1393	6.1685	GS	0	30	18.3397	18.7228	38.9148	0	38.9148	40.8969	40.8969
17	0.560146	25.6627	7.36568	GS	0	30	21.0202	21.4593	44.6023	0	44.6023	47.3196	47.3196
18	0.560146	29.0726	8.56611	GS	0	30	23.5472	24.0391	49.9644	0	49.9644	53.5113	53.5113
19	0.560146	32.3511	9.77034	GS	0	30	25.9103	26.4516	54.9786	0	54.9786	59.4403	59.4403
20	0.560146	35.4961	10.9789	GS	0	30	28.1122	28.6995	59.6508	0	59.6508	65.1045	65.1045
21	0.564291	38.7801	12.197	R	0	35	35.7297	36.4761	62.512	0	62.512	70.2351	70.2351
22	0.564291	41.65	13.4253	R	0	35	37.8622	38.6531	66.2428	0	66.2428	75.2805	75.2805
23	0.564291	44.3751	14.6598	R	0	35	39.8006	40.632	69.6342	0	69.6342	80.0459	80.0459
24	0.564291	46.9532	15.9013	R	0	35	41.5483	42.4162	72.692	0	72.692	84.5284	84.5284
25	0.564291	49.3816	17.1506	R	0	35	43.1084	44.0089	75.4216	0	75.4216	88.7251	88.7251
26	0.564291	51.6574	18.4083	R	0	35	44.4834	45.4127	77.8273	0	77.8273	92.6322	92.6322
27	0.564291	53.7772	19.6753	R	0	35	45.6756	46.6298	79.9131	0	79.9131	96.2452	96.2452
28	0.564291	55.7375	20.9524	R	0	35	46.6868	47.6621	81.6822	0	81.6822	99.5592	99.5592
29	0.564291	56.1268	22.2405	R	0	35	46.3559	47.3243	81.1033	0	81.1033	100.059	100.059
30	0.564291	53.5176	23.5406	R	0	35	43.5749	44.4852	76.2378	0	76.2378	95.2215	95.2215
31	0.564291	50.6554	24.8537	R	0	35	40.6514	41.5006	71.1228	0	71.1228	89.9526	89.9526
32	0.564291	47.6149	26.1808	R	0	35	37.6522	38.4388	65.8756	0	65.8756	84.3871	84.3871
33	0.564291	45.1682	27.5233	R	0	35	35.1846	35.9196	61.5583	0	61.5583	79.8924	79.8924
34	0.564291	45.8289	28.8823	R	0	35	35.1551	35.8895	61.5067	0	61.5067	80.8992	80.8992
35	0.564291	46.6622	30.2594	R	0	35	35.2356	35.9717	61.6475	0	61.6475	82.2041	82.2041
36	0.564291	47.2887	31.6561	R	0	35	35.1365	35.8705	61.474	0	61.474	83.1376	83.1376
37	0.564291	47.6992	33.0741	R	0	35	34.8569	35.5851	60.985	0	60.985	83.6856	83.6856
38	0.564291	47.8833	34.5154	R	0	35	34.3958	35.1143	60.1782	0	60.1782	83.8314	83.8314
39	0.564291	47.8291	35.9821	R	0	35	33.7514	34.4565	59.0508	0	59.0508	83.5565	83.5565
40	0.564291	47.5233	37.4766	R	0	35	32.9219	33.6096	57.5993	0	57.5993	82.8398	82.8398
41	0.564291	46.9508	39.0017	R	0	35	31.9047	32.5712	55.8199	0	55.8199	81.6574	81.6574
42	0.564291	46.0942	40.5604	R	0	35	30.6974	31.3387	53.7076	0	53.7076	79.9817	79.9817
43	0.564291	44.9335	42.1563	R	0	35	29.2967	29.9087	51.2569	0	51.2569	77.7808	77.7808
44	0.564291	43.4452	43.7936	R	0	35	27.6991	28.2777	48.4616	0	48.4616	75.0181	75.0181
45	0.564291	41.5846	45.4771	R	0	35	25.8896	26.4304	45.2958	0	45.2958	71.6201	71.6201
46	0.564291	36.6753	47.2126	R	0	35	22.2599	22.7249	38.9454	0	38.9454	62.9945	62.9945
47	0.564291	29.4275	49.007	R	0	35	17.3787	17.7417	30.4054	0	30.4054	50.4021	50.4021
48	0.564291	21.7062	50.8686	R	0	35	12.4437	12.7036	21.771	0	21.771	37.0658	37.0658
49	0.564291	13.4525	52.808	R	0	35	7.7517	7.91363	13.5622	0	13.5622	23.7777	23.7777
50	0.564291	4.59218	54.8385	R	0	35	4.19215	4.27972	7.3345	0	7.3345	13.2857	13.2857

## Global Minimum Query (janbu simplified) - Safety Factor: 0.977208

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.46475	0.553219	-12.3077	GS	0	30	0.703172	0.687145	1.42821	0	1.42821	1.27479	1.27479
2	0.46475	1.60923	-10.9917	GS	0	30	2.01269	1.96682	4.08795	0	4.08795	3.69702	3.69702
3	0.46475	2.56505	-9.68155	GS	0	30	3.15829	3.08631	6.41477	0	6.41477	5.87596	5.87596
4	0.46475	3.42193	-8.3765	GS	0	30	4.14962	4.05504	8.42823	0	8.42823	7.81721	7.81721
5	0.46475	4.6708	-7.07581	GS	0	30	5.58048	5.45329	11.3344	0	11.3344	10.6417	10.6417
6	0.46475	7.80948	-5.77878	GS	0	30	9.19588	8.98629	18.6777	0	18.6777	17.747	17.747
7	0.46475	11.0634	-4.48472	GS	0	30	12.8435	12.5508	26.0864	0	26.0864	25.0791	25.0791
8	0.46475	14.2298	-3.19294	GS	0	30	16.2905	15.9192	33.0874	0	33.0874	32.1787	32.1787
9	0.46475	16.2393	-1.9028	GS	0	30	18.338	17.92	37.2461	0	37.2461	36.6369	36.6369
10	0.46475	16.3658	-0.613611	GS	0	30	18.2333	17.8177	37.0335	0	37.0335	36.8382	36.8382
11	0.46475	16.3712	0.675262	GS	0	30	17.9983	17.5881	36.556	0	36.556	36.7682	36.7682
12	0.46475	16.2819	1.96448	GS	0	30	17.6665	17.2638	35.8823	0	35.8823	36.4882	36.4882
13	0.46475	17.2244	3.25469	GS	0	30	18.4479	18.0274	37.4693	0	37.4693	38.5184	38.5184
14	0.46475	19.8519	4.54656	GS	0	30	20.99	20.5116	42.6325	0	42.6325	44.3016	44.3016
15	0.46475	22.4059	5.84075	GS	0	30	23.3895	22.8564	47.5061	0	47.5061	49.8988	49.8988
16	0.46475	24.8636	7.13793	GS	0	30	25.6273	25.0432	52.0513	0	52.0513	55.2606	55.2606
17	0.46475	27.224	8.43881	GS	0	30	27.7073	27.0758	56.2761	0	56.2761	60.3867	60.3867
18	0.46475	29.4861	9.74409	GS	0	30	29.6331	28.9577	60.1875	0	60.1875	65.2763	65.2763
19	0.46507	31.6576	11.055	R	0	35	37.2545	36.4054	62.3906	0	62.3906	69.6693	69.6693
20	0.46507	33.6937	12.3722	R	0	35	39.0613	38.171	65.4168	0	65.4168	73.9851	73.9851
21	0.46507	35.6253	13.696	R	0	35	40.6867	39.7594	68.1387	0	68.1387	78.0541	78.0541
22	0.46507	37.4507	15.0274	R	0	35	42.1345	41.1742	70.5634	0	70.5634	81.8749	81.8749
23	0.46507	39.1679	16.3672	R	0	35	43.4079	42.4185	72.6959	0	72.6959	85.4445	85.4445
24	0.46507	40.7749	17.7162	R	0	35	44.5095	43.495	74.5409	0	74.5409	88.7595	88.7595
25	0.46507	42.2692	19.0754	R	0	35	45.4419	44.4062	76.1024	0	76.1024	91.8163	91.8163
26	0.46507	43.648	20.4459	R	0	35	46.2071	45.1539	77.3838	0	77.3838	94.6102	94.6102
27	0.46507	44.9085	21.8288	R	0	35	46.8064	45.7396	78.3876	0	78.3876	97.1361	97.1361
28	0.46507	46.0467	23.2251	R	0	35	47.2408	46.1641	79.1151	0	79.1151	99.3871	99.3871
29	0.46507	45.5426	24.6363	R	0	35	45.9802	44.9322	77.0038	0	77.0038	98.0904	98.0904
30	0.46507	43.4928	26.0635	R	0	35	43.1995	42.2149	72.3469	0	72.3469	93.4761	93.4761
31	0.46507	41.3085	27.5084	R	0	35	40.3519	39.4322	67.578	0	67.578	88.5914	88.5914
32	0.46507	38.9846	28.9725	R	0	35	37.4381	36.5848	62.6981	0	62.6981	83.4269	83.4269
33	0.46507	36.5152	30.4577	R	0	35	34.4586	33.6732	57.7083	0	57.7083	77.9717	77.9717
34	0.46507	35.1226	31.9659	R	0	35	32.5534	31.8114	54.5177	0	54.5177	74.8323	74.8323
35	0.46507	35.3478	33.4993	R	0	35	32.1594	31.4264	53.8578	0	53.8578	75.1431	75.1431
36	0.46507	35.4193	35.0604	R	0	35	31.6109	30.8904	52.9392	0	52.9392	75.1231	75.1231
37	0.46507	35.3131	36.6519	R	0	35	30.8927	30.1886	51.7365	0	51.7365	74.7229	74.7229
38	0.46507	35.018	38.2771	R	0	35	30.0026	29.3188	50.246	0	50.246	73.9212	73.9212
39	0.46507	34.5212	39.9396	R	0	35	28.9382	28.2786	48.4632	0	48.4632	72.6933	72.6933
40	0.46507	33.8079	41.6436	R	0	35	27.696	27.0648	46.3831	0	46.3831	71.0105	71.0105
41	0.46507	32.8607	43.3939	R	0	35	26.2729	25.6741	43.9996	0	43.9996	68.8394	68.8394
42	0.46507	31.6589	45.1965	R	0	35	24.6646	24.1024	41.3061	0	41.3061	66.1404	66.1404
43	0.46507	30.178	47.0581	R	0	35	22.8663	22.3451	38.2946	0	38.2946	62.8656	62.8656
44	0.46507	28.3878	48.9874	R	0	35	20.8731	20.3974	34.9566	0	34.9566	58.9577	58.9577
45	0.46507	26.2513	50.9946	R	0	35	18.6795	18.2538	31.2829	0	31.2829	54.3458	54.3458
46	0.46507	23.7218	53.0931	R	0	35	16.2797	15.9087	27.2639	0	27.2639	48.941	48.941
47	0.46507	20.7392	55.2997	R	0	35	13.6681	13.3566	22.8902	0	22.8902	42.6293	42.6293
48	0.46507	17.2236	57.6372	R	0	35	10.84	10.5929	18.1538	0	18.1538	35.2594	35.2594
49	0.46507	12.2332	60.137	R	0	35	7.29738	7.13106	12.221	0	12.221	24.9306	24.9306
50	0.46507	4.26549	62.8452	R	0	35	2.38625	2.33186	3.99629	0	3.99629	8.64845	8.64845

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.02089

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	117.078	171.735	0	0	0
2	117.638	171.619	0.514368	0	0
3	118.198	171.514	1.95143	0	0
4	118.759	171.422	4.17667	0	0
5	119.319	171.342	7.02326	0	0
6	119.879	171.274	10.3397	0	0
7	120.439	171.218	13.9914	0	0
8	120.999	171.173	17.8588	0	0
9	121.559	171.14	21.8366	0	0
10	122.119	171.119	25.9246	0	0
11	122.68	171.109	31.2262	0	0
12	123.24	171.112	37.8644	0	0
13	123.8	171.125	45.5398	0	0
14	124.36	171.151	53.041	0	0
15	124.92	171.188	59.872	0	0
16	125.48	171.236	66.023	0	0
17	126.04	171.297	71.966	0	0
18	126.601	171.369	78.2219	0	0
19	127.161	171.454	84.6025	0	0
20	127.721	171.55	90.9265	0	0
21	128.281	171.659	97.0234	0	0
22	128.845	171.781	106.111	0	0
23	129.41	171.916	114.848	0	0
24	129.974	172.063	123.079	0	0
25	130.538	172.224	130.658	0	0
26	131.102	172.398	137.452	0	0
27	131.667	172.586	143.335	0	0
28	132.231	172.788	148.194	0	0
29	132.795	173.004	151.921	0	0
30	133.36	173.234	154.361	0	0
31	133.924	173.48	155.435	0	0
32	134.488	173.742	155.265	0	0
33	135.052	174.019	153.987	0	0
34	135.617	174.313	151.708	0	0
35	136.181	174.624	148.308	0	0
36	136.745	174.954	143.729	0	0
37	137.31	175.302	137.943	0	0
38	137.874	175.669	130.938	0	0
39	138.438	176.057	122.715	0	0
40	139.003	176.467	113.289	0	0
41	139.567	176.899	102.696	0	0
42	140.131	177.356	90.9899	0	0
43	140.695	177.839	78.2464	0	0
44	141.26	178.35	64.5683	0	0
45	141.824	178.891	50.0884	0	0
46	142.388	179.465	34.9819	0	0
47	142.953	180.075	20.5122	0	0
48	143.517	180.724	7.9374	0	0
49	144.081	181.418	-2.08837	0	0
50	144.645	182.161	-9.01994	0	0
51	145.21	182.962	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 0.977208**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	119.896	171.848	0	0	0
2	120.361	171.746	0.421598	0	0
3	120.825	171.656	1.5805	0	0
4	121.29	171.577	3.32497	0	0
5	121.755	171.508	5.52081	0	0
6	122.22	171.451	8.34574	0	0
7	122.684	171.404	12.7916	0	0
8	123.149	171.367	18.7107	0	0
9	123.614	171.341	25.8522	0	0
10	124.079	171.326	33.4806	0	0
11	124.543	171.321	40.658	0	0
12	125.008	171.326	47.341	0	0
13	125.473	171.342	53.506	0	0
14	125.938	171.369	59.5305	0	0
15	126.402	171.406	65.9133	0	0
16	126.867	171.453	72.4969	0	0
17	127.332	171.511	79.1271	0	0
18	127.797	171.58	85.6593	0	0
19	128.261	171.66	91.9582	0	0
20	128.726	171.751	100.752	0	0
21	129.192	171.853	109.196	0	0
22	129.657	171.966	117.173	0	0
23	130.122	172.091	124.57	0	0
24	130.587	172.228	131.284	0	0
25	131.052	172.376	137.219	0	0
26	131.517	172.537	142.289	0	0
27	131.982	172.711	146.411	0	0
28	132.447	172.897	149.511	0	0
29	132.912	173.096	151.524	0	0
30	133.377	173.31	152.362	0	0
31	133.842	173.537	152.058	0	0
32	134.307	173.779	150.718	0	0
33	134.772	174.037	148.454	0	0
34	135.237	174.31	145.39	0	0
35	135.703	174.601	141.526	0	0
36	136.168	174.908	136.703	0	0
37	136.633	175.235	130.917	0	0
38	137.098	175.581	124.182	0	0
39	137.563	175.948	116.523	0	0
40	138.028	176.337	107.981	0	0
41	138.493	176.751	98.617	0	0
42	138.958	177.19	88.5109	0	0
43	139.423	177.659	77.7696	0	0
44	139.888	178.158	66.5311	0	0
45	140.353	178.693	54.9714	0	0
46	140.818	179.267	43.3157	0	0
47	141.283	179.887	31.8523	0	0
48	141.748	180.558	20.9541	0	0
49	142.213	181.292	11.1103	0	0
50	142.679	182.102	3.49525	0	0
51	143.144	183.009	0	0	0

## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	117.797, 171.754
	116.967, 171.732
	116.539, 171.715
	116.152, 171.7
	115.404, 171.665
	115.199, 171.655
	114.737, 171.632
	114.55, 171.621
	114.145, 171.598
	112.57, 171.297
	111.686, 171.542
	111.404, 171.551
	111.072, 171.559
	104.726, 171.809
	104.239, 171.835
	103.425, 171.879
	103.171, 171.892
	100.856, 172
	100.841, 172
	100.84, 172
	100.827, 172
	98.9988, 172
	97.8702, 172
	96.0192, 172
	95.9885, 172
	95.9849, 172
	95.8963, 171.996
	95.7799, 171.99
	95.0929, 171.95
	92.6415, 171.829
	82.7527, 171.356
	80.3194, 171.792
	80.0035, 171.821
	78.881, 171.858
	77.7611, 171.888
	76.5394, 171.922
	74.2801, 172
	73.9621, 172
	73.8567, 172
	73.8454, 172
	73.8312, 172
	73.4897, 172
	72.5092, 172
	48.2394, 172.939

47.5972, 172.924  
45.3497, 172.816  
44.4633, 172.761  
43.0692, 172.672  
42.7499, 172.651  
41.3498, 172.716  
40.7862, 172.675  
40.6461, 172.667  
39.8944, 172.638  
39.4024, 172.619  
37.9021, 172.539  
36.8866, 172.634  
36.5531, 172.609  
35.4462, 172.54  
35.0448, 172.522  
34.3037, 172.604  
33.1529, 172.515  
32.8871, 172.488  
32.64, 172.479  
32.0974, 172.449  
29.3618, 172.471  
28.265, 172.506  
26.081, 172.16  
26.0776, 172.159  
26.0733, 172.159  
23.3064, 172.232  
19.9644, 172.233  
19.6622, 172.223  
19.6074, 172.22  
19.5653, 172.216  
19.5228, 172.214  
19.434, 172.21  
19.349, 172.206  
19.2928, 172.204  
19.1214, 172.195  
17.2124, 172.118  
17.0981, 172.114  
16.5461, 172.112  
16.402, 172.108  
16.1724, 172.106  
15.5906, 172.345  
15.3426, 172.361  
15.128, 172.343  
14.8234, 172.355  
14.4687, 172.369  
14.2035, 172.398  
13.9601, 172.45  
12.1076, 172.163  
11.7853, 172.185  
11.4509, 172.216  
9.09612, 172.458  
8.75219, 172.488  
8.252, 172.543  
5.37884, 172.725  
4.92527, 172.734  
4.66894, 172.738  
4.22508, 172.742  
3.94246, 172.744  
3.65928, 172.746

External Boundary

3.10738, 172.75  
0, 172.566  
0, 133.879  
0, 123.064  
0, 75.489  
311, 75.489  
311, 207.9  
311, 218.715  
309.272, 218.438  
306.897, 218.288  
306.775, 218.198  
306.487, 218  
306.404, 217.978  
306.382, 217.973  
303.872, 217.319  
303.365, 217.185  
302.586, 216.987  
300.248, 216.377  
298.828, 216  
298.051, 215.695  
297.123, 215.372  
294.646, 214.474  
293.674, 214.121  
293.611, 214.099  
293.313, 214  
291.396, 212.965  
290.833, 212.662  
289.653, 212  
288.329, 211.572  
287.7, 211.358  
284.016, 210.087  
283.9, 210.048  
283.866, 210.036  
283.824, 210.022  
283.759, 210  
282.581, 209.679  
280.358, 209.045  
279.603, 208.826  
278.218, 208.43  
276.782, 208  
276.763, 208  
276.753, 208  
276.089, 207.909  
275.464, 207.814  
275.026, 207.749  
274.707, 207.702  
274.439, 207.668  
273.46, 207.588  
270.158, 206.584  
269.739, 206.442  
269.585, 206.404  
269.317, 206.341  
267.836, 206  
266.509, 205.644  
262.164, 204.393  
260.812, 204  
260.032, 203.744  
259.559, 203.593  
257.487, 202.928




255.257, 202.212  
255.178, 202.187  
254.588, 202  
254.572, 202  
253.36, 201.258  
251.346, 200  
251.338, 200  
250.86, 199.853  
244.823, 198  
243.938, 197.64  
241.48, 196.63  
239.893, 196  
237.867, 194.486  
237.17, 194  
237.154, 193.992  
235.029, 192.836  
232.226, 192.67  
230.988, 192.461  
230.918, 192.442  
230.838, 192.418  
230.737, 192.39  
230.655, 192.364  
230.475, 192.312  
229.462, 192  
227.778, 191.417  
225.876, 190.757  
225.663, 190.682  
225.182, 190.516  
224.911, 190.427  
224.785, 190.386  
224.739, 190.373  
224.074, 190.171  
224.033, 190.16  
223.987, 190.154  
223.969, 190.151  
223.949, 190.147  
223.94, 190.171  
223.885, 190.138  
223.753, 190.118  
223.671, 190.103  
223.232, 190.018  
223.145, 190  
223.021, 190.011  
222.296, 190.079  
222.134, 190.096  
221.919, 190.12  
221.593, 190.171  
221.418, 190.171  
220.349, 189.709  
219.893, 189.511  
219.085, 189.183  
217.841, 188.673  
217.004, 188.324  
216.213, 188  
213.376, 188.711  
212.723, 188.874  
211.823, 189.071  
210.767, 189.071  
210.688, 188.939

210.337, 188.67
209.855, 188.196
208.779, 187.121
207.649, 186
207.576, 186.196
205.33, 185.12
191.17, 184.054
187.165, 183.69
186.534, 183.688
186.433, 183.536
186.431, 183.497
186.422, 183.479
186.391, 183.431
186.358, 183.376
186.321, 183.304
186.164, 182.872
185.945, 182.405
185.634, 182
185.514, 182
185.381, 182
185.08, 182
184.874, 182
184.845, 182
184.81, 182
184.311, 182
181.223, 182
180.292, 182
178.831, 182
176.2, 182
175.919, 182
168.783, 182
168.114, 182.446
142.339, 183.027
135.283, 178.099
132.904, 178.099
125.53, 173.099
123.679, 173.099
121.939, 171.939

Material Boundary	121.939, 171.939 123.006, 172 123.195, 171.991 124.227, 171.944 127.347, 171.72 129.503, 171.579 130.673, 171.503 131.196, 171.47 132.22, 171.374 132.458, 171.542 132.57, 171.592 132.681, 171.643 132.748, 171.665 133.278, 171.69 134.084, 171.933 134.977, 172.249 135.029, 172.257 139.481, 174 140.524, 174.621 142.67, 176 145.394, 177.888 145.549, 178 145.643, 178.06 148.617, 180 149.71, 180.511 150.121, 180.714 152.61, 182 152.656, 182.005 153.129, 182.053 154.46, 182.235 159.245, 182.332 164.283, 182.359 164.702, 182.315 164.923, 182.288 165.198, 182.258 165.374, 182.239 165.674, 182.208 166.441, 182.133 167.838, 182 168.783, 182
Material Boundary	132.57, 171.592 142.734, 171.521 154.27, 172.496 167.707, 175.197 179.382, 180.128 184.311, 182
Material Boundary	0, 133.879 50.3512, 135.766 111.871, 145.119 153, 155.5 167.397, 168.165 174.258, 176.577 179.382, 180.128

Material Boundary	0, 123.064 50.3512, 124.95 111.871, 134.304 153, 144.685 171.454, 152.92 196.483, 167.135 229.969, 181.341 247.841, 188.111 285.858, 199.907 311, 207.9
-------------------	--

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 167.771 155.007, 169.644 179.599, 173.397 205.964, 179.149 235.19, 188.426 311, 211.233	Assigned to: 
Distributed Load	168.114, 182.446 144.555, 183.033	Constant DistributionOrientation: Normal to boundary Magnitude: 6 kN/m2 Creates Excess Pore Pressure: No
Distributed Load	184.835, 182 184.81, 182 184.311, 182 181.223, 182 180.292, 182 178.831, 182 176.2, 182 175.919, 182 168.783, 182	Constant DistributionOrientation: Normal to boundary Magnitude: 6 kN/m2 Creates Excess Pore Pressure: No



1+000

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 1+000

### Project Summary

---

File Name:	1+000.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.486s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left



## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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

# Loading

---

2 Distributed Loads present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

## Distributed Load 2

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

# Materials

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## R

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

## GS

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	0
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1



# Global Minimums

---

## Method: bishop simplified

---

	<b>FS</b>	<b>1.015440</b>
Center:		119.344, 202.272
Radius:		30.491
Left Slip Surface Endpoint:		118.606, 171.790
Right Slip Surface Endpoint:		142.984, 183.015
Resisting Moment:		10519.5 kN-m
Driving Moment:		10359.6 kN-m
Total Slice Area:		38.1439 m <sup>2</sup>
Surface Horizontal Width:		24.3783 m
Surface Average Height:		1.56467 m

## Method: janbu simplified

---

	<b>FS</b>	<b>1.002250</b>
Center:		119.535, 201.948
Radius:		30.138
Left Slip Surface Endpoint:		119.110, 171.813
Right Slip Surface Endpoint:		142.984, 183.015
Resisting Horizontal Force:		303.945 kN
Driving Horizontal Force:		303.263 kN
Total Slice Area:		38.3975 m <sup>2</sup>
Surface Horizontal Width:		23.8735 m
Surface Average Height:		1.60838 m

# Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 4916

Number of Invalid Surfaces: 16

#### Error Codes

Error Code -112 reported for 16 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 4909

Number of Invalid Surfaces: 23

#### Error Codes

Error Code -108 reported for 1 surface

Error Code -112 reported for 22 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1+\tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.01544

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.48532	0.139577	-0.931476	GS	0	24.7913	0.119812	0.121662	0.289746	0	0.289746	0.287798	0.287798
2	0.48532	0.382172	-0.0194295	GS	0	24.7913	0.325672	0.3307	0.787585	0	0.787585	0.787475	0.787475
3	0.48532	0.551649	0.892612	GS	0	24.7913	0.466704	0.47391	1.12865	0	1.12865	1.13592	1.13592
4	0.48532	0.647982	1.80488	GS	0	24.7913	0.544276	0.55268	1.31625	0	1.31625	1.3334	1.3334
5	0.48532	0.671089	2.71761	GS	0	24.7913	0.55967	0.568311	1.35347	0	1.35347	1.38004	1.38004
6	0.48532	0.620831	3.63102	GS	0	24.7913	0.514086	0.522023	1.24324	0	1.24324	1.27586	1.27586
7	0.48532	0.522336	4.54537	GS	0	24.7913	0.429473	0.436104	1.03861	0	1.03861	1.07275	1.07275
8	0.48532	2.15006	5.46087	GS	0	24.7913	1.75537	1.78247	4.24509	0	4.24509	4.4129	4.4129
9	0.48532	4.8091	6.37778	GS	0	24.7913	3.89872	3.95892	9.42844	0	9.42844	9.86422	9.86422
10	0.488059	7.4383	7.29892	R	0	29.2561	7.13743	7.24763	14.2322	0	14.2322	15.1464	15.1464
11	0.488059	9.47882	8.22457	R	0	29.2561	9.01873	9.15798	17.9836	0	17.9836	19.2871	19.2871
12	0.488059	9.06672	9.15238	R	0	29.2561	8.55403	8.6861	17.0569	0	17.0569	18.4351	18.4351
13	0.488059	8.2594	10.0826	R	0	29.2561	7.72681	7.84611	15.4074	0	15.4074	16.7814	16.7814
14	0.488059	7.51536	11.0156	R	0	29.2561	6.97159	7.07923	13.9015	0	13.9015	15.2586	15.2586
15	0.488059	8.99701	11.9515	R	0	29.2561	8.27574	8.40352	16.502	0	16.502	18.2538	18.2538
16	0.488059	11.2022	12.8906	R	0	29.2561	10.2172	10.375	20.3734	0	20.3734	22.7117	22.7117
17	0.488059	13.3251	13.8333	R	0	29.2561	12.0505	12.2366	24.0292	0	24.0292	26.9965	26.9965
18	0.488059	15.3647	14.7798	R	0	29.2561	13.7771	13.9898	27.4717	0	27.4717	31.1065	31.1065
19	0.488059	17.3199	15.7305	R	0	29.2561	15.3977	15.6354	30.7033	0	30.7033	35.0402	35.0402
20	0.488059	19.1895	16.6856	R	0	29.2561	16.9136	17.1747	33.726	0	33.726	38.7956	38.7956
21	0.488059	20.9724	17.6456	R	0	29.2561	18.3254	18.6083	36.5412	0	36.5412	42.3704	42.3704
22	0.488059	22.6671	18.6106	R	0	29.2561	19.634	19.9371	39.1506	0	39.1506	45.7622	45.7622
23	0.488059	24.2722	19.5812	R	0	29.2561	20.8399	21.1617	41.5553	0	41.5553	48.9684	48.9684
24	0.488059	25.7862	20.5577	R	0	29.2561	21.9438	22.2826	43.7565	0	43.7565	51.9861	51.9861
25	0.488059	27.2072	21.5404	R	0	29.2561	22.946	23.3003	45.7548	0	45.7548	54.8122	54.8122
26	0.488059	28.5334	22.5299	R	0	29.2561	23.8469	24.2151	47.5512	0	47.5512	57.4435	57.4435
27	0.488059	29.7628	23.5265	R	0	29.2561	24.6467	25.0272	49.1461	0	49.1461	59.8763	59.8763
28	0.488059	30.8932	24.5307	R	0	29.2561	25.3454	25.7367	50.5392	0	50.5392	62.1061	62.1061
29	0.488059	31.7753	25.543	R	0	29.2561	25.8236	26.2223	51.4929	0	51.4929	63.8339	63.8339
30	0.488059	30.2422	26.5639	R	0	29.2561	24.3425	24.7183	48.5394	0	48.5394	60.7101	60.7101
31	0.488059	27.8063	27.5941	R	0	29.2561	22.164	22.5062	44.1953	0	44.1953	55.7795	55.7795
32	0.488059	25.2608	28.634	R	0	29.2561	19.9354	20.2432	39.7515	0	39.7515	50.636	50.636
33	0.488059	22.6024	29.6843	R	0	29.2561	17.6571	17.9297	35.2086	0	35.2086	45.2736	45.2736
34	0.488059	20.8908	30.7457	R	0	29.2561	16.1514	16.4008	32.2063	0	32.2063	41.8137	41.8137
35	0.488059	21.0253	31.8189	R	0	29.2561	16.0838	16.3321	32.0714	0	32.0714	42.0511	42.0511
36	0.488059	21.079	32.9048	R	0	29.2561	15.9503	16.1966	31.8053	0	31.8053	42.126	42.126
37	0.488059	21.0037	34.0041	R	0	29.2561	15.7168	15.9595	31.3398	0	31.3398	41.9425	41.9425
38	0.488059	20.7944	35.1179	R	0	29.2561	15.3827	15.6202	30.6733	0	30.6733	41.4916	41.4916
39	0.488059	20.4457	36.2471	R	0	29.2561	14.9469	15.1777	29.8044	0	29.8044	40.7627	40.7627
40	0.488059	19.9516	37.3929	R	0	29.2561	14.4086	14.6311	28.7311	0	28.7311	39.7446	39.7446
41	0.488059	19.3052	38.5565	R	0	29.2561	13.7668	13.9794	27.4515	0	27.4515	38.4244	38.4244
42	0.488059	18.4992	39.7393	R	0	29.2561	13.0206	13.2216	25.9632	0	25.9632	36.7881	36.7881
43	0.488059	17.5253	40.9427	R	0	29.2561	12.1683	12.3562	24.2639	0	24.2639	34.8203	34.8203
44	0.488059	16.3742	42.1685	R	0	29.2561	11.209	11.3821	22.3511	0	22.3511	32.5036	32.5036
45	0.488059	15.0356	43.4185	R	0	29.2561	10.1412	10.2978	20.2218	0	20.2218	29.8181	29.8181
46	0.488059	13.4977	44.695	R	0	29.2561	8.96354	9.10194	17.8735	0	17.8735	26.7421	26.7421
47	0.488059	11.7472	46.0002	R	0	29.2561	7.6745	7.79299	15.3031	0	15.3031	23.2503	23.2503
48	0.488059	9.76875	47.337	R	0	29.2561	6.27262	6.36947	12.5078	0	12.5078	19.3142	19.3142
49	0.488059	7.49552	48.7086	R	0	29.2561	4.72552	4.79848	9.42279	0	9.42279	14.8034	14.8034
50	0.488059	2.9047	50.1187	R	0	29.2561	1.79581	1.82354	3.58088	0	3.58088	5.73008	5.73008

## Global Minimum Query (janbu simplified) - Safety Factor: 1.00225

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.463696	0.106745	-0.366592	GS	0	24.7913	0.0967294	0.096947	0.230886	0	0.230886	0.230267	0.230267
2	0.463696	0.287977	0.514987	GS	0	24.7913	0.259111	0.259694	0.61848	0	0.61848	0.620809	0.620809
3	0.463696	0.404683	1.39669	GS	0	24.7913	0.361558	0.362372	0.863014	0	0.863014	0.87183	0.87183
4	0.463696	0.456812	2.27872	GS	0	24.7913	0.40528	0.406192	0.967376	0	0.967376	0.983503	0.983503
5	0.463696	0.444269	3.16129	GS	0	24.7913	0.391412	0.392293	0.934271	0	0.934271	0.955889	0.955889
6	0.463696	0.366912	4.04462	GS	0	24.7913	0.321021	0.321743	0.766252	0	0.766252	0.788951	0.788951
7	0.463696	1.30783	4.92891	GS	0	24.7913	1.13636	1.13892	2.71241	0	2.71241	2.81041	2.81041
8	0.463696	3.76227	5.81437	GS	0	24.7913	3.24651	3.25381	7.74919	0	7.74919	8.07978	8.07978
9	0.480093	6.42185	6.71695	R	0	29.2561	6.37583	6.39018	12.5484	0	12.5484	13.2993	13.2993
10	0.480093	8.84803	7.63691	R	0	29.2561	8.70996	8.72956	17.1423	0	17.1423	18.3102	18.3102
11	0.480093	9.15063	8.55886	R	0	29.2561	8.93144	8.95154	17.5782	0	17.5782	18.9224	18.9224
12	0.480093	8.41873	9.48305	R	0	29.2561	8.14748	8.16581	16.0352	0	16.0352	17.3962	17.3962
13	0.480093	7.61029	10.4097	R	0	29.2561	7.30272	7.31915	14.3726	0	14.3726	15.7142	15.7142
14	0.480093	7.99708	11.3392	R	0	29.2561	7.60887	7.62599	14.9752	0	14.9752	16.501	16.501
15	0.480093	10.1666	12.2717	R	0	29.2561	9.59106	9.61264	18.8764	0	18.8764	20.9626	20.9626
16	0.480093	12.2735	13.2075	R	0	29.2561	11.4803	11.5061	22.5945	0	22.5945	25.2888	25.2888
17	0.480093	14.3009	14.1469	R	0	29.2561	13.2626	13.2924	26.1024	0	26.1024	29.4452	29.4452
18	0.480093	16.2476	15.0902	R	0	29.2561	14.939	14.9726	29.4018	0	29.4018	33.4298	33.4298
19	0.480093	18.1128	16.0377	R	0	29.2561	16.5108	16.5479	32.495	0	32.495	37.2412	37.2412
20	0.480093	19.8952	16.9897	R	0	29.2561	17.9786	18.0191	35.3841	0	35.3841	40.8772	40.8772
21	0.480093	21.5936	17.9466	R	0	29.2561	19.3437	19.3872	38.0708	0	38.0708	44.336	44.336
22	0.480093	23.2067	18.9087	R	0	29.2561	20.6064	20.6528	40.556	0	40.556	47.6147	47.6147
23	0.480093	24.7331	19.8764	R	0	29.2561	21.7676	21.8166	42.8413	0	42.8413	50.711	50.711
24	0.480093	26.1712	20.85	R	0	29.2561	22.8276	22.879	44.9275	0	44.9275	53.6217	53.6217
25	0.480093	27.5192	21.8299	R	0	29.2561	23.787	23.8405	46.8157	0	46.8157	56.3442	56.3442
26	0.480093	28.7754	22.8167	R	0	29.2561	24.6458	24.7013	48.5062	0	48.5062	58.8748	58.8748
27	0.480093	29.9379	23.8106	R	0	29.2561	25.4046	25.4618	49.9993	0	49.9993	61.2097	61.2097
28	0.480093	31.0044	24.8122	R	0	29.2561	26.0632	26.1218	51.2954	0	51.2954	63.345	63.345
29	0.480093	31.2992	25.8219	R	0	29.2561	26.061	26.1196	51.291	0	51.291	63.9017	63.9017
30	0.480093	29.2061	26.8404	R	0	29.2561	24.0832	24.1374	47.3989	0	47.3989	59.5855	59.5855
31	0.480093	26.821	27.8681	R	0	29.2561	21.8992	21.9485	43.1003	0	43.1003	54.6797	54.6797
32	0.480093	24.3296	28.9056	R	0	29.2561	19.6662	19.7104	38.7053	0	38.7053	49.5641	49.5641
33	0.480093	21.7471	29.9537	R	0	29.2561	17.3991	17.4382	34.2435	0	34.2435	44.2701	44.2701
34	0.480093	20.8319	31.0129	R	0	29.2561	16.4931	16.5302	32.4603	0	32.4603	42.3753	42.3753
35	0.480093	20.9748	32.084	R	0	29.2561	16.4289	16.4659	32.3341	0	32.3341	42.6335	42.6335
36	0.480093	20.9968	33.1678	R	0	29.2561	16.2663	16.3029	32.0141	0	32.0141	42.6454	42.6454
37	0.480093	20.8936	34.2652	R	0	29.2561	16.0047	16.0407	31.4992	0	31.4992	42.4026	42.4026
38	0.480093	20.6601	35.3771	R	0	29.2561	15.6432	15.6784	30.7878	0	30.7878	41.8954	41.8954
39	0.480093	20.2911	36.5046	R	0	29.2561	15.1811	15.2153	29.8783	0	29.8783	41.1137	41.1137
40	0.480093	19.7806	37.6487	R	0	29.2561	14.6176	14.6505	28.7692	0	28.7692	40.0461	40.0461
41	0.480093	19.122	38.8108	R	0	29.2561	13.9515	13.9829	27.4583	0	27.4583	38.6799	38.6799
42	0.480093	18.3081	39.9921	R	0	29.2561	13.1818	13.2115	25.9434	0	25.9434	37.0012	37.0012
43	0.480093	17.3306	41.1943	R	0	29.2561	12.3074	12.3351	24.2225	0	24.2225	34.9947	34.9947
44	0.480093	16.1806	42.419	R	0	29.2561	11.3269	11.3524	22.2928	0	22.2928	32.6425	32.6425
45	0.480093	14.8479	43.6681	R	0	29.2561	10.2391	10.2621	20.1517	0	20.1517	29.9254	29.9254
46	0.480093	13.3208	44.9437	R	0	29.2561	9.04247	9.06282	17.7967	0	17.7967	26.8214	26.8214
47	0.480093	11.5862	46.2484	R	0	29.2561	7.73573	7.75314	15.2249	0	15.2249	23.3053	23.3053
48	0.480093	9.62923	47.585	R	0	29.2561	6.31747	6.33168	12.4335	0	12.4335	19.3484	19.3484
49	0.480093	7.3736	48.9566	R	0	29.2561	4.7485	4.75918	9.34561	0	9.34561	14.7998	14.7998
50	0.480093	2.83508	50.3671	R	0	29.2561	1.78989	1.79392	3.52273	0	3.52273	5.68381	5.68381

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.01544

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	118.606	171.79	0	0	0
2	119.091	171.782	0.0605943	0	0
3	119.576	171.782	0.219216	0	0
4	120.062	171.79	0.437809	0	0
5	120.547	171.805	0.682558	0	0
6	121.032	171.828	0.923748	0	0
7	121.518	171.859	1.13565	0	0
8	122.003	171.897	1.30458	0	0
9	122.488	171.944	1.9619	0	0
10	122.973	171.998	3.34779	0	0
11	123.462	172.061	5.95122	0	0
12	123.95	172.131	9.09643	0	0
13	124.438	172.21	11.9416	0	0
14	124.926	172.297	14.3861	0	0
15	125.414	172.392	16.4773	0	0
16	125.902	172.495	18.8227	0	0
17	126.39	172.607	21.5475	0	0
18	126.878	172.727	24.5573	0	0
19	127.366	172.856	27.7625	0	0
20	127.854	172.993	31.0775	0	0
21	128.342	173.139	34.4213	0	0
22	128.83	173.295	37.7169	0	0
23	129.318	173.459	40.8915	0	0
24	129.806	173.633	43.8764	0	0
25	130.294	173.816	46.6067	0	0
26	130.782	174.008	49.0221	0	0
27	131.27	174.211	51.0657	0	0
28	131.759	174.423	52.6853	0	0
29	132.247	174.646	53.8326	0	0
30	132.735	174.879	54.4606	0	0
31	133.223	175.123	54.5295	0	0
32	133.711	175.378	54.1031	0	0
33	134.199	175.645	53.2668	0	0
34	134.687	175.923	52.1131	0	0
35	135.175	176.213	50.6678	0	0
36	135.663	176.516	48.827	0	0
37	136.151	176.832	46.5892	0	0
38	136.639	177.161	43.9626	0	0
39	137.127	177.504	40.9626	0	0
40	137.615	177.862	37.613	0	0
41	138.103	178.235	33.9465	0	0
42	138.591	178.624	30.0053	0	0
43	139.079	179.03	25.8428	0	0
44	139.568	179.453	21.5246	0	0
45	140.056	179.895	17.1299	0	0
46	140.544	180.357	12.754	0	0
47	141.032	180.84	8.5099	0	0
48	141.52	181.346	4.5316	0	0
49	142.008	181.875	0.977482	0	0
50	142.496	182.431	-1.9462	0	0
51	142.984	183.015	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.00225**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	119.11	171.813	0	0	0
2	119.574	171.81	0.0456389	0	0
3	120.038	171.814	0.16348	0	0
4	120.502	171.825	0.321754	0	0
5	120.965	171.844	0.492254	0	0
6	121.429	171.869	0.650231	0	0
7	121.893	171.902	0.774298	0	0
8	122.356	171.942	1.19394	0	0
9	122.82	171.989	2.33682	0	0
10	123.3	172.046	4.69519	0	0
11	123.78	172.11	7.7827	0	0
12	124.26	172.182	10.8102	0	0
13	124.74	172.263	13.4446	0	0
14	125.22	172.351	15.6908	0	0
15	125.701	172.447	17.9103	0	0
16	126.181	172.552	20.554	0	0
17	126.661	172.664	23.5323	0	0
18	127.141	172.785	26.7552	0	0
19	127.621	172.915	30.1374	0	0
20	128.101	173.053	33.5974	0	0
21	128.581	173.199	37.0579	0	0
22	129.061	173.355	40.4457	0	0
23	129.541	173.519	43.6914	0	0
24	130.021	173.693	46.7295	0	0
25	130.502	173.876	49.4986	0	0
26	130.982	174.068	51.9409	0	0
27	131.462	174.27	54.0027	0	0
28	131.942	174.482	55.6343	0	0
29	132.422	174.704	56.7897	0	0
30	132.902	174.936	57.414	0	0
31	133.382	175.179	57.4872	0	0
32	133.862	175.433	57.0834	0	0
33	134.342	175.698	56.2859	0	0
34	134.822	175.975	55.1839	0	0
35	135.302	176.263	53.7513	0	0
36	135.783	176.564	51.9247	0	0
37	136.263	176.878	49.7063	0	0
38	136.743	177.205	47.1049	0	0
39	137.223	177.546	44.1366	0	0
40	137.703	177.901	40.8253	0	0
41	138.183	178.272	37.2036	0	0
42	138.663	178.658	33.3135	0	0
43	139.143	179.061	29.208	0	0
44	139.623	179.481	24.9516	0	0
45	140.103	179.92	20.6225	0	0
46	140.583	180.378	16.3142	0	0
47	141.064	180.857	12.1379	0	0
48	141.544	181.358	8.22509	0	0
49	142.024	181.884	4.73115	0	0
50	142.504	182.435	1.86246	0	0
51	142.984	183.015	0	0	0

## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	117.797, 171.754
	116.967, 171.732
	116.539, 171.715
	116.152, 171.7
	115.404, 171.665
	115.199, 171.655
	114.737, 171.632
	114.55, 171.621
	114.145, 171.598
	112.57, 171.297
	111.686, 171.542
	111.404, 171.551
	111.072, 171.559
	104.726, 171.809
	104.239, 171.835
	103.425, 171.879
	103.171, 171.892
	100.856, 172
	100.841, 172
	100.84, 172
	100.827, 172
	98.9988, 172
	97.8702, 172
	96.0192, 172
	95.9885, 172
	95.9849, 172
	95.8963, 171.996
	95.7799, 171.99
	95.0929, 171.95
	92.6415, 171.829
	82.7527, 171.356
	80.3194, 171.792
	80.0035, 171.821
	78.881, 171.858
	77.7611, 171.888
	76.5394, 171.922
	74.2801, 172
	73.9621, 172
	73.8567, 172
	73.8454, 172
	73.8312, 172
	73.4897, 172
	72.5092, 172
	48.2394, 172.939

47.5972, 172.924  
45.3497, 172.816  
44.4633, 172.761  
43.0692, 172.672  
42.7499, 172.651  
41.3498, 172.716  
40.7862, 172.675  
40.6461, 172.667  
39.8944, 172.638  
39.4024, 172.619  
37.9021, 172.539  
36.8866, 172.634  
36.5531, 172.609  
35.4462, 172.54  
35.0448, 172.522  
34.3037, 172.604  
33.1529, 172.515  
32.8871, 172.488  
32.64, 172.479  
32.0974, 172.449  
29.3618, 172.471  
28.265, 172.506  
26.081, 172.16  
26.0776, 172.159  
26.0733, 172.159  
23.3064, 172.232  
19.9644, 172.233  
19.6622, 172.223  
19.6074, 172.22  
19.5653, 172.216  
19.5228, 172.214  
19.434, 172.21  
19.349, 172.206  
19.2928, 172.204  
19.1214, 172.195  
17.2124, 172.118  
17.0981, 172.114  
16.5461, 172.112  
16.402, 172.108  
16.1724, 172.106  
15.5906, 172.345  
15.3426, 172.361  
15.128, 172.343  
14.8234, 172.355  
14.4687, 172.369  
14.2035, 172.398  
13.9601, 172.45  
12.1076, 172.163  
11.7853, 172.185  
11.4509, 172.216  
9.09612, 172.458  
8.75219, 172.488  
8.252, 172.543  
5.37884, 172.725  
4.92527, 172.734  
4.66894, 172.738  
4.22508, 172.742  
3.94246, 172.744  
3.65928, 172.746



External Boundary

3.10738, 172.75  
0, 172.566  
0, 133.879  
0, 123.064  
0, 75.489  
311, 75.489  
311, 207.9  
311, 218.715  
309.272, 218.438  
306.897, 218.288  
306.775, 218.198  
306.487, 218  
306.404, 217.978  
306.382, 217.973  
303.872, 217.319  
303.365, 217.185  
302.586, 216.987  
300.248, 216.377  
298.828, 216  
298.051, 215.695  
297.123, 215.372  
294.646, 214.474  
293.674, 214.121  
293.611, 214.099  
293.313, 214  
291.396, 212.965  
290.833, 212.662  
289.653, 212  
288.329, 211.572  
287.7, 211.358  
284.016, 210.087  
283.9, 210.048  
283.866, 210.036  
283.824, 210.022  
283.759, 210  
282.581, 209.679  
280.358, 209.045  
279.603, 208.826  
278.218, 208.43  
276.782, 208  
276.763, 208  
276.753, 208  
276.089, 207.909  
275.464, 207.814  
275.026, 207.749  
274.707, 207.702  
274.439, 207.668  
273.46, 207.588  
270.158, 206.584  
269.739, 206.442  
269.585, 206.404  
269.317, 206.341  
267.836, 206  
266.509, 205.644  
262.164, 204.393  
260.812, 204  
260.032, 203.744  
259.559, 203.593  
257.487, 202.928





255.257, 202.212  
255.178, 202.187  
254.588, 202  
254.572, 202  
253.36, 201.258  
251.346, 200  
251.338, 200  
250.86, 199.853  
244.823, 198  
243.938, 197.64  
241.48, 196.63  
239.893, 196  
237.867, 194.486  
237.17, 194  
237.154, 193.992  
235.029, 192.836  
232.226, 192.67  
230.988, 192.461  
230.918, 192.442  
230.838, 192.418  
230.737, 192.39  
230.655, 192.364  
230.475, 192.312  
229.462, 192  
227.778, 191.417  
225.876, 190.757  
225.663, 190.682  
225.182, 190.516  
224.911, 190.427  
224.785, 190.386  
224.739, 190.373  
224.074, 190.171  
224.033, 190.16  
223.987, 190.154  
223.969, 190.151  
223.949, 190.147  
223.94, 190.171  
223.885, 190.138  
223.753, 190.118  
223.671, 190.103  
223.232, 190.018  
223.145, 190  
223.021, 190.011  
222.296, 190.079  
222.134, 190.096  
221.919, 190.12  
221.593, 190.171  
221.418, 190.171  
220.349, 189.709  
219.893, 189.511  
219.085, 189.183  
217.841, 188.673  
217.004, 188.324  
216.213, 188  
213.376, 188.711  
212.723, 188.874  
211.823, 189.071  
210.767, 189.071  
210.688, 188.939

210.337, 188.67
209.855, 188.196
208.779, 187.121
207.649, 186
207.576, 186.196
205.33, 185.12
191.17, 184.054
187.165, 183.69
186.534, 183.688
186.433, 183.536
186.431, 183.497
186.422, 183.479
186.391, 183.431
186.358, 183.376
186.321, 183.304
186.164, 182.872
185.945, 182.405
185.634, 182
185.514, 182
185.381, 182
185.08, 182
184.874, 182
184.845, 182
184.81, 182
184.311, 182
181.223, 182
180.292, 182
178.831, 182
176.2, 182
175.919, 182
168.783, 182
168.114, 182.446
142.41, 183.028
134.769, 178.099
132.588, 178.099
125.269, 173.099
123.679, 173.099
121.939, 171.939

Material Boundary	121.939, 171.939 123.006, 172 123.195, 171.991 124.227, 171.944 127.347, 171.72 129.503, 171.579 130.673, 171.503 131.196, 171.47 132.22, 171.374 132.458, 171.542 132.57, 171.592 132.681, 171.643 132.748, 171.665 133.278, 171.69 134.084, 171.933 134.977, 172.249 135.029, 172.257 139.481, 174 140.524, 174.621 142.67, 176 145.394, 177.888 145.549, 178 145.643, 178.06 148.617, 180 149.71, 180.511 150.121, 180.714 152.61, 182 152.656, 182.005 153.129, 182.053 154.46, 182.235 159.245, 182.332 164.283, 182.359 164.702, 182.315 164.923, 182.288 165.198, 182.258 165.374, 182.239 165.674, 182.208 166.441, 182.133 167.838, 182 168.783, 182
Material Boundary	132.57, 171.592 142.734, 171.521 154.27, 172.496 167.707, 175.197 179.382, 180.128 184.311, 182
Material Boundary	0, 133.879 50.3512, 135.766 111.871, 145.119 153, 155.5 167.397, 168.165 174.258, 176.577 179.382, 180.128

Material Boundary	0, 123.064
	50.3512, 124.95
	111.871, 134.304
	153, 144.685
	171.454, 152.92
	196.483, 167.135
	229.969, 181.341
	247.841, 188.111
	285.858, 199.907
311, 207.9	

### Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 167.771	Assigned to:  AC  AC alt  R  GS
	155.007, 169.644	
	179.599, 173.397	
	205.964, 179.149	
	235.19, 188.426	
	311, 211.233	
Distributed Load	168.114, 182.446	Constant DistributionOrientation: Normal to boundaryMagnitude: 20 kN/m2Creates Excess Pore Pressure: No
	144.347, 183.038	
Distributed Load	184.835, 182	Constant DistributionOrientation: Normal to boundaryMagnitude: 20 kN/m2Creates Excess Pore Pressure: No
	184.81, 182	
	184.311, 182	
	181.223, 182	
	180.292, 182	
	178.831, 182	
	176.2, 182	
	175.919, 182	
168.783, 182		



3+300 - SISMA

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 3+300 - SISMA

### Project Summary

---

File Name:	3+300 - SISMA.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.267s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31



## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)
Name:	M1+R2 fronti scavo sisma
Type	Partial Factor
Permanent Actions: Unfavourable	1
Permanent Actions: Favourable	1
Variable Actions: Unfavourable	1
Variable Actions: Favourable	1
Effective cohesion	1
Coefficient of shearing resistance	1
Undrained strength	1
Weight density	1
Shear strength (other models)	1
Earth resistance	1.2
Tensile and plate strength	1
Shear strength	1
Compressive strength	1
Bond strength	1
Seismic Coefficient	1

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	5
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading

---




1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live



# Materials

<b>AC</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>AC alt</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>R</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

## Global Minimums

---

### Method: bishop simplified

---

FS	1.344060
Center:	124.419, 114.884
Radius:	35.033
Left Slip Surface Endpoint:	101.033, 88.800
Right Slip Surface Endpoint:	124.035, 79.854
Resisting Moment:	29378.2 kN-m
Driving Moment:	21857.8 kN-m
Total Slice Area:	66.9375 m <sup>2</sup>
Surface Horizontal Width:	23.0011 m
Surface Average Height:	2.91019 m

### Method: janbu simplified

---

FS	1.326960
Center:	124.419, 114.884
Radius:	35.033
Left Slip Surface Endpoint:	101.033, 88.800
Right Slip Surface Endpoint:	124.035, 79.854
Resisting Horizontal Force:	775.73 kN
Driving Horizontal Force:	584.591 kN
Total Slice Area:	66.9375 m <sup>2</sup>
Surface Horizontal Width:	23.0011 m
Surface Average Height:	2.91019 m

## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 7100

Number of Invalid Surfaces: 10

#### Error Codes

Error Code -112 reported for 10 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 7052

Number of Invalid Surfaces: 58

#### Error Codes

Error Code -108 reported for 4 surfaces

Error Code -112 reported for 54 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1+\tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.34406

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.464861	1.77405	-41.3707	R	0	35	2.97441	3.99779	6.85132	0	6.85132	9.47092	9.47092
2	0.464861	5.25583	-40.3652	R	0	35	5.36397	7.2095	12.3555	0	12.3555	16.9149	16.9149
3	0.464861	8.60786	-39.3745	R	0	35	7.71446	10.3687	17.7695	0	17.7695	24.1005	24.1005
4	0.464861	11.8356	-38.3977	R	0	35	10.0253	13.4746	23.0925	0	23.0925	31.0378	31.0378
5	0.464861	14.9442	-37.4339	R	0	35	12.2963	16.5269	28.3234	0	28.3234	37.7362	37.7362
6	0.464861	17.9382	-36.4824	R	0	35	14.527	19.5251	33.4617	0	33.4617	44.2041	44.2041
7	0.464861	20.8217	-35.5424	R	0	35	16.717	22.4687	38.5065	0	38.5065	50.4493	50.4493
8	0.464861	23.5988	-34.6134	R	0	35	18.8665	25.3577	43.4575	0	43.4575	56.4791	56.4791
9	0.464861	26.2729	-33.6946	R	0	35	20.975	28.1917	48.3145	0	48.3145	62.3002	62.3002
10	0.464861	28.8474	-32.7855	R	0	35	23.0426	30.9707	53.0769	0	53.0769	67.9186	67.9186
11	0.464861	31.3253	-31.8856	R	0	35	25.0691	33.6944	57.7448	0	57.7448	73.3402	73.3402
12	0.464861	33.7095	-30.9945	R	0	35	27.0544	36.3628	62.3178	0	62.3178	78.5702	78.5702
13	0.464861	36.0027	-30.1116	R	0	35	27.1762	36.5265	62.5984	0	62.5984	78.3593	78.3593
14	0.464861	38.2072	-29.2365	R	0	35	28.8836	38.8213	66.531	0	66.531	82.6977	82.6977
15	0.464861	40.3254	-28.3688	R	0	35	30.7289	41.3015	70.7817	0	70.7817	87.3752	87.3752
16	0.464861	42.3594	-27.5082	R	0	35	32.533	43.7263	74.9371	0	74.9371	91.8787	91.8787
17	0.464861	44.3111	-26.6543	R	0	35	34.2958	46.0956	78.9975	0	78.9975	96.2123	96.2123
18	0.464861	46.1583	-25.8067	R	0	35	35.9983	48.3839	82.9193	0	82.9193	100.327	100.327
19	0.464861	46.3065	-24.9651	R	0	35	36.386	48.9049	83.8121	0	83.8121	100.752	100.752
20	0.464861	45.3978	-24.1293	R	0	35	35.9372	48.3017	82.7784	0	82.7784	98.8759	98.8759
21	0.464861	44.4137	-23.2988	R	0	35	35.4163	47.6016	81.5785	0	81.5785	96.8303	96.8303
22	0.464861	43.3555	-22.4736	R	0	35	34.8235	46.8049	80.2131	0	80.2131	94.6187	94.6187
23	0.464861	42.2246	-21.6532	R	0	35	34.1588	45.9115	78.682	0	78.682	92.2431	92.2431
24	0.464861	41.0223	-20.8374	R	0	35	33.4222	44.9214	76.9854	0	76.9854	89.7063	89.7063
25	0.464861	39.7497	-20.0261	R	0	35	32.6136	43.8346	75.1229	0	75.1229	87.0101	87.0101
26	0.464861	38.4079	-19.2189	R	0	35	31.733	42.651	73.0943	0	73.0943	84.1566	84.1566
27	0.464861	36.9981	-18.4157	R	0	35	30.78	41.3702	70.8994	0	70.8994	81.1479	81.1479
28	0.464861	35.521	-17.6162	R	0	35	29.7547	39.9921	68.5376	0	68.5376	77.9856	77.9856
29	0.464861	33.9777	-16.8202	R	0	35	28.6566	38.5162	66.0082	0	66.0082	74.6712	74.6712
30	0.464861	32.3691	-16.0276	R	0	35	27.4855	36.9422	63.3108	0	63.3108	71.2064	71.2064
31	0.464861	30.6958	-15.2381	R	0	35	26.2411	35.2696	60.4441	0	60.4441	67.5924	67.5924
32	0.464861	28.9586	-14.4515	R	0	35	24.9228	33.4977	57.4075	0	57.4075	63.8305	63.8305
33	0.464861	27.1583	-13.6677	R	0	35	23.5301	31.6259	54.1999	0	54.1999	59.9219	59.9219
34	0.464861	25.2956	-12.8866	R	0	35	22.0629	29.6538	50.8201	0	50.8201	55.8677	55.8677
35	0.464861	24.8411	-12.1078	R	0	35	21.8109	29.3152	50.2398	0	50.2398	54.9188	54.9188
36	0.464861	25.7377	-11.3313	R	0	35	22.7485	30.5754	52.3996	0	52.3996	56.9581	56.9581
37	0.464861	26.5735	-10.5569	R	0	35	23.6434	31.7781	54.4605	0	54.4605	58.8669	58.8669
38	0.464861	27.3489	-9.78451	R	0	35	24.4947	32.9224	56.4217	0	56.4217	60.6458	60.6458
39	0.464861	27.3424	-9.01387	R	0	35	24.6515	33.1331	56.7828	0	56.7828	60.6934	60.6934
40	0.464861	25.2388	-8.24487	R	0	35	22.9059	30.7869	52.7621	0	52.7621	56.0812	56.0812
41	0.464861	22.9528	-7.47736	R	0	35	20.9697	28.1845	48.302	0	48.302	51.0543	51.0543
42	0.464861	20.608	-6.7112	R	0	35	18.9527	25.4735	43.656	0	43.656	45.8862	45.8862
43	0.464861	18.2046	-5.94624	R	0	35	16.8539	22.6527	38.8216	0	38.8216	40.5771	40.5771
44	0.464861	15.743	-5.18235	R	0	35	14.6723	19.7205	33.7966	0	33.7966	35.1273	35.1273
45	0.464861	13.2233	-4.41937	R	0	35	12.4066	16.6752	28.5775	0	28.5775	29.5364	29.5364
46	0.41647	9.65919	-3.69682	AC alt	50	30	38.6073	51.8905	21.2498	0	21.2498	23.7443	23.7443
47	0.41647	7.54725	-3.01451	AC alt	50	30	36.9456	49.6571	16.6077	0	16.6077	18.5534	18.5534
48	0.41647	5.39494	-2.33262	AC alt	50	30	35.2312	47.3529	11.8185	0	11.8185	13.2536	13.2536
49	0.41647	3.20232	-1.65106	AC alt	50	30	33.4635	44.977	6.88022	0	6.88022	7.84479	7.84479
50	0.41647	0.975107	-0.969738	AC alt	50	30	31.6469	42.5353	1.8053	0	1.8053	2.34098	2.34098

## Global Minimum Query (janbu simplified) - Safety Factor: 1.32696

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.464861	1.77405	-41.3707	R	0	35	3.00093	3.98212	6.82448	0	6.82448	9.46743	9.46743
2	0.464861	5.25583	-40.3652	R	0	35	5.41231	7.18192	12.3082	0	12.3082	16.9088	16.9088
3	0.464861	8.60786	-39.3745	R	0	35	7.78471	10.33	17.7032	0	17.7032	24.0918	24.0918
4	0.464861	11.8356	-38.3977	R	0	35	10.1176	13.4256	23.0084	0	23.0084	31.0268	31.0268
5	0.464861	14.9442	-37.4339	R	0	35	12.4105	16.4682	28.2228	0	28.2228	37.723	37.723
6	0.464861	17.9382	-36.4824	R	0	35	14.6631	19.4574	33.3456	0	33.3456	44.1888	44.1888
7	0.464861	20.8217	-35.5424	R	0	35	16.8753	22.3928	38.3763	0	38.3763	50.4321	50.4321
8	0.464861	23.5988	-34.6134	R	0	35	19.0466	25.2741	43.3143	0	43.3143	56.4602	56.4602
9	0.464861	26.2729	-33.6946	R	0	35	21.1771	28.1011	48.1591	0	48.1591	62.2795	62.2795
10	0.464861	28.8474	-32.7855	R	0	35	23.2665	30.8737	52.9105	0	52.9105	67.8964	67.8964
11	0.464861	31.3253	-31.8856	R	0	35	25.3147	33.5916	57.5685	0	57.5685	73.3167	73.3167
12	0.464861	33.7095	-30.9945	R	0	35	27.3216	36.2547	62.1325	0	62.1325	78.5454	78.5454
13	0.464861	36.0027	-30.1116	R	0	35	27.4468	36.4208	62.4172	0	62.4172	78.3349	78.3349
14	0.464861	38.2072	-29.2365	R	0	35	29.1734	38.712	66.3437	0	66.3437	82.6726	82.6726
15	0.464861	40.3254	-28.3688	R	0	35	31.0397	41.1884	70.5877	0	70.5877	87.349	87.349
16	0.464861	42.3594	-27.5082	R	0	35	32.8645	43.6099	74.7377	0	74.7377	91.8519	91.8519
17	0.464861	44.3111	-26.6543	R	0	35	34.6479	45.9764	78.7934	0	78.7934	96.1848	96.1848
18	0.464861	46.1583	-25.8067	R	0	35	36.3707	48.2624	82.7111	0	82.7111	100.299	100.299
19	0.464861	46.3065	-24.9651	R	0	35	36.7651	48.7858	83.6081	0	83.6081	100.725	100.725
20	0.464861	45.3978	-24.1293	R	0	35	36.3143	48.1876	82.5829	0	82.5829	98.8493	98.8493
21	0.464861	44.4137	-23.2988	R	0	35	35.7907	47.4928	81.392	0	81.392	96.8051	96.8051
22	0.464861	43.3555	-22.4736	R	0	35	35.1942	46.7013	80.0356	0	80.0356	94.5945	94.5945
23	0.464861	42.2246	-21.6532	R	0	35	34.525	45.8133	78.5138	0	78.5138	92.2203	92.2203
24	0.464861	41.0223	-20.8374	R	0	35	33.783	44.8287	76.8264	0	76.8264	89.6846	89.6846
25	0.464861	39.7497	-20.0261	R	0	35	32.9681	43.7473	74.9731	0	74.9731	86.9895	86.9895
26	0.464861	38.4079	-19.2189	R	0	35	32.0802	42.5692	72.9541	0	72.9541	84.1375	84.1375
27	0.464861	36.9981	-18.4157	R	0	35	31.1192	41.2939	70.7686	0	70.7686	81.13	81.13
28	0.464861	35.521	-17.6162	R	0	35	30.0847	39.9212	68.416	0	68.416	77.9688	77.9688
29	0.464861	33.9777	-16.8202	R	0	35	28.9766	38.4508	65.8962	0	65.8962	74.6559	74.6559
30	0.464861	32.3691	-16.0276	R	0	35	27.7945	36.8822	63.2078	0	63.2078	71.1922	71.1922
31	0.464861	30.6958	-15.2381	R	0	35	26.538	35.2148	60.3503	0	60.3503	67.5794	67.5794
32	0.464861	28.9586	-14.4515	R	0	35	25.2066	33.4482	57.3227	0	57.3227	63.8188	63.8188
33	0.464861	27.1583	-13.6677	R	0	35	23.7999	31.5815	54.1238	0	54.1238	59.9114	59.9114
34	0.464861	25.2956	-12.8866	R	0	35	22.3175	29.6144	50.7524	0	50.7524	55.8583	55.8583
35	0.464861	24.8411	-12.1078	R	0	35	22.0643	29.2784	50.1767	0	50.1767	54.91	54.91
36	0.464861	25.7377	-11.3313	R	0	35	23.0145	30.5393	52.3376	0	52.3376	56.9494	56.9494
37	0.464861	26.5735	-10.5569	R	0	35	23.9215	31.7429	54.4003	0	54.4003	58.8584	58.8584
38	0.464861	27.3489	-9.78451	R	0	35	24.7848	32.8885	56.3636	0	56.3636	60.6378	60.6378
39	0.464861	27.3424	-9.01387	R	0	35	24.9454	33.1015	56.7287	0	56.7287	60.6858	60.6858
40	0.464861	25.2388	-8.24487	R	0	35	23.1808	30.76	52.7157	0	52.7157	56.0746	56.0746
41	0.464861	22.9528	-7.47736	R	0	35	21.2229	28.1619	48.2634	0	48.2634	51.0489	51.0489
42	0.464861	20.608	-6.7112	R	0	35	19.183	25.4551	43.6244	0	43.6244	45.8817	45.8817
43	0.464861	18.2046	-5.94624	R	0	35	17.0601	22.6381	38.7968	0	38.7968	40.5737	40.5737
44	0.464861	15.743	-5.18235	R	0	35	14.853	19.7094	33.7775	0	33.7775	35.1246	35.1246
45	0.464861	13.2233	-4.41937	R	0	35	12.5604	16.6671	28.5636	0	28.5636	29.5343	29.5343
46	0.41647	9.65919	-3.69682	AC alt	50	30	39.0916	51.873	21.2134	0	21.2134	23.7391	23.7391
47	0.41647	7.54725	-3.01451	AC alt	50	30	37.4114	49.6434	16.5792	0	16.5792	18.5494	18.5494
48	0.41647	5.39494	-2.33262	AC alt	50	30	35.6775	47.3427	11.7973	0	11.7973	13.2506	13.2506
49	0.41647	3.20232	-1.65106	AC alt	50	30	33.8895	44.9701	6.86592	0	6.86592	7.84277	7.84277
50	0.41647	0.975107	-0.969738	AC alt	50	30	32.0518	42.5314	1.79732	0	1.79732	2.33985	2.33985

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.34406

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	101.033	88.7997	0	0	0
2	101.498	88.3903	1.42006	0	0
3	101.963	87.9951	4.12572	0	0
4	102.428	87.6137	7.943	0	0
5	102.893	87.2452	12.7107	0	0
6	103.358	86.8894	18.2791	0	0
7	103.823	86.5456	24.5092	0	0
8	104.287	86.2135	31.271	0	0
9	104.752	85.8927	38.4437	0	0
10	105.217	85.5827	45.914	0	0
11	105.682	85.2833	53.576	0	0
12	106.147	84.9941	61.3307	0	0
13	106.612	84.7149	69.0848	0	0
14	107.077	84.4453	76.6165	0	0
15	107.541	84.1851	84.0064	0	0
16	108.006	83.934	91.19	0	0
17	108.471	83.692	98.0946	0	0
18	108.936	83.4586	104.652	0	0
19	109.401	83.2338	110.793	0	0
20	109.866	83.0174	116.268	0	0
21	110.331	82.8092	120.967	0	0
22	110.795	82.609	124.912	0	0
23	111.26	82.4167	128.129	0	0
24	111.725	82.2322	130.647	0	0
25	112.19	82.0552	132.499	0	0
26	112.655	81.8858	133.716	0	0
27	113.12	81.7237	134.337	0	0
28	113.585	81.569	134.4	0	0
29	114.05	81.4213	133.947	0	0
30	114.514	81.2808	133.023	0	0
31	114.979	81.1473	131.674	0	0
32	115.444	81.0206	129.949	0	0
33	115.909	80.9008	127.901	0	0
34	116.374	80.7878	125.585	0	0
35	116.839	80.6814	123.058	0	0
36	117.304	80.5817	120.211	0	0
37	117.768	80.4886	116.882	0	0
38	118.233	80.4019	113.052	0	0
39	118.698	80.3218	108.702	0	0
40	119.163	80.248	103.942	0	0
41	119.628	80.1807	99.168	0	0
42	120.093	80.1197	94.4769	0	0
43	120.558	80.065	89.9489	0	0
44	121.022	80.0165	85.6674	0	0
45	121.487	79.9744	81.7191	0	0
46	121.952	79.9384	78.1942	0	0
47	122.369	79.9115	63.601	0	0
48	122.785	79.8896	49.2986	0	0
49	123.202	79.8726	35.3491	0	0
50	123.618	79.8606	21.8167	0	0
51	124.035	79.8536	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.32696**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	101.033	88.7997	0	0	0
2	101.498	88.3903	1.39725	0	0
3	101.963	87.9951	4.06271	0	0
4	102.428	87.6137	7.82337	0	0
5	102.893	87.2452	12.519	0	0
6	103.358	86.8894	18.0007	0	0
7	103.823	86.5456	24.13	0	0
8	104.287	86.2135	30.7781	0	0
9	104.752	85.8927	37.8243	0	0
10	105.217	85.5827	45.1562	0	0
11	105.682	85.2833	52.6685	0	0
12	106.147	84.9941	60.2624	0	0
13	106.612	84.7149	67.8454	0	0
14	107.077	84.4453	75.2073	0	0
15	107.541	84.1851	82.4187	0	0
16	108.006	83.934	89.4146	0	0
17	108.471	83.692	96.1225	0	0
18	108.936	83.4586	102.474	0	0
19	109.401	83.2338	108.402	0	0
20	109.866	83.0174	113.663	0	0
21	110.331	82.8092	118.152	0	0
22	110.795	82.609	121.892	0	0
23	111.26	82.4167	124.909	0	0
24	111.725	82.2322	127.232	0	0
25	112.19	82.0552	128.893	0	0
26	112.655	81.8858	129.927	0	0
27	113.12	81.7237	130.369	0	0
28	113.585	81.569	130.259	0	0
29	114.05	81.4213	129.641	0	0
30	114.514	81.2808	128.557	0	0
31	114.979	81.1473	127.055	0	0
32	115.444	81.0206	125.185	0	0
33	115.909	80.9008	123	0	0
34	116.374	80.7878	120.553	0	0
35	116.839	80.6814	117.905	0	0
36	117.304	80.5817	114.938	0	0
37	117.768	80.4886	111.484	0	0
38	118.233	80.4019	107.523	0	0
39	118.698	80.3218	103.037	0	0
40	119.163	80.248	98.1419	0	0
41	119.628	80.1807	93.2408	0	0
42	120.093	80.1197	88.4333	0	0
43	120.558	80.065	83.7999	0	0
44	121.022	80.0165	79.4243	0	0
45	121.487	79.9744	75.3938	0	0
46	121.952	79.9384	71.7992	0	0
47	122.369	79.9115	57.0095	0	0
48	122.785	79.8896	42.5184	0	0
49	123.202	79.8726	28.3882	0	0
50	123.618	79.8606	14.6836	0	0
51	124.035	79.8536	0	0	0

## Discharge Sections

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### Entity Information

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#### ◆ Group 1




##### Shared Entities

Type	Coordinates (x,y)
	178.625, 72
	177.501, 72.4819
	176.791, 72.7503
	175.969, 73.0821
	174.148, 73.7098
	173.752, 73.859
	172.168, 74.309
	171.093, 74.5701
	170.751, 74.6928
	169.946, 74.8921
	169.403, 75.0908
	168.866, 75.2436
	166.839, 75.975
	163.762, 77.229
	162.66, 77.6923
	161.841, 78
	161.213, 78.0799
	160.193, 78.1804
	159.287, 78.2433
	158.58, 78.3128
	158.311, 78.4208
	158.283, 78.469
	158.208, 78.5614
	158.04, 78.8994
	138.649, 79.3745
	133.433, 79.5468
	130.58, 79.62
	126.93, 79.7356
	124.004, 79.8548
	118.834, 83.3035
	116.834, 83.3035
	109.338, 88.3035
	95.0378, 89.158
	91.9949, 88.9233
	77.2063, 89.8585
	75.0134, 88.3985
	70.4181, 90
	67.8529, 90.584
	65.9638, 90.9764
External Boundary	65, 91.1899
	61.0888, 92
	58.1464, 92.7634
	56.6739, 93.1559
	53.4161, 94



	52.0027, 94.2851 51.2807, 94.4155 49.3645, 94.7925 47.9989, 95.0382 46.8281, 95.267 42.7093, 96 42.292, 96.0605 41.9263, 96.0884 39.2521, 96.4008 37.4992, 96.5751 35, 96.855 33.3697, 97.0301 31.4943, 97.2171 30.4183, 97.3055 23.6879, 98 22.9919, 98 17.8236, 98.5004 15.8633, 98.6806 15, 98.7768 13.4498, 98.9282 10.0494, 99.2197 8.59317, 99.3694 7.71378, 99.4453 5.12817, 99.7088 3.12414, 100 2.12582, 100 0, 100.359 0, 91.2465 0, 81.3588 0, 0 184.033, 0 184.033, 52.5014 184.033, 60.0552 184.033, 70.1824
Material Boundary	0, 81.3588 23.4701, 78.8781 57.3993, 73.3886 81.4223, 69.6951 110.989, 64.3858 134.221, 61.1062 159.167, 57.5504 184.033, 52.5014
Material Boundary	75.0134, 88.3985 76.0721, 86.6818 97.7463, 86.6818 99.6426, 85.5097 103.666, 85.5097 109.182, 80.5496 114.486, 80 120.442, 80 124.004, 79.8548

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 91.2465 28.3675, 86.5422 39.2219, 85.2993 52.9808, 83.0741 67.2302, 79.9858 84.134, 77.5441 95.5378, 76.0116 104.966, 75.3358 122.339, 71.5789 132.64, 69.8632 147.447, 68.4739 156.323, 66.2281 163.627, 64.6561 184.033, 60.0552	Assigned to:  AC  AC alt  R
Distributed Load	106.653, 88.4639 95.0378, 89.158 91.9949, 88.9233 80.6681, 89.6396	Constant DistributionOrientation: Normal to boundaryMagnitude: 6 kN/m2Creates Excess Pore Pressure: No



3+300

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 3+300

### Project Summary

---

File Name:	3+300.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.277s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes



## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	5
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Loading

---

1 Distributed Load present


## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

# Materials

---

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## R

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

## Global Minimums

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### Method: bishop simplified

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	<b>FS</b>	<b>1.427800</b>
Center:		124.317, 115.031
Radius:		35.177
Left Slip Surface Endpoint:		100.867, 88.810
Right Slip Surface Endpoint:		124.010, 79.855
Resisting Moment:		28368.2 kN-m
Driving Moment:		19868.4 kN-m
Total Slice Area:		68.1335 m <sup>2</sup>
Surface Horizontal Width:		23.1437 m
Surface Average Height:		2.94394 m

### Method: janbu simplified

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	<b>FS</b>	<b>1.395620</b>
Center:		124.317, 115.031
Radius:		35.177
Left Slip Surface Endpoint:		100.867, 88.810
Right Slip Surface Endpoint:		124.010, 79.855
Resisting Horizontal Force:		738.531 kN
Driving Horizontal Force:		529.177 kN
Total Slice Area:		68.1335 m <sup>2</sup>
Surface Horizontal Width:		23.1437 m
Surface Average Height:		2.94394 m

## Global Minimum Support Data

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No Supports Present

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces: 6894

Number of Invalid Surfaces: 42

#### Error Codes

Error Code -112 reported for 42 surfaces

### Method: janbu simplified

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Number of Valid Surfaces: 6935

Number of Invalid Surfaces: 1

#### Error Codes

Error Code -108 reported for 1 surface

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.



# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.4278

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.464296	1.76528	-41.3039	R	0	29.2561	7.90937	11.293	22.1761	0	22.1761	29.1256	29.1256
2	0.464296	5.23023	-40.3047	R	0	29.2561	9.97843	14.2472	27.9772	0	27.9772	36.4409	36.4409
3	0.464296	8.56677	-39.3201	R	0	29.2561	12.0054	17.1413	33.6606	0	33.6606	43.4939	43.4939
4	0.464296	11.7803	-38.3492	R	0	29.2561	13.9905	19.9757	39.2264	0	39.2264	50.295	50.295
5	0.464296	14.8758	-37.3911	R	0	29.2561	15.934	22.7506	44.6754	0	44.6754	56.854	56.854
6	0.464296	17.8578	-36.4452	R	0	29.2561	17.836	25.4663	50.0082	0	50.0082	63.1798	63.1798
7	0.464296	20.7303	-35.5106	R	0	29.2561	19.6969	28.1232	55.2257	0	55.2257	69.2809	69.2809
8	0.464296	23.4974	-34.5868	R	0	29.2561	21.5168	30.7217	60.3283	0	60.3283	75.1644	75.1644
9	0.464296	26.1623	-33.6732	R	0	29.2561	23.296	33.2621	65.3169	0	65.3169	80.8376	80.8376
10	0.464296	28.7285	-32.7691	R	0	29.2561	25.0348	35.7447	70.1921	0	70.1921	86.3068	86.3068
11	0.464296	31.199	-31.8742	R	0	29.2561	26.7335	38.1701	74.9548	0	74.9548	91.5782	91.5782
12	0.464296	33.5765	-30.9878	R	0	29.2561	28.3923	40.5385	79.6055	0	79.6055	96.6571	96.6571
13	0.464296	35.8636	-30.1097	R	0	29.2561	25.9553	37.059	72.7728	0	72.7728	87.8244	87.8244
14	0.464296	38.0628	-29.2392	R	0	29.2561	23.9844	34.2449	67.2468	0	67.2468	80.6727	80.6727
15	0.464296	40.1763	-28.3761	R	0	29.2561	25.4766	36.3755	71.4307	0	71.4307	85.1922	85.1922
16	0.464296	42.2063	-27.52	R	0	29.2561	26.9305	38.4513	75.507	0	75.507	89.538	89.538
17	0.464296	44.1546	-26.6705	R	0	29.2561	28.346	40.4724	79.4758	0	79.4758	93.7141	93.7141
18	0.464296	46.0232	-25.8273	R	0	29.2561	29.7235	42.4392	83.3378	0	83.3378	97.7242	97.7242
19	0.464296	47.0675	-24.99	R	0	29.2561	30.5782	43.6595	85.7342	0	85.7342	99.9866	99.9866
20	0.464296	46.2421	-24.1585	R	0	29.2561	30.2174	43.1444	84.7228	0	84.7228	98.2767	98.2767
21	0.464296	45.2631	-23.3322	R	0	29.2561	29.7481	42.4744	83.4071	0	83.4071	96.2386	96.2386
22	0.464296	44.2107	-22.5111	R	0	29.2561	29.2217	41.7228	81.9312	0	81.9312	94.0419	94.0419
23	0.464296	43.086	-21.6949	R	0	29.2561	28.6385	40.89	80.2957	0	80.2957	91.6894	91.6894
24	0.464296	41.8904	-20.8832	R	0	29.2561	27.9985	39.9762	78.5015	0	78.5015	89.1837	89.1837
25	0.464296	40.625	-20.076	R	0	29.2561	27.302	38.9818	76.5487	0	76.5487	86.5268	86.5268
26	0.464296	39.2909	-19.2728	R	0	29.2561	26.5491	37.9068	74.4379	0	74.4379	83.7211	83.7211
27	0.464296	37.8891	-18.4736	R	0	29.2561	25.74	36.7516	72.1693	0	72.1693	80.7686	80.7686
28	0.464296	36.4207	-17.6781	R	0	29.2561	24.8747	35.5161	69.743	0	69.743	77.671	77.671
29	0.464296	34.8864	-16.886	R	0	29.2561	23.9531	34.2003	67.1593	0	67.1593	74.4304	74.4304
30	0.464296	33.2872	-16.0973	R	0	29.2561	22.9755	32.8044	64.4181	0	64.4181	71.0485	71.0485
31	0.464296	31.6238	-15.3118	R	0	29.2561	21.9415	31.3281	61.5191	0	61.5191	67.5265	67.5265
32	0.464296	29.8969	-14.5291	R	0	29.2561	20.8512	29.7714	58.4622	0	58.4622	63.866	63.866
33	0.464296	28.1074	-13.7492	R	0	29.2561	19.7044	28.134	55.2468	0	55.2468	60.0682	60.0682
34	0.464296	26.2557	-12.9719	R	0	29.2561	18.5011	26.4158	51.8729	0	51.8729	56.1346	56.1346
35	0.464296	24.8768	-12.1971	R	0	29.2561	17.6193	25.1568	49.4003	0	49.4003	53.2088	53.2088
36	0.464296	25.5593	-11.4244	R	0	29.2561	18.195	25.9788	51.0147	0	51.0147	54.6915	54.6915
37	0.464296	26.4004	-10.6539	R	0	29.2561	18.8895	26.9704	52.9618	0	52.9618	56.5153	56.5153
38	0.464296	27.1816	-9.88536	R	0	29.2561	19.5471	27.9094	54.8058	0	54.8058	58.2122	58.2122
39	0.464296	27.7721	-9.11858	R	0	29.2561	20.073	28.6602	56.2801	0	56.2801	59.502	59.502
40	0.464296	26.2595	-8.35345	R	0	29.2561	19.0757	27.2363	53.484	0	53.484	56.285	56.285
41	0.464296	23.9876	-7.58981	R	0	29.2561	17.5134	25.0056	49.1036	0	49.1036	51.4372	51.4372
42	0.464296	21.6572	-6.82753	R	0	29.2561	15.8919	22.6904	44.5572	0	44.5572	46.4599	46.4599
43	0.464296	19.2687	-6.06647	R	0	29.2561	14.2107	20.29	39.8436	0	39.8436	41.3538	41.3538
44	0.464296	16.8223	-5.30647	R	0	29.2561	12.4693	17.8036	34.9609	0	34.9609	36.1191	36.1191
45	0.464296	14.3183	-4.54741	R	0	29.2561	10.6669	15.2302	29.9077	0	29.9077	30.7561	30.7561
46	0.45007	11.4341	-3.80076	AC alt	40	24.7913	32.2481	46.0439	23.0543	0	23.0543	25.1966	25.1966
47	0.45007	8.97305	-3.06636	AC alt	40	24.7913	30.799	43.9748	18.1265	0	18.1265	19.7764	19.7764
48	0.45007	6.46123	-2.33246	AC alt	40	24.7913	29.3049	41.8416	13.0462	0	13.0462	14.2399	14.2399
49	0.45007	3.89874	-1.59895	AC alt	40	24.7913	27.7657	39.6438	7.81203	0	7.81203	8.58709	8.58709
50	0.45007	1.28588	-0.8657	AC alt	40	24.7913	26.1808	37.381	2.42295	0	2.42295	2.81855	2.81855

## Global Minimum Query (janbu simplified) - Safety Factor: 1.39562

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.464296	1.76528	-41.3039	R	0	29.2561	8.0398	11.2205	22.0337	0	22.0337	29.0978	29.0978
2	0.464296	5.23023	-40.3047	R	0	29.2561	10.1447	14.1581	27.8023	0	27.8023	36.407	36.407
3	0.464296	8.56677	-39.3201	R	0	29.2561	12.2074	17.0369	33.4554	0	33.4554	43.4543	43.4543
4	0.464296	11.7803	-38.3492	R	0	29.2561	14.2282	19.8572	38.9936	0	38.9936	50.2502	50.2502
5	0.464296	14.8758	-37.3911	R	0	29.2561	16.2072	22.6191	44.4172	0	44.4172	56.8046	56.8046
6	0.464296	17.8578	-36.4452	R	0	29.2561	18.1446	25.323	49.7268	0	49.7268	63.1263	63.1263
7	0.464296	20.7303	-35.5106	R	0	29.2561	20.0406	27.9691	54.9229	0	54.9229	69.2234	69.2234
8	0.464296	23.4974	-34.5868	R	0	29.2561	21.8954	30.5577	60.0063	0	60.0063	75.1035	75.1035
9	0.464296	26.1623	-33.6732	R	0	29.2561	23.7094	33.0893	64.9776	0	64.9776	80.7737	80.7737
10	0.464296	28.7285	-32.7691	R	0	29.2561	25.4827	35.5641	69.8373	0	69.8373	86.2403	86.2403
11	0.464296	31.199	-31.8742	R	0	29.2561	27.2154	37.9824	74.5862	0	74.5862	91.5093	91.5093
12	0.464296	33.5765	-30.9878	R	0	29.2561	28.908	40.3446	79.2248	0	79.2248	96.5861	96.5861
13	0.464296	35.8636	-30.1097	R	0	29.2561	26.4303	36.8867	72.4346	0	72.4346	87.7617	87.7617
14	0.464296	38.0628	-29.2392	R	0	29.2561	24.4266	34.0902	66.943	0	66.943	80.6166	80.6166
15	0.464296	40.1763	-28.3761	R	0	29.2561	25.9497	36.2159	71.1173	0	71.1173	85.1343	85.1343
16	0.464296	42.2063	-27.52	R	0	29.2561	27.4341	38.2876	75.1855	0	75.1855	89.479	89.479
17	0.464296	44.1546	-26.6705	R	0	29.2561	28.8799	40.3053	79.1475	0	79.1475	93.6539	93.6539
18	0.464296	46.0232	-25.8273	R	0	29.2561	30.287	42.2692	83.0042	0	83.0042	97.6633	97.6633
19	0.464296	47.0675	-24.99	R	0	29.2561	31.1618	43.4901	85.4016	0	85.4016	99.926	99.926
20	0.464296	46.2421	-24.1585	R	0	29.2561	30.7981	42.9824	84.4047	0	84.4047	98.219	98.219
21	0.464296	45.2631	-23.3322	R	0	29.2561	30.3235	42.3201	83.1042	0	83.1042	96.1838	96.1838
22	0.464296	44.2107	-22.5111	R	0	29.2561	29.7906	41.5763	81.6435	0	81.6435	93.99	93.99
23	0.464296	43.086	-21.6949	R	0	29.2561	29.1995	40.7514	80.0236	0	80.0236	91.6404	91.6404
24	0.464296	41.8904	-20.8832	R	0	29.2561	28.5504	39.8455	78.2447	0	78.2447	89.1375	89.1375
25	0.464296	40.625	-20.076	R	0	29.2561	27.8435	38.859	76.3075	0	76.3075	86.4836	86.4836
26	0.464296	39.2909	-19.2728	R	0	29.2561	27.079	37.792	74.2122	0	74.2122	83.6807	83.6807
27	0.464296	37.8891	-18.4736	R	0	29.2561	26.2569	36.6446	71.9591	0	71.9591	80.731	80.731
28	0.464296	36.4207	-17.6781	R	0	29.2561	25.3772	35.4169	69.5482	0	69.5482	77.6364	77.6364
29	0.464296	34.8864	-16.886	R	0	29.2561	24.44	34.1089	66.9798	0	66.9798	74.3987	74.3987
30	0.464296	33.2872	-16.0973	R	0	29.2561	23.4451	32.7205	64.2534	0	64.2534	71.0193	71.0193
31	0.464296	31.6238	-15.3118	R	0	29.2561	22.3927	31.2517	61.3691	0	61.3691	67.5	67.5
32	0.464296	29.8969	-14.5291	R	0	29.2561	21.2825	29.7023	58.3265	0	58.3265	63.842	63.842
33	0.464296	28.1074	-13.7492	R	0	29.2561	20.1144	28.0721	55.1253	0	55.1253	60.047	60.047
34	0.464296	26.2557	-12.9719	R	0	29.2561	18.8882	26.3608	51.7648	0	51.7648	56.1157	56.1157
35	0.464296	24.8768	-12.1971	R	0	29.2561	17.9901	25.1073	49.3033	0	49.3033	53.1919	53.1919
36	0.464296	25.5593	-11.4244	R	0	29.2561	18.5801	25.9308	50.9205	0	50.9205	54.6752	54.6752
37	0.464296	26.4004	-10.6539	R	0	29.2561	19.2916	26.9237	52.8702	0	52.8702	56.4993	56.4993
38	0.464296	27.1816	-9.88536	R	0	29.2561	19.9657	27.8645	54.7175	0	54.7175	58.1968	58.1968
39	0.464296	27.7721	-9.11858	R	0	29.2561	20.5052	28.6175	56.1963	0	56.1963	59.4876	59.4876
40	0.464296	26.2595	-8.35345	R	0	29.2561	19.4888	27.199	53.4107	0	53.4107	56.2724	56.2724
41	0.464296	23.9876	-7.58981	R	0	29.2561	17.8948	24.9743	49.0423	0	49.0423	51.4267	51.4267
42	0.464296	21.6572	-6.82753	R	0	29.2561	16.24	22.6648	44.507	0	44.507	46.4514	46.4514
43	0.464296	19.2687	-6.06647	R	0	29.2561	14.5237	20.2696	39.8035	0	39.8035	41.3471	41.3471
44	0.464296	16.8223	-5.30647	R	0	29.2561	12.7454	17.7878	34.9301	0	34.9301	36.1139	36.1139
45	0.464296	14.3183	-4.54741	R	0	29.2561	10.9045	15.2186	29.8848	0	29.8848	30.7521	30.7521
46	0.45007	11.4341	-3.80076	AC alt	40	24.7913	32.9742	46.0195	22.9962	0	22.9962	25.1868	25.1868
47	0.45007	8.97305	-3.06636	AC alt	40	24.7913	31.4956	43.9559	18.0816	0	18.0816	19.7688	19.7688
48	0.45007	6.46123	-2.33246	AC alt	40	24.7913	29.9708	41.8279	13.0136	0	13.0136	14.2344	14.2344
49	0.45007	3.89874	-1.59895	AC alt	40	24.7913	28.3995	39.6349	7.79076	0	7.79076	8.58351	8.58351
50	0.45007	1.28588	-0.8657	AC alt	40	24.7913	26.7812	37.3764	2.41204	0	2.41204	2.81672	2.81672

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.4278

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	100.867	88.8097	0	0	0
2	101.331	88.4017	4.66197	0	0
3	101.795	88.0079	10.3368	0	0
4	102.26	87.6276	16.8558	0	0
5	102.724	87.2603	24.0633	0	0
6	103.188	86.9054	31.8155	0	0
7	103.652	86.5625	39.9795	0	0
8	104.117	86.2312	48.4319	0	0
9	104.581	85.9111	57.0579	0	0
10	105.045	85.6017	65.7511	0	0
11	105.51	85.3029	74.4122	0	0
12	105.974	85.0142	82.9486	0	0
13	106.438	84.7353	91.2742	0	0
14	106.903	84.4661	98.5121	0	0
15	107.367	84.2062	104.881	0	0
16	107.831	83.9554	110.995	0	0
17	108.295	83.7135	116.787	0	0
18	108.76	83.4803	122.193	0	0
19	109.224	83.2555	127.154	0	0
20	109.688	83.0391	131.544	0	0
21	110.153	82.8309	135.193	0	0
22	110.617	82.6306	138.118	0	0
23	111.081	82.4382	140.349	0	0
24	111.545	82.2535	141.916	0	0
25	112.01	82.0763	142.854	0	0
26	112.474	81.9066	143.198	0	0
27	112.938	81.7443	142.985	0	0
28	113.403	81.5892	142.258	0	0
29	113.867	81.4412	141.057	0	0
30	114.331	81.3003	139.428	0	0
31	114.796	81.1663	137.418	0	0
32	115.26	81.0391	135.075	0	0
33	115.724	80.9188	132.452	0	0
34	116.188	80.8052	129.602	0	0
35	116.653	80.6983	126.58	0	0
36	117.117	80.5979	123.377	0	0
37	117.581	80.5041	119.736	0	0
38	118.046	80.4167	115.613	0	0
39	118.51	80.3358	110.994	0	0
40	118.974	80.2613	105.891	0	0
41	119.439	80.1931	100.702	0	0
42	119.903	80.1313	95.6277	0	0
43	120.367	80.0757	90.7439	0	0
44	120.831	80.0263	86.128	0	0
45	121.296	79.9832	81.8602	0	0
46	121.76	79.9463	78.024	0	0
47	122.21	79.9164	64.2345	0	0
48	122.66	79.8923	50.8433	0	0
49	123.11	79.8739	37.9251	0	0
50	123.56	79.8614	25.5569	0	0
51	124.01	79.8546	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.39562**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	100.867	88.8097	0	0	0
2	101.331	88.4017	4.53552	0	0
3	101.795	88.0079	10.0544	0	0
4	102.26	87.6276	16.3897	0	0
5	102.724	87.2603	23.3876	0	0
6	103.188	86.9054	30.9056	0	0
7	103.652	86.5625	38.8122	0	0
8	104.117	86.2312	46.9852	0	0
9	104.581	85.9111	55.3111	0	0
10	105.045	85.6017	63.6844	0	0
11	105.51	85.3029	72.0067	0	0
12	105.974	85.0142	80.1866	0	0
13	106.438	84.7353	88.1385	0	0
14	106.903	84.4661	95.0391	0	0
15	107.367	84.2062	101.1	0	0
16	107.831	83.9554	106.891	0	0
17	108.295	83.7135	112.344	0	0
18	108.76	83.4803	117.398	0	0
19	109.224	83.2555	121.993	0	0
20	109.688	83.0391	126.01	0	0
21	110.153	82.8309	129.293	0	0
22	110.617	82.6306	131.861	0	0
23	111.081	82.4382	133.743	0	0
24	111.545	82.2535	134.971	0	0
25	112.01	82.0763	135.58	0	0
26	112.474	81.9066	135.604	0	0
27	112.938	81.7443	135.083	0	0
28	113.403	81.5892	134.058	0	0
29	113.867	81.4412	132.57	0	0
30	114.331	81.3003	130.666	0	0
31	114.796	81.1663	128.393	0	0
32	115.26	81.0391	125.8	0	0
33	115.724	80.9188	122.94	0	0
34	116.188	80.8052	119.866	0	0
35	116.653	80.6983	116.635	0	0
36	117.117	80.5979	113.233	0	0
37	117.581	80.5041	109.386	0	0
38	118.046	80.4167	105.049	0	0
39	118.51	80.3358	100.209	0	0
40	118.974	80.2613	94.8794	0	0
41	119.439	80.1931	89.4747	0	0
42	119.903	80.1313	84.2026	0	0
43	120.367	80.0757	79.1387	0	0
44	120.831	80.0263	74.3614	0	0
45	121.296	79.9832	69.9517	0	0
46	121.76	79.9463	65.9938	0	0
47	122.21	79.9164	61.8449	0	0
48	122.66	79.8923	58.1096	0	0
49	123.11	79.8739	54.863	0	0
50	123.56	79.8614	52.1827	0	0
51	124.01	79.8546	0	0	0

## Discharge Sections

---

### Entity Information

---




#### ◆ **Group 1**

##### Shared Entities

Type	Coordinates (x,y)
	178.625, 72
	177.501, 72.4819
	176.791, 72.7503
	175.969, 73.0821
	174.148, 73.7098
	173.752, 73.859
	172.168, 74.309
	171.093, 74.5701
	170.751, 74.6928
	169.946, 74.8921
	169.403, 75.0908
	168.866, 75.2436
	166.839, 75.975
	163.762, 77.229
	162.66, 77.6923
	161.841, 78
	161.213, 78.0799
	160.193, 78.1804
	159.287, 78.2433
	158.58, 78.3128
	158.311, 78.4208
	158.283, 78.469
	158.208, 78.5614
	158.04, 78.8994
	138.649, 79.3745
	133.433, 79.5468
	130.58, 79.62
	126.93, 79.7356
	124.004, 79.8548
	118.834, 83.3035
	116.834, 83.3035
	109.338, 88.3035
	95.0378, 89.158
	91.9949, 88.9233
	77.2063, 89.8585
	75.0134, 88.3985
	70.4181, 90
	67.8529, 90.584
External Boundary	65.9638, 90.9764
	65, 91.1899
	61.0888, 92
	58.1464, 92.7634
	56.6739, 93.1559
	53.4161, 94

	52.0027, 94.2851 51.2807, 94.4155 49.3645, 94.7925 47.9989, 95.0382 46.8281, 95.267 42.7093, 96 42.292, 96.0605 41.9263, 96.0884 39.2521, 96.4008 37.4992, 96.5751 35, 96.855 33.3697, 97.0301 31.4943, 97.2171 30.4183, 97.3055 23.6879, 98 22.9919, 98 17.8236, 98.5004 15.8633, 98.6806 15, 98.7768 13.4498, 98.9282 10.0494, 99.2197 8.59317, 99.3694 7.71378, 99.4453 5.12817, 99.7088 3.12414, 100 2.12582, 100 0, 100.359 0, 91.2465 0, 81.3588 0, 0 184.033, 0 184.033, 52.5014 184.033, 60.0552 184.033, 70.1824
Material Boundary	0, 81.3588 23.4701, 78.8781 57.3993, 73.3886 81.4223, 69.6951 110.989, 64.3858 134.221, 61.1062 159.167, 57.5504 184.033, 52.5014
Material Boundary	75.0134, 88.3985 76.0721, 86.6818 97.7463, 86.6818 99.6426, 85.5097 103.666, 85.5097 109.182, 80.5496 114.486, 80 120.442, 80 124.004, 79.8548

### Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 91.2465 28.3675, 86.5422 39.2219, 85.2993 52.9808, 83.0741 67.2302, 79.9858 84.134, 77.5441 95.5378, 76.0116 104.966, 75.3358 122.339, 71.5789 132.64, 69.8632 147.447, 68.4739 156.323, 66.2281 163.627, 64.6561 184.033, 60.0552	Assigned to:  AC  AC alt  R
Distributed Load	106.653, 88.4639 95.0378, 89.158 91.9949, 88.9233 80.6681, 89.6396	Constant DistributionOrientation: Normal to boundaryMagnitude: 20 kN/m2Creates Excess Pore Pressure: No



sisma 3+475

Slide2 - An Interactive Slope Stability Program

Date Created: 05/09/2023, 11:12:42

Software Version: 9.027



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# Slide2 Analysis Information

## sisma

### Project Summary

---

File Name:	sisma.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.287s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	05/09/2023, 11:12:42

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	M1+R2 fronti scavo sisma	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1	
Variable Actions: Favourable	1	
Effective cohesion	1	
Coefficient of shearing resistance	1	
Undrained strength	1	
Weight density	1	
Shear strength (other models)	1	
Earth resistance	1.2	
Tensile and plate strength	1	
Shear strength	1	
Compressive strength	1	
Bond strength	1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
<b>Analysis Methods Used</b>	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading

---

1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

# Materials

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## R

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

## FN


Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	0
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

# Support




## pali

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	250 kN

## Ancoraggio

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	1.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	50 kN/m
Material Dependent	Yes

## Bond Strength Dependency

	Material	Bond Strength [kN/m]
	AC alt	80
	R	27
	FN	17

# Global Minimums

## Method: bishop simplified

FS	1.423400
Center:	160.207, 173.136
Radius:	165.954
Left Slip Surface Endpoint:	43.294, 55.357
Right Slip Surface Endpoint:	204.538, 13.213
Resisting Moment:	3.96444e+06 kN-m
Driving Moment:	2.78518e+06 kN-m
Passive Support Moment:	93539.1 kN-m
Maximum Single Support Force:	666.667 kN
Total Support Force:	1166.67 kN
Total Slice Area:	2525.79 m <sup>2</sup>
Surface Horizontal Width:	161.244 m
Surface Average Height:	15.6644 m

## Method: janbu simplified

FS	1.390530
Center:	159.866, 172.939
Radius:	165.676
Left Slip Surface Endpoint:	43.144, 55.362
Right Slip Surface Endpoint:	204.106, 13.279
Resisting Horizontal Force:	22664.6 kN
Driving Horizontal Force:	16299.2 kN
Passive Horizontal Support Force:	869.108 kN
Maximum Single Support Force:	666.667 kN
Total Support Force:	1166.67 kN
Total Slice Area:	2523.48 m <sup>2</sup>
Surface Horizontal Width:	160.962 m
Surface Average Height:	15.6775 m

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 2						
<b>pali</b>						
Support Type: Pile/Micro Pile						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	15	9.28886	5.71114	9.28886	5.71114	500
<b>Ancoraggio</b>						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	20.0078	7.35425	12.6535	7.35425	12.6535	666.667

### Method: janbu simplified

Number of Supports: 2						
<b>pali</b>						
Support Type: Pile/Micro Pile						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	15	9.39513	5.60487	9.39513	5.60487	500
<b>Ancoraggio</b>						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	20.0078	7.44641	12.5614	7.44641	12.5614	666.667

# Valid and Invalid Surfaces

---

## Method: bishop simplified

---

Number of Valid Surfaces:	4950
Number of Invalid Surfaces:	5

### Error Codes

Error Code -112 reported for 5 surfaces

## Method: janbu simplified

---

Number of Valid Surfaces:	4954
Number of Invalid Surfaces:	1

### Error Codes

Error Code -108 reported for 1 surface

## Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.4234

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	2.44731	56.2947	-44.1993	R	0	35	8.33223	11.8601	20.3256	0	20.3256	28.4282	28.4282
2	2.44731	166.551	-43.032	R	0	35	21.1367	30.086	51.5607	0	51.5607	71.2931	71.2931
3	4.58984	546.049	-41.3978	FN	0	21	22.578	32.1375	100.465	0	100.465	120.369	120.369
4	3.05829	453.327	-39.6557	AC alt	50	30	88.5802	126.085	175.46	0	175.46	248.885	248.885
5	3.05829	509.417	-38.2972	AC alt	50	30	66.7517	95.0144	110.881	0	110.881	163.593	163.593
6	3.05829	571.563	-36.9638	AC alt	50	30	55.1513	78.5024	76.5615	0	76.5615	118.066	118.066
7	3.30634	743.387	-35.601	AC alt	50	30	82.0768	116.828	164.517	8.29736	156.22	223.281	214.984
8	3.30634	844.733	-34.2089	AC alt	50	30	87.2649	124.213	195.876	24.3068	171.569	255.201	230.894
9	3.30634	988.705	-32.8394	AC alt	50	30	96.4382	137.27	237.88	39.1724	198.708	300.124	260.952
10	3.30634	1119.01	-31.4907	AC alt	50	30	104.889	149.3	276.658	52.9474	223.711	340.911	287.964
11	3.30634	1231.89	-30.1612	AC alt	50	30	112.249	159.776	311.164	65.6793	245.485	376.393	310.714
12	3.30634	1323.33	-28.8494	AC alt	50	30	118.111	168.119	340.261	77.4362	262.825	405.326	327.89
13	3.30634	1386.18	-27.5539	AC alt	50	30	121.784	173.348	361.949	88.2571	273.692	425.491	337.234
14	3.30634	1413.33	-26.2736	AC alt	50	30	122.57	174.466	374.168	98.1501	276.018	434.676	336.526
15	3.30634	1463.81	-25.0073	AC alt	50	30	125.684	178.899	392.376	107.146	285.23	451.003	343.857
16	3.30634	1520.84	-23.7538	AC alt	50	30	129.663	184.563	412.276	115.273	297.003	469.339	354.066
17	3.30634	1568.66	-22.5124	AC alt	50	30	133.081	189.428	429.675	122.558	307.117	484.832	362.274
18	3.30634	1567.95	-21.282	AC alt	50	30	132.29	188.302	433.797	129.022	304.775	485.327	356.305
19	3.30634	1526.32	-20.0618	AC alt	50	30	128	182.196	426.376	134.293	292.083	473.121	338.828
20	3.30634	1512.71	-18.851	AC alt	50	30	126.553	180.136	426.317	138.514	287.803	469.525	331.011
21	3.30634	1530.15	-17.649	AC alt	50	30	128.325	182.658	434.68	141.637	293.043	475.508	333.871
22	3.30634	1532.45	-16.4549	AC alt	50	30	128.956	183.556	438.692	143.781	294.911	476.78	332.999
23	4.62032	2125.5	-15.0338	AC alt	50	30	128.653	183.125	439.317	145.301	294.016	473.871	328.57
24	3.14239	1427.73	-13.6497	AC alt	50	30	127.84	181.968	437.577	145.968	291.609	468.622	322.654
25	3.14239	1415.53	-12.5358	AC alt	50	30	127.633	181.673	436.717	145.719	290.998	465.096	319.377
26	3.14239	1379.1	-11.4266	AC alt	50	30	125.089	178.052	428.312	144.843	283.469	453.595	308.752
27	3.14239	1342.86	-10.3218	AC alt	50	30	122.709	174.665	419.78	143.347	276.433	442.128	298.781
28	3.14239	1313.48	-9.22083	AC alt	50	30	121.203	172.521	413.212	141.238	271.974	432.888	291.65
29	3.14239	1276.77	-8.1233	AC alt	50	30	119.08	169.499	404.214	138.521	265.693	421.211	282.69
30	3.14239	1240.5	-7.02877	AC alt	50	30	117.159	166.764	395.211	135.203	260.008	409.656	274.453
31	3.14239	1202.77	-5.9368	AC alt	50	30	115.287	164.1	385.61	131.137	254.473	397.598	266.461
32	3.14239	1169.67	-4.847	AC alt	50	30	114.169	162.508	377.367	126.205	251.162	387.048	260.843
33	3.14239	1131.74	-3.75895	AC alt	50	30	112.694	160.409	367.485	120.682	246.803	374.889	254.207
34	3.14239	1093.33	-2.67226	AC alt	50	30	111.337	158.478	357.358	114.572	242.786	362.554	247.982
35	3.14239	1040.72	-1.58653	AC alt	50	30	108.574	154.545	342.487	107.875	234.612	345.494	237.619
36	3.14239	992.671	-0.501367	AC alt	50	30	106.474	151.556	328.995	100.595	228.4	329.927	229.332
37	3.14239	946.98	0.583613	AC alt	50	30	104.807	149.183	316.198	92.7302	223.467	315.13	222.4
38	3.14239	895.42	1.6688	AC alt	50	30	102.646	146.107	301.356	84.2816	217.075	298.366	214.084
39	3.14239	837.94	2.75459	AC alt	50	30	99.8565	142.136	284.416	75.5946	208.821	279.611	204.016
40	3.14239	781.127	3.84137	AC alt	50	30	97.1758	138.32	267.585	66.6944	200.89	261.06	194.365
41	3.14239	725.675	4.92954	AC alt	50	30	94.8195	134.966	251.126	57.2064	193.919	242.947	185.741
42	3.14239	652.365	6.01949	AC alt	50	30	90.5404	128.875	228.387	47.1281	181.259	218.84	171.712
43	3.14239	573.513	7.11164	AC alt	50	30	85.7507	122.058	203.546	36.4561	167.089	192.847	156.391
44	3.14239	511.616	8.20639	AC alt	50	30	83.1247	118.32	184.507	25.1866	159.32	172.519	147.332
45	3.14239	453.309	9.30416	AC alt	50	30	81.1104	115.452	166.676	13.3149	153.361	153.387	140.072
46	1.78581	234.194	10.1671	FN	0	21	31.5074	44.8476	143.816	3.61753	140.198	138.165	134.548
47	3.53604	406.005	11.1023	FN	0	21	28.4699	40.5241	126.682	0	126.682	121.096	121.096
48	3.53604	303.63	12.3493	FN	0	21	21.4295	30.5028	95.3548	0	95.3548	90.6631	90.6631
49	3.53604	177.685	13.6022	FN	0	21	12.6238	17.9687	56.1722	0	56.1722	53.1176	53.1176
50	3.53604	53.5991	14.8618	FN	0	21	3.83386	5.45712	17.0595	0	17.0595	16.0421	16.0421



**Global Minimum Query (janbu simplified) - Safety Factor: 1.39053**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	2.42755	55.4017	-44.2055	R	0	35	8.40838	11.6921	20.0377	0	20.0377	28.2161	28.2161
2	2.42755	163.925	-43.0456	R	0	35	21.4397	29.8125	51.092	0	51.092	71.1167	71.1167
3	4.61329	551.356	-41.4075	FN	0	21	23.1074	32.1315	100.447	0	100.447	120.824	120.824
4	3.04896	455.683	-39.6591	AC alt	50	30	91.2187	126.842	177.035	0	177.035	252.656	252.656
5	3.04896	511.486	-38.3024	AC alt	50	30	68.2466	94.899	110.641	0	110.641	164.544	164.544
6	3.04896	570.473	-36.9707	AC alt	50	30	55.6835	77.4296	74.3319	0	74.3319	116.248	116.248
7	3.29661	741.214	-35.6096	AC alt	50	30	83.5572	116.189	163.168	8.2766	154.891	223.01	214.733
8	3.29661	839.593	-34.2191	AC alt	50	30	88.6391	123.255	193.825	24.2468	169.579	254.108	229.861
9	3.29661	982.841	-32.8511	AC alt	50	30	97.9799	136.244	235.653	39.0775	196.575	298.92	259.843
10	3.29661	1112.05	-31.5039	AC alt	50	30	106.551	148.162	274.166	52.8219	221.345	339.471	286.649
11	3.29661	1225.85	-30.1759	AC alt	50	30	114.184	158.777	308.936	65.527	243.409	375.329	309.802
12	3.29661	1317.59	-28.8656	AC alt	50	30	120.235	167.191	338.152	77.257	260.895	404.432	327.175
13	3.29661	1382.9	-27.5716	AC alt	50	30	124.244	172.765	360.541	88.0584	272.483	425.416	337.358
14	3.29661	1410.4	-26.2927	AC alt	50	30	125.113	173.973	372.926	97.9353	274.991	434.741	336.806
15	3.29661	1457.75	-25.0278	AC alt	50	30	128.042	178.046	390.377	106.919	283.458	450.159	343.24
16	3.29661	1514.57	-23.7757	AC alt	50	30	132.119	183.716	410.281	115.037	295.244	468.485	353.448
17	3.29661	1563.3	-22.5356	AC alt	50	30	135.729	188.735	427.987	122.314	305.673	484.307	361.993
18	3.29661	1567.55	-21.3066	AC alt	50	30	135.414	188.298	433.541	128.775	304.766	486.355	357.58
19	3.29661	1528.96	-20.0878	AC alt	50	30	131.323	182.609	427.051	134.109	292.942	475.077	340.968
20	3.29661	1507.46	-18.8783	AC alt	50	30	129.112	179.534	424.885	138.335	286.55	469.035	330.7
21	3.29661	1525.35	-17.6776	AC alt	50	30	130.971	182.119	433.446	141.522	291.924	475.188	333.666
22	3.29661	1529.1	-16.4848	AC alt	50	30	131.776	183.239	437.93	143.678	294.252	476.925	333.247
23	4.78363	2202.13	-15.0338	AC alt	50	30	131.504	182.86	438.691	145.227	293.464	474.011	328.784
24	3.13382	1424.28	-13.6197	AC alt	50	30	130.668	181.698	436.956	145.908	291.048	468.615	322.707
25	3.13382	1412.18	-12.5071	AC alt	50	30	130.49	181.451	436.178	145.643	290.535	465.124	319.481
26	3.13382	1377.24	-11.3992	AC alt	50	30	128.063	178.076	428.277	144.754	283.523	454.097	309.343
27	3.13382	1339.71	-10.2957	AC alt	50	30	125.509	174.525	419.387	143.247	276.14	442.186	298.939
28	3.13382	1310.84	-9.19596	AC alt	50	30	124.04	172.481	413.022	141.13	271.892	433.104	291.974
29	3.13382	1273.48	-8.09966	AC alt	50	30	121.811	169.382	403.858	138.407	265.451	421.193	282.786
30	3.13382	1237.85	-7.00634	AC alt	50	30	119.927	166.762	395.091	135.086	260.005	409.83	274.744
31	3.13382	1199.23	-5.91557	AC alt	50	30	117.912	163.961	385.235	131.053	254.182	397.452	266.399
32	3.13382	1166.29	-4.82695	AC alt	50	30	116.796	162.409	377.078	126.122	250.956	386.941	260.819
33	3.13382	1128.14	-3.74008	AC alt	50	30	115.27	160.286	367.151	120.604	246.547	374.686	254.082
34	3.13382	1090.45	-2.65455	AC alt	50	30	113.967	158.475	357.282	114.5	242.782	362.566	248.066
35	3.13382	1038.4	-1.56998	AC alt	50	30	111.204	154.633	342.61	107.813	234.797	345.658	237.845
36	3.13382	989.442	-0.485967	AC alt	50	30	108.952	151.501	328.83	100.544	228.286	329.754	229.21
37	3.13382	943.812	0.597869	AC alt	50	30	107.252	149.137	316.065	92.6927	223.373	314.946	222.254
38	3.13382	892.899	1.68192	AC alt	50	30	105.112	146.162	301.448	84.2599	217.188	298.362	214.102
39	3.13382	835.754	2.76657	AC alt	50	30	102.315	142.272	284.621	75.5176	209.103	279.677	204.159
40	3.13382	778.247	3.85222	AC alt	50	30	99.4811	138.332	267.55	66.6356	200.914	260.851	194.215
41	3.13382	723.444	4.93926	AC alt	50	30	97.1379	135.073	251.31	57.1679	194.142	242.915	185.747
42	3.13382	652.617	6.02808	AC alt	50	30	93.0391	129.374	229.408	47.1121	182.296	219.583	172.471
43	3.13382	571.86	7.11909	AC alt	50	30	87.8835	122.205	203.86	36.4648	167.395	192.884	156.419
44	3.13382	509.203	8.2127	AC alt	50	30	85.0854	118.314	184.53	25.2223	159.308	172.25	147.028
45	3.13382	450.141	9.30934	AC alt	50	30	82.9128	115.293	166.409	13.3798	153.029	152.817	139.438
46	1.80725	235.23	10.176	FN	0	21	32.0344	44.5448	142.914	3.66239	139.252	137.164	133.502
47	3.5166	401.959	11.1132	FN	0	21	29.0534	40.3996	126.294	0	126.294	120.587	120.587
48	3.5166	303.45	12.3554	FN	0	21	22.0789	30.7014	95.9758	0	95.9758	91.1395	91.1395
49	3.5166	180.082	13.6035	FN	0	21	13.1917	18.3434	57.3433	0	57.3433	54.1511	54.1511
50	3.5166	54.276	14.8583	FN	0	21	4.0035	5.56698	17.403	0	17.403	16.3408	16.3408

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.4234

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	43.294	55.357	0	0	0
2	45.7413	52.9772	32.6485	0	0
3	48.1886	50.6925	113.61	0	0
4	52.7784	46.6463	466.287	0	0
5	55.8367	44.1112	351.801	0	0
6	58.895	41.6962	462.025	0	0
7	61.9533	39.3946	241.098	0	0
8	65.2597	37.0274	427.122	0	0
9	68.566	34.7797	656.066	0	0
10	71.8724	32.6457	935.177	0	0
11	75.1787	30.6203	1250.94	0	0
12	78.485	28.699	1590.17	0	0
13	81.7914	26.8776	1940.27	0	0
14	85.0977	25.1524	2288.61	0	0
15	88.4041	23.5202	2623.14	0	0
16	91.7104	21.9779	2946.42	0	0
17	95.0167	20.5229	3256.48	0	0
18	98.3231	19.1525	3548.53	0	0
19	101.629	17.8646	3812.99	0	0
20	104.936	16.6571	4043.97	0	0
21	108.242	15.5283	4244.92	0	0
22	111.548	14.4763	4417.62	0	0
23	114.855	13.4998	4559.58	0	0
24	119.475	12.2589	4704.41	0	0
25	122.618	11.4957	4766.98	0	0
26	125.76	10.797	4800.31	0	0
27	128.902	10.1619	4805.21	0	0
28	132.045	9.5896	4782.48	0	0
29	135.187	9.07947	4732.36	0	0
30	138.329	8.63094	4656.08	0	0
31	141.472	8.2435	4554.34	0	0
32	144.614	7.91673	4427.93	0	0
33	147.757	7.65026	4276.56	0	0
34	150.899	7.4438	4101.69	0	0
35	154.041	7.29713	3904.12	0	0
36	157.184	7.2101	3687.84	0	0
37	160.326	7.1826	3453.01	0	0
38	163.469	7.21461	3200.09	0	0
39	166.611	7.30616	2931.79	0	0
40	169.753	7.45735	2651.6	0	0
41	172.896	7.66835	2361.2	0	0
42	176.038	7.93938	2061.55	0	0
43	179.181	8.27074	1761.05	0	0
44	182.323	8.66279	1464.28	0	0
45	185.465	9.11598	1166.3	0	0
46	188.608	9.6308	867.15	0	0
47	190.393	9.95105	786.2	0	0
48	193.93	10.6449	634.685	0	0
49	197.466	11.4191	512.804	0	0
50	201.002	12.2747	436.324	0	0
51	204.538	13.2131	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.39053**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	43.1437	55.3619	0	0	0
2	45.5713	53.0008	31.4736	0	0
3	47.9988	50.7334	109.843	0	0
4	52.6121	46.6652	462.086	0	0
5	55.6611	44.1376	335.243	0	0
6	58.71	41.7294	440.202	0	0
7	61.759	39.4343	205.704	0	0
8	65.0556	37.0734	383.01	0	0
9	68.3522	34.8314	601.836	0	0
10	71.6488	32.7027	869.992	0	0
11	74.9454	30.6822	1173.98	0	0
12	78.242	28.7654	1501.38	0	0
13	81.5386	26.9481	1839.53	0	0
14	84.8353	25.2268	2176.52	0	0
15	88.1319	23.598	2499.94	0	0
16	91.4285	22.0589	2811.47	0	0
17	94.7251	20.6065	3109.72	0	0
18	98.0217	19.2386	3390.11	0	0
19	101.318	17.9529	3643.89	0	0
20	104.615	16.7473	3865.07	0	0
21	107.912	15.62	4055.7	0	0
22	111.208	14.5694	4218.28	0	0
23	114.505	13.5938	4350.35	0	0
24	119.288	12.309	4485.48	0	0
25	122.422	11.5497	4537.49	0	0
26	125.556	10.8546	4560.39	0	0
27	128.69	10.2227	4555.11	0	0
28	131.824	9.65345	4522.55	0	0
29	134.957	9.14611	4462.76	0	0
30	138.091	8.70012	4377.14	0	0
31	141.225	8.31498	4266.22	0	0
32	144.359	7.99027	4131.02	0	0
33	147.493	7.72563	3971.03	0	0
34	150.627	7.52078	3787.77	0	0
35	153.76	7.37548	3581.85	0	0
36	156.894	7.28959	3357.38	0	0
37	160.028	7.26301	3114.81	0	0
38	163.162	7.29571	2854.35	0	0
39	166.296	7.38773	2578.55	0	0
40	169.429	7.53917	2290.95	0	0
41	172.563	7.75018	1993.65	0	0
42	175.697	8.02101	1687.09	0	0
43	178.831	8.35194	1379.07	0	0
44	181.965	8.74334	1075.98	0	0
45	185.099	9.19564	772.289	0	0
46	188.232	9.70934	468.003	0	0
47	190.04	10.0337	385.17	0	0
48	193.556	10.7245	232.368	0	0
49	197.073	11.4948	108.43	0	0
50	200.589	12.3458	29.6417	0	0
51	204.106	13.2787	0	0	0

## Discharge Sections

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### Entity Information

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#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	9.93704, 54.9765
	6.67447, 55.1458
	5.1052, 55.2782
	4.07352, 55.3939
	3.18, 55.4699
	2.85781, 55.4972
	1.72108, 55.6124
	1.24033, 55.6949
	0, 55.8557
	0, 30.8993
	0, 0
	165.118, 0
	224.8, 0
	224.8, 1.58638
	224.8, 8.21239
	222.826, 8.67095
	221.818, 8.87694
	219.726, 9.33154
	218.22, 9.61678
	217.448, 9.77681
	216.062, 10
	215, 10.5787
	213.754, 11.2178
	212.134, 12
	210.232, 12.2999
	208.238, 12.5909
	207.473, 12.7349
	205.626, 13.002
	204.438, 13.2323
	203.416, 13.3751
	202.717, 13.5095
	200.899, 13.914
	200.828, 13.9244
	200.584, 14
	200.501, 14
	200.311, 14.0563
	198.212, 14.7729
	197.263, 15.0144
	195.421, 15.5041
	194.81, 15.6974
	193.406, 16
	193.355, 16
	191.991, 16.2303
	190.078, 16.4743

External Boundary


189.352, 16.5231  
189.263, 16.5367  
188.241, 16.6201  
187.818, 16.6793  
187.13, 16.7461  
185.588, 16.9622  
184.722, 17.091  
183.566, 17.2869  
182.787, 17.4372  
179.775, 18  
178.918, 18.2923  
177.757, 18.7268  
177.178, 18.8977  
176.828, 19.0306  
176.031, 19.2414  
175.789, 19.3371  
175.676, 19.364  
175.493, 19.4388  
174.373, 19.657  
174.249, 19.7037  
172.868, 20  
171.197, 20.3259  
169.898, 20.6156  
168.503, 20.9658  
167.017, 21.3662  
165, 21.8829  
164.53, 22  
163.607, 22.246  
162.425, 22.5387  
161.686, 22.6955  
160.24, 23.043  
159.495, 23.2099  
156.311, 24  
155.237, 24.3552  
154.481, 24.5913  
154.073, 24.73  
153.54, 24.8892  
152.772, 25.1385  
151.965, 25.3547  
151.493, 25.5184  
149.115, 26.0456  
147.87, 26.3974  
147.159, 26.6238  
146.756, 26.7248  
146.583, 26.7855  
145.161, 27.1232  
144.62, 27.3051  
141.889, 28  
141.865, 28  
140.917, 28.3557  
139.735, 28.7229  
137.7, 29.4403  
135.616, 30  
135.446, 30.0639  
133.785, 30.738  
133.047, 30.9703  
132.617, 31.138  
131.318, 31.5211  
130, 31.932

129.131, 32.221  
129.013, 32.268  
128.596, 32.4554  
127.362, 32.955  
126.441, 33.3727  
125.912, 33.6026  
125.095, 34  
125, 34.0295  
122.758, 34.6713  
121.622, 34.9652  
120, 35.5299  
119.322, 35.7247  
118.605, 36  
117.188, 36.4844  
116.394, 36.736  
115.089, 37.1305  
113.867, 37.5428  
113.568, 37.6314  
113.284, 37.7041  
112.533, 38  
110.474, 38.5971  
109.688, 38.7875  
108.568, 39.0829  
107.527, 39.3263  
106.917, 39.483  
105.844, 39.7306  
105, 39.9369  
104.715, 40  
104.324, 40.2392  
103.05, 41.0935  
102.454, 41.4725  
101.638, 42  
100.909, 42.371  
99.2469, 43.1772  
98.645, 43.5023  
97.618, 44  
95.0538, 44.5121  
94.3453, 44.6435  
93.0752, 44.9076  
91.7579, 45.1339  
91.4818, 45.1892  
90.2052, 45.4215  
87.1896, 46  
86.3324, 46.4024  
85.5499, 46.7373  
85, 46.9563  
84.4469, 47.1919  
84.1112, 47.3163  
83.2366, 47.5769  
82.9228, 47.6905  
82.0039, 48  
81.1428, 48.1474  
81.0753, 48.1527  
79.6408, 48.4066  
77.8862, 48.6568  
77.6009, 48.6645  
77.3562, 48.692  
76.246, 48.8468  
75.0928, 48.9563

	74.1318, 49.0087 73.7898, 48.9938 71.5326, 48.9895 70, 49.0557 69.4041, 49.0897 68.6236, 49.1073 68.3534, 49.1231 66.0731, 48.8524 63.5956, 49.8777 60.6438, 49.9413 60.2727, 49.9483 49.732, 55.1459 47.4119, 55.2231 35, 55.6267 33.4209, 55.6854 20.7231, 55.7596 14.943, 55.8285 12.6235, 55.8423 10.8961, 55.0576
Material Boundary	3.18, 55.4699 3.73771, 53.909 6.07913, 52.2574 16.0059, 51.9432 19.9227, 54.182 23.9767, 54.0371 29.561, 53.8375 42.7713, 51.8617 53.011, 49.6516 55.6534, 49.0521 60.6135, 48.5607 61.0219, 48.5784 61.424, 48.6188 61.5467, 48.6406 62.3492, 48.5192 62.7448, 48.6291 62.9779, 48.5939 63.1863, 48.6543 63.6993, 48.5705 66.0731, 48.8524
Material Boundary	23.9767, 54.0371 24.3404, 53.7588 26.3418, 51.5991 29.4441, 49.9927 33.8437, 49.0943 42.0789, 48.2075 49.2142, 47.051 53, 46.6211 58.8678, 46.5556 66.316, 45.8499 73.8816, 44.3307 89.0543, 41.4431 103.706, 36.6881 124.499, 27.8191 142.306, 20.747 170, 13.5258 189.112, 9.5253 203.364, 6.84087 211.33, 5.42983 224.8, 1.58638

Material Boundary	0, 30.8993 38.2686, 27.8395 53.3751, 26.0536 107.132, 15.574 165.118, 0
Material Boundary	10.8961, 55.0576 12.913, 55.2282 14.5499, 55.1502 16.1234, 55.2261 16.3673, 55.2257 21.9325, 55.0924 25, 54.9985 28.5301, 54.8808 34.3842, 54.4037 38.892, 54.1882 42.5923, 54 43.2467, 53.8722 43.8889, 53.7626 44.4866, 53.6737 45.551, 53.4737 48.5394, 52 49.5641, 51.5616 50.7594, 51.0886 51.3483, 50.8721 52.0442, 50.6423 53.9273, 50 55.2722, 49.6208 55.4465, 49.5633 55.7367, 49.5083 56.4724, 49.3195 57.2015, 49.1987 57.9347, 49.0319 58.4903, 48.9371 59.3257, 48.7439 60, 48.6767 60.6135, 48.5607

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0.0704232, 50.2107 38.2413, 43.7882 50.1938, 41.7972 78.5099, 36.0119 101.322, 31.3877 107.941, 29.9106 141.929, 21.7314 166.669, 15.4373 188.903, 10.2993 219.728, 3.09576 224.827, 2.01484	Assigned to: 
Distributed Load	47.4119, 55.2231 35, 55.6267 33.4209, 55.6854 20.7231, 55.7596 14.943, 55.8285	Constant DistributionOrientation: Normal to boundary Magnitude: 6 kN/m2 Creates Excess Pore Pressure: No





statica 3+475

Slide2 - An Interactive Slope Stability Program

Date Created: 05/09/2023, 11:12:42

Software Version: 9.027

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# Slide2 Analysis Information

## statica

### Project Summary

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File Name:	statica.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.295s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	05/09/2023, 11:12:42

## General Settings

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Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

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Slices Type:	Vertical
<b>Analysis Methods Used</b>	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

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Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

# Random Numbers

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Pseudo-random Seed:

10116

Random Number Generation Method:

Park and Miller v.3



## Surface Options

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Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

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Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Loading

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1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

# Materials

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## R

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

## FN


Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	0
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

# Support




## pali

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	250 kN

## Ancoraggio

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	1.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	50 kN/m
Material Dependent	Yes

## Bond Strength Dependency

	Material	Bond Strength [kN/m]
	AC alt	80
	R	27
	FN	17

# Global Minimums

## Method: bishop simplified

FS	1.670520
Center:	138.313, 162.864
Radius:	150.554
Left Slip Surface Endpoint:	32.576, 55.690
Right Slip Surface Endpoint:	179.565, 18.072
Resisting Moment:	2.9321e+06 kN-m
Driving Moment:	1.7552e+06 kN-m
Passive Support Moment:	7647.29 kN-m
Maximum Single Support Force:	316.594 kN
Total Support Force:	316.594 kN
Total Slice Area:	2408.17 m <sup>2</sup>
Surface Horizontal Width:	146.988 m
Surface Average Height:	16.3834 m

## Method: janbu simplified

FS	1.605640
Center:	138.313, 162.864
Radius:	150.554
Left Slip Surface Endpoint:	32.576, 55.690
Right Slip Surface Endpoint:	179.565, 18.072
Resisting Horizontal Force:	18347 kN
Driving Horizontal Force:	11426.6 kN
Passive Horizontal Support Force:	223.026 kN
Maximum Single Support Force:	316.594 kN
Total Support Force:	316.594 kN
Total Slice Area:	2408.17 m <sup>2</sup>
Surface Horizontal Width:	146.988 m
Surface Average Height:	16.3834 m

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 2						
<b>pali</b>						
Support Type: Pile/Micro Pile						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	15	Not Effective	Not Effective	Not Effective	Not Effective	0
<b>Ancoraggio</b>						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	20.0078	13.478	6.52974	13.478	6.52974	316.594

### Method: janbu simplified

Number of Supports: 2						
<b>pali</b>						
Support Type: Pile/Micro Pile						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	15	Not Effective	Not Effective	Not Effective	Not Effective	0
<b>Ancoraggio</b>						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
60.2727, 49.9483	20.0078	13.478	6.52974	13.478	6.52974	316.594

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces:	5391
Number of Invalid Surfaces:	12

#### Error Codes

Error Code -112 reported for 12 surfaces

### Method: janbu simplified

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Number of Valid Surfaces:	5403
Number of Invalid Surfaces:	0

#### Error Code Descriptions

The following errors were encountered during the computation:

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.



# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.67052

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	2.83879	75.7439	-43.8641	R	0	29.2561	12.15	20.2969	39.8571	0	39.8571	51.5347	51.5347
2	2.56616	192.912	-42.453	FN	0	17.0713	14.4774	24.1848	86.6301	0	86.6301	99.8744	99.8744
3	2.56616	303.954	-41.1428	FN	0	17.0713	20.8038	34.7531	124.486	0	124.486	142.661	142.661
4	2.62425	420.312	-39.844	AC alt	40	24.7913	55.7247	93.0892	135.096	0	135.096	181.597	181.597
5	2.62425	526.04	-38.555	AC alt	40	24.7913	64.4976	107.745	169.999	0	169.999	221.404	221.404
6	2.62425	626.943	-37.2888	AC alt	40	24.7913	70.9314	118.492	195.595	0	195.595	249.609	249.609
7	2.99707	820.202	-35.9566	AC alt	40	24.7913	83.111	138.839	252.266	8.21455	244.052	312.554	304.339
8	2.99707	864.359	-34.5595	AC alt	40	24.7913	74.3208	124.154	232.179	23.099	209.08	283.372	260.273
9	2.99707	894.291	-33.1856	AC alt	40	24.7913	74.1277	123.832	245.144	36.8326	208.312	293.626	256.793
10	2.99707	917.936	-31.8328	AC alt	40	24.7913	73.6681	123.064	256.05	49.5666	206.483	301.785	252.218
11	2.99707	981.682	-30.4997	AC alt	40	24.7913	76.276	127.421	278.204	61.3453	216.858	323.133	261.788
12	2.99707	1047.79	-29.1846	AC alt	40	24.7913	79.2708	132.423	300.982	72.2083	228.774	345.257	273.049
13	2.99707	1124.42	-27.8861	AC alt	40	24.7913	83.2493	139.07	326.791	82.1911	244.6	370.844	288.653
14	2.99707	1213.61	-26.603	AC alt	40	24.7913	88.3758	147.634	356.322	91.3257	264.996	400.583	309.257
15	2.99707	1296.7	-25.3342	AC alt	40	24.7913	93.2815	155.829	384.155	99.6409	284.514	428.317	328.676
16	2.99707	1364.15	-24.0786	AC alt	40	24.7913	97.2425	162.446	407.437	107.163	300.274	450.892	343.729
17	2.99707	1416.45	-22.8351	AC alt	40	24.7913	100.267	167.498	426.241	113.937	312.304	468.461	354.524
18	2.99707	1449.56	-21.6029	AC alt	40	24.7913	102.025	170.435	439.29	119.989	319.301	479.69	359.701
19	2.99707	1451.74	-20.3811	AC alt	40	24.7913	101.602	169.729	442.93	125.312	317.618	480.678	355.366
20	2.99707	1461.66	-19.169	AC alt	40	24.7913	101.915	170.251	448.786	129.924	318.862	484.215	354.291
21	2.99707	1487.91	-17.9657	AC alt	40	24.7913	103.636	173.126	459.549	133.842	325.707	493.154	359.312
22	2.99707	1509.19	-16.7705	AC alt	40	24.7913	105.137	175.634	468.758	137.079	331.679	500.442	363.363
23	2.99707	1516.41	-15.5828	AC alt	40	24.7913	105.705	176.582	473.588	139.649	333.939	503.067	363.418
24	2.99707	1479.82	-14.4019	AC alt	40	24.7913	102.991	172.049	464.707	141.564	323.143	491.155	349.591
25	2.99707	1418.37	-13.2273	AC alt	40	24.7913	98.5535	164.636	447.811	142.324	305.487	470.976	328.652
26	2.99707	1393.85	-12.0583	AC alt	40	24.7913	97.1539	162.298	442.279	142.358	299.921	463.033	320.675
27	2.99707	1385.95	-10.8943	AC alt	40	24.7913	97.2826	162.513	441.869	141.437	300.432	460.593	319.156
28	2.99707	1366.59	-9.73491	AC alt	40	24.7913	96.6828	161.511	437.761	139.713	298.048	454.348	314.635
29	2.99707	1338.19	-8.57952	AC alt	40	24.7913	95.4904	159.519	430.678	137.377	293.301	445.084	307.707
30	2.99707	1304.98	-7.42763	AC alt	40	24.7913	94.0363	157.09	421.955	134.436	287.519	434.214	299.778
31	2.99707	1268.7	-6.27876	AC alt	40	24.7913	92.4602	154.457	412.141	130.894	281.247	422.314	291.42
32	2.99707	1233.2	-5.13242	AC alt	40	24.7913	91.0732	152.14	402.484	126.757	275.727	410.664	283.907
33	2.99707	1173.77	-3.98814	AC alt	40	24.7913	87.8449	146.747	384.912	122.026	262.886	391.037	269.011
34	2.99707	1120.43	-2.84544	AC alt	40	24.7913	85.2301	142.379	369.188	116.706	252.482	373.424	256.718
35	2.99707	1069.86	-1.70388	AC alt	40	24.7913	82.962	138.59	354.256	110.799	243.457	356.724	245.925
36	2.99707	1013.62	-0.563	AC alt	40	24.7913	80.3413	134.212	337.336	104.305	233.031	338.126	233.821
37	2.99707	957.281	0.577661	AC alt	40	24.7913	77.83	130.017	320.267	97.2258	223.041	319.482	222.256
38	2.99707	898.877	1.71855	AC alt	40	24.7913	75.296	125.783	302.399	89.4396	212.959	300.14	210.7
39	2.99707	845.394	2.86012	AC alt	40	24.7913	73.3744	122.573	286.099	80.7843	205.315	282.433	201.649
40	2.99707	786.639	4.00283	AC alt	40	24.7913	71.1322	118.828	267.935	71.5413	196.394	262.958	191.417
41	2.99707	728.959	5.14714	AC alt	40	24.7913	69.1108	115.451	250.061	61.7086	188.352	243.835	182.127
42	2.99707	658.099	6.29351	AC alt	40	24.7913	66.0818	110.391	227.584	51.2834	176.301	220.297	169.013
43	2.99707	586.838	7.44242	AC alt	40	24.7913	63.1406	105.478	204.862	40.2619	164.6	196.614	156.352
44	2.99707	519.981	8.59435	AC alt	40	24.7913	60.7109	101.419	183.573	28.64	154.933	174.398	145.758
45	2.99707	449.81	9.74978	AC alt	40	24.7913	58.1234	97.0963	161.052	16.4124	144.639	151.064	134.652
46	2.3777	302.413	10.789	FN	0	17.0713	21.1672	35.3602	131.617	4.95706	126.66	127.583	122.626
47	2.97022	306.369	11.8271	FN	0	17.0713	17.9266	29.9468	107.27	0	107.27	103.516	103.516
48	2.97022	230.197	12.9845	FN	0	17.0713	13.5243	22.5926	80.9266	0	80.9266	77.8081	77.8081
49	2.97022	150.96	14.1474	FN	0	17.0713	8.90567	14.8771	53.2897	0	53.2897	51.0449	51.0449
50	2.97022	53.8138	15.3163	FN	0	17.0713	3.18806	5.32571	19.0767	0	19.0767	18.2036	18.2036

**Global Minimum Query (janbu simplified) - Safety Factor: 1.60564**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	2.83879	75.7439	-43.8641	R	0	29.2561	12.5177	20.099	39.4685	0	39.4685	51.4995	51.4995
2	2.56616	192.912	-42.453	FN	0	17.0713	14.9753	24.045	86.1289	0	86.1289	99.8287	99.8287
3	2.56616	303.954	-41.1428	FN	0	17.0713	21.5241	34.5599	123.794	0	123.794	142.598	142.598
4	2.62425	420.312	-39.844	AC alt	40	24.7913	57.5406	92.3895	133.43	0	133.43	181.445	181.445
5	2.62425	526.04	-38.555	AC alt	40	24.7913	66.6179	106.964	168.141	0	168.141	221.235	221.235
6	2.62425	626.943	-37.2888	AC alt	40	24.7913	73.2827	117.666	193.626	0	193.626	249.43	249.43
7	2.99707	820.202	-35.9566	AC alt	40	24.7913	86.2819	138.538	251.55	8.21455	243.335	314.138	305.923
8	2.99707	864.359	-34.5595	AC alt	40	24.7913	76.8274	123.357	230.28	23.099	207.181	283.2	260.101
9	2.99707	894.291	-33.1856	AC alt	40	24.7913	76.6489	123.071	243.331	36.8326	206.498	293.461	256.628
10	2.99707	917.936	-31.8328	AC alt	40	24.7913	76.194	122.34	254.326	49.5666	204.759	301.628	252.062
11	2.99707	981.682	-30.4997	AC alt	40	24.7913	78.9116	126.704	276.497	61.3453	215.151	322.978	261.633
12	2.99707	1047.79	-29.1846	AC alt	40	24.7913	82.0307	131.712	299.287	72.2083	227.078	345.103	272.895
13	2.99707	1124.42	-27.8861	AC alt	40	24.7913	86.1685	138.356	325.093	82.1911	242.902	370.69	288.499
14	2.99707	1213.61	-26.603	AC alt	40	24.7913	91.4972	146.912	354.603	91.3257	263.278	400.428	309.102
15	2.99707	1296.7	-25.3342	AC alt	40	24.7913	96.5992	155.104	382.43	99.6409	282.789	428.163	328.522
16	2.99707	1364.15	-24.0786	AC alt	40	24.7913	100.725	161.728	405.725	107.163	298.562	450.737	343.574
17	2.99707	1416.45	-22.8351	AC alt	40	24.7913	103.88	166.795	424.568	113.937	310.631	468.31	354.373
18	2.99707	1449.56	-21.6029	AC alt	40	24.7913	105.726	169.758	437.677	119.989	317.688	479.543	359.554
19	2.99707	1451.74	-20.3811	AC alt	40	24.7913	105.311	169.092	441.413	125.312	316.101	480.539	355.227
20	2.99707	1461.66	-19.169	AC alt	40	24.7913	105.659	169.65	447.355	129.924	317.431	484.086	354.162
21	2.99707	1487.91	-17.9657	AC alt	40	24.7913	107.467	172.553	458.184	133.842	324.342	493.031	359.189
22	2.99707	1509.19	-16.7705	AC alt	40	24.7913	109.047	175.09	467.464	137.079	330.385	500.326	363.247
23	2.99707	1516.41	-15.5828	AC alt	40	24.7913	109.659	176.073	472.376	139.649	332.727	502.958	363.309
24	2.99707	1479.82	-14.4019	AC alt	40	24.7913	106.867	171.59	463.615	141.564	322.051	491.058	349.494
25	2.99707	1418.37	-13.2273	AC alt	40	24.7913	102.284	164.231	446.85	142.324	304.526	470.892	328.568
26	2.99707	1393.85	-12.0583	AC alt	40	24.7913	100.853	161.934	441.411	142.358	299.053	462.955	320.597
27	2.99707	1385.95	-10.8943	AC alt	40	24.7913	101.007	162.182	441.083	141.437	299.646	460.523	319.086
28	2.99707	1366.59	-9.73491	AC alt	40	24.7913	100.406	161.216	437.057	139.713	297.344	454.283	314.57
29	2.99707	1338.19	-8.57952	AC alt	40	24.7913	99.1882	159.261	430.064	137.377	292.687	445.029	307.652
30	2.99707	1304.98	-7.42763	AC alt	40	24.7913	97.6991	156.87	421.428	134.436	286.992	434.165	299.729
31	2.99707	1268.7	-6.27876	AC alt	40	24.7913	96.0817	154.273	411.703	130.894	280.809	422.274	291.38
32	2.99707	1233.2	-5.13242	AC alt	40	24.7913	94.6604	151.991	402.132	126.757	275.375	410.634	283.877
33	2.99707	1173.77	-3.98814	AC alt	40	24.7913	91.3247	146.635	384.646	122.026	262.62	391.013	268.987
34	2.99707	1120.43	-2.84544	AC alt	40	24.7913	88.6255	142.301	369.005	116.706	252.299	373.41	256.704
35	2.99707	1069.86	-1.70388	AC alt	40	24.7913	86.2856	138.544	354.149	110.799	243.35	356.716	245.917
36	2.99707	1013.62	-0.563	AC alt	40	24.7913	83.5786	134.197	337.303	104.305	232.998	338.124	233.819
37	2.99707	957.281	0.577661	AC alt	40	24.7913	80.9841	130.031	320.302	97.2258	223.076	319.485	222.26
38	2.99707	898.877	1.71855	AC alt	40	24.7913	78.365	125.826	302.5	89.4396	213.061	300.149	210.71
39	2.99707	845.394	2.86012	AC alt	40	24.7913	76.3825	122.643	286.264	80.7843	205.48	282.448	201.664
40	2.99707	786.639	4.00283	AC alt	40	24.7913	74.0655	118.922	268.161	71.5413	196.62	262.978	191.437
41	2.99707	728.959	5.14714	AC alt	40	24.7913	71.9776	115.57	250.344	61.7086	188.636	243.861	182.152
42	2.99707	658.099	6.29351	AC alt	40	24.7913	68.8394	110.531	227.919	51.2834	176.635	220.327	169.043
43	2.99707	586.838	7.44242	AC alt	40	24.7913	65.7916	105.638	205.243	40.2619	164.981	196.648	156.387
44	2.99707	519.981	8.59435	AC alt	40	24.7913	63.2755	101.598	183.999	28.64	155.359	174.436	145.796
45	2.99707	449.81	9.74978	AC alt	40	24.7913	60.594	97.2922	161.518	16.4124	145.106	151.106	134.694
46	2.3777	302.413	10.789	FN	0	17.0713	22.0548	35.4121	131.803	4.95706	126.846	127.6	122.643
47	2.97022	306.369	11.8271	FN	0	17.0713	18.6812	29.9953	107.443	0	107.443	103.531	103.531
48	2.97022	230.197	12.9845	FN	0	17.0713	14.096	22.6331	81.0716	0	81.0716	77.8213	77.8213
49	2.97022	150.96	14.1474	FN	0	17.0713	9.28371	14.9063	53.3945	0	53.3945	51.0544	51.0544
50	2.97022	53.8138	15.3163	FN	0	17.0713	3.324	5.33714	19.1176	0	19.1176	18.2073	18.2073

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.67052

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	32.5762	55.6904	0	0	0
2	35.415	52.962	72.3037	0	0
3	37.9812	50.6144	236.414	0	0
4	40.5473	48.3724	460.039	0	0
5	43.1716	46.1825	607.66	0	0
6	45.7958	44.091	792.014	0	0
7	48.4201	42.0927	995.669	0	0
8	51.4172	39.9186	1161.91	0	0
9	54.4142	37.8542	1418.83	0	0
10	57.4113	35.8941	1677.54	0	0
11	60.4084	34.0334	1933.53	0	0
12	63.4054	32.268	2196.43	0	0
13	66.4025	30.5941	2463.06	0	0
14	69.3996	29.0081	2732.22	0	0
15	72.3967	27.5071	3002.63	0	0
16	75.3937	26.0882	3268.58	0	0
17	78.3908	24.7489	3523.29	0	0
18	81.3879	23.4869	3761.19	0	0
19	84.385	22.3001	3977.25	0	0
20	87.382	21.1866	4166.43	0	0
21	90.3791	20.1447	4329.05	0	0
22	93.3762	19.1729	4465.54	0	0
23	96.3733	18.2697	4574.32	0	0
24	99.3703	17.4339	4653.86	0	0
25	102.367	16.6643	4703.34	0	0
26	105.364	15.9598	4723.91	0	0
27	108.362	15.3196	4716.36	0	0
28	111.359	14.7427	4680.15	0	0
29	114.356	14.2286	4615.93	0	0
30	117.353	13.7764	4524.94	0	0
31	120.35	13.3857	4408.42	0	0
32	123.347	13.0559	4267.67	0	0
33	126.344	12.7867	4103.5	0	0
34	129.341	12.5778	3921.07	0	0
35	132.338	12.4288	3721.03	0	0
36	135.335	12.3397	3504.37	0	0
37	138.332	12.3102	3273.9	0	0
38	141.329	12.3404	3031.34	0	0
39	144.326	12.4303	2778.84	0	0
40	147.324	12.5801	2516.45	0	0
41	150.321	12.7898	2247.41	0	0
42	153.318	13.0598	1973.1	0	0
43	156.315	13.3903	1700.14	0	0
44	159.312	13.7818	1431	0	0
45	162.309	14.2348	1166.19	0	0
46	165.306	14.7498	909.329	0	0
47	167.684	15.2029	799.445	0	0
48	170.654	15.8248	679.566	0	0
49	173.624	16.5097	584.034	0	0
50	176.594	17.2584	517.728	0	0
51	179.565	18.0719	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.60564**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	32.5762	55.6904	0	0	0
2	35.415	52.962	70.1997	0	0
3	37.9812	50.6144	231.857	0	0
4	40.5473	48.3724	452.082	0	0
5	43.1716	46.1825	591.29	0	0
6	45.7958	44.091	766.195	0	0
7	48.4201	42.0927	959.747	0	0
8	51.4172	39.9186	1109.53	0	0
9	54.4142	37.8542	1355.03	0	0
10	57.4113	35.8941	1602.63	0	0
11	60.4084	34.0334	1847.84	0	0
12	63.4054	32.268	2099.83	0	0
13	66.4025	30.5941	2355.35	0	0
14	69.3996	29.0081	2613.08	0	0
15	72.3967	27.5071	2871.55	0	0
16	75.3937	26.0882	3125.12	0	0
17	78.3908	24.7489	3367.1	0	0
18	81.3879	23.4869	3592.06	0	0
19	84.385	22.3001	3795.12	0	0
20	87.382	21.1866	3971.5	0	0
21	90.3791	20.1447	4121.41	0	0
22	93.3762	19.1729	4245.1	0	0
23	96.3733	18.2697	4341	0	0
24	99.3703	17.4339	4407.68	0	0
25	102.367	16.6643	4444.7	0	0
26	105.364	15.9598	4453.42	0	0
27	108.362	15.3196	4434.23	0	0
28	111.359	14.7427	4386.41	0	0
29	114.356	14.2286	4310.68	0	0
30	117.353	13.7764	4208.33	0	0
31	120.35	13.3857	4080.64	0	0
32	123.347	13.0559	3928.89	0	0
33	126.344	12.7867	3753.88	0	0
34	129.341	12.5778	3560.97	0	0
35	132.338	12.4288	3350.74	0	0
36	135.335	12.3397	3124.11	0	0
37	138.332	12.3102	2883.94	0	0
38	141.329	12.3404	2631.93	0	0
39	144.326	12.4303	2370.23	0	0
40	147.324	12.5801	2098.8	0	0
41	150.321	12.7898	1820.92	0	0
42	153.318	13.0598	1537.95	0	0
43	156.315	13.3903	1256.62	0	0
44	159.312	13.7818	979.395	0	0
45	162.309	14.2348	706.705	0	0
46	165.306	14.7498	442.205	0	0
47	167.684	15.2029	330.127	0	0
48	170.654	15.8248	207.9	0	0
49	173.624	16.5097	110.572	0	0
50	176.594	17.2584	43.0651	0	0
51	179.565	18.0719	0	0	0

# Discharge Sections

---

## Entity Information

---

◆ **Group 1**

**Shared Entities**

Type	Coordinates (x,y)
	9.93704, 54.9765
	6.67447, 55.1458
	5.1052, 55.2782
	4.07352, 55.3939
	3.18, 55.4699
	2.85781, 55.4972
	1.72108, 55.6124
	1.24033, 55.6949
	0, 55.8557
	0, 30.8993
	0, 0
	165.118, 0
	224.8, 0
	224.8, 1.58638
	224.8, 8.21239
	222.826, 8.67095
	221.818, 8.87694
	219.726, 9.33154
	218.22, 9.61678
	217.448, 9.77681
	216.062, 10
	215, 10.5787
	213.754, 11.2178
	212.134, 12
	210.232, 12.2999
	208.238, 12.5909
	207.473, 12.7349
	205.626, 13.002
	204.438, 13.2323
	203.416, 13.3751
	202.717, 13.5095
	200.899, 13.914
	200.828, 13.9244
	200.584, 14
	200.501, 14
	200.311, 14.0563
	198.212, 14.7729
	197.263, 15.0144
	195.421, 15.5041
	194.81, 15.6974
	193.406, 16
	193.355, 16
	191.991, 16.2303
	190.078, 16.4743

External Boundary

189.352, 16.5231  
189.263, 16.5367  
188.241, 16.6201  
187.818, 16.6793  
187.13, 16.7461  
185.588, 16.9622  
184.722, 17.091  
183.566, 17.2869  
182.787, 17.4372  
179.775, 18  
178.918, 18.2923  
177.757, 18.7268  
177.178, 18.8977  
176.828, 19.0306  
176.031, 19.2414  
175.789, 19.3371  
175.676, 19.364  
175.493, 19.4388  
174.373, 19.657  
174.249, 19.7037  
172.868, 20  
171.197, 20.3259  
169.898, 20.6156  
168.503, 20.9658  
167.017, 21.3662  
165, 21.8829  
164.53, 22  
163.607, 22.246  
162.425, 22.5387  
161.686, 22.6955  
160.24, 23.043  
159.495, 23.2099  
156.311, 24  
155.237, 24.3552  
154.481, 24.5913  
154.073, 24.73  
153.54, 24.8892  
152.772, 25.1385  
151.965, 25.3547  
151.493, 25.5184  
149.115, 26.0456  
147.87, 26.3974  
147.159, 26.6238  
146.756, 26.7248  
146.583, 26.7855  
145.161, 27.1232  
144.62, 27.3051  
141.889, 28  
141.865, 28  
140.917, 28.3557  
139.735, 28.7229  
137.7, 29.4403  
135.616, 30  
135.446, 30.0639  
133.785, 30.738  
133.047, 30.9703  
132.617, 31.138  
131.318, 31.5211  
130, 31.932


129.131, 32.221  
129.013, 32.268  
128.596, 32.4554  
127.362, 32.955  
126.441, 33.3727  
125.912, 33.6026  
125.095, 34  
125, 34.0295  
122.758, 34.6713  
121.622, 34.9652  
120, 35.5299  
119.322, 35.7247  
118.605, 36  
117.188, 36.4844  
116.394, 36.736  
115.089, 37.1305  
113.867, 37.5428  
113.568, 37.6314  
113.284, 37.7041  
112.533, 38  
110.474, 38.5971  
109.688, 38.7875  
108.568, 39.0829  
107.527, 39.3263  
106.917, 39.483  
105.844, 39.7306  
105, 39.9369  
104.715, 40  
104.324, 40.2392  
103.05, 41.0935  
102.454, 41.4725  
101.638, 42  
100.909, 42.371  
99.2469, 43.1772  
98.645, 43.5023  
97.618, 44  
95.0538, 44.5121  
94.3453, 44.6435  
93.0752, 44.9076  
91.7579, 45.1339  
91.4818, 45.1892  
90.2052, 45.4215  
87.1896, 46  
86.3324, 46.4024  
85.5499, 46.7373  
85, 46.9563  
84.4469, 47.1919  
84.1112, 47.3163  
83.2366, 47.5769  
82.9228, 47.6905  
82.0039, 48  
81.1428, 48.1474  
81.0753, 48.1527  
79.6408, 48.4066  
77.8862, 48.6568  
77.6009, 48.6645  
77.3562, 48.692  
76.246, 48.8468  
75.0928, 48.9563

	74.1318, 49.0087 73.7898, 48.9938 71.5326, 48.9895 70, 49.0557 69.4041, 49.0897 68.6236, 49.1073 68.3534, 49.1231 66.0731, 48.8524 63.5956, 49.8777 60.6438, 49.9413 60.2727, 49.9483 49.732, 55.1459 47.4119, 55.2231 35, 55.6267 33.4209, 55.6854 20.7231, 55.7596 14.943, 55.8285 12.6235, 55.8423 10.8961, 55.0576
Material Boundary	3.18, 55.4699 3.73771, 53.909 6.07913, 52.2574 16.0059, 51.9432 19.9227, 54.182 23.9767, 54.0371 29.561, 53.8375 42.7713, 51.8617 53.011, 49.6516 55.6534, 49.0521 60.6135, 48.5607 61.0219, 48.5784 61.424, 48.6188 61.5467, 48.6406 62.3492, 48.5192 62.7448, 48.6291 62.9779, 48.5939 63.1863, 48.6543 63.6993, 48.5705 66.0731, 48.8524
Material Boundary	23.9767, 54.0371 24.3404, 53.7588 26.3418, 51.5991 29.4441, 49.9927 33.8437, 49.0943 42.0789, 48.2075 49.2142, 47.051 53, 46.6211 58.8678, 46.5556 66.316, 45.8499 73.8816, 44.3307 89.0543, 41.4431 103.706, 36.6881 124.499, 27.8191 142.306, 20.747 170, 13.5258 189.112, 9.5253 203.364, 6.84087 211.33, 5.42983 224.8, 1.58638



Material Boundary	0, 30.8993 38.2686, 27.8395 53.3751, 26.0536 107.132, 15.574 165.118, 0
Material Boundary	10.8961, 55.0576 12.913, 55.2282 14.5499, 55.1502 16.1234, 55.2261 16.3673, 55.2257 21.9325, 55.0924 25, 54.9985 28.5301, 54.8808 34.3842, 54.4037 38.892, 54.1882 42.5923, 54 43.2467, 53.8722 43.8889, 53.7626 44.4866, 53.6737 45.551, 53.4737 48.5394, 52 49.5641, 51.5616 50.7594, 51.0886 51.3483, 50.8721 52.0442, 50.6423 53.9273, 50 55.2722, 49.6208 55.4465, 49.5633 55.7367, 49.5083 56.4724, 49.3195 57.2015, 49.1987 57.9347, 49.0319 58.4903, 48.9371 59.3257, 48.7439 60, 48.6767 60.6135, 48.5607

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0.0704232, 50.2107 38.2413, 43.7882 50.1938, 41.7972 78.5099, 36.0119 101.322, 31.3877 107.941, 29.9106 141.929, 21.7314 166.669, 15.4373 188.903, 10.2993 219.728, 3.09576 224.827, 2.01484	Assigned to: 
Distributed Load	47.4119, 55.2231 35, 55.6267 33.4209, 55.6854 20.7231, 55.7596 14.943, 55.8285	Constant DistributionOrientation: Normal to boundary Magnitude: 20 kN/m2 Creates Excess Pore Pressure: No



4+525 statica

Slide2 - An Interactive Slope Stability Program

Date Created: 06/09/2023, 16:11:56

Software Version: 9.027

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# Slide2 Analysis Information

## statica

### Project Summary

---

File Name:	statica.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:02.854s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	06/09/2023, 16:11:56

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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

# Loading

---

2 Distributed Loads present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

## Distributed Load 2

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

# Materials

---

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1


## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

# Support

---

## Support 1

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	2.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	70 kN/m
Material Dependent	No

# Global Minimums

## Method: bishop simplified

	<b>FS</b>	<b>1.646160</b>
Center:		186.340, 137.481
Radius:		14.906
Left Slip Surface Endpoint:		172.237, 132.652
Right Slip Surface Endpoint:		190.728, 123.236
Resisting Moment:		14770.3 kN-m
Driving Moment:		8972.56 kN-m
Passive Support Moment:		716.788 kN-m
Maximum Single Support Force:		57.8918 kN
Total Support Force:		73.9344 kN
Total Slice Area:		75.631 m <sup>2</sup>
Surface Horizontal Width:		18.4905 m
Surface Average Height:		4.09025 m

## Method: janbu simplified

	<b>FS</b>	<b>1.509490</b>
Center:		185.690, 135.635
Radius:		13.393
Left Slip Surface Endpoint:		172.612, 132.744
Right Slip Surface Endpoint:		190.746, 123.233
Resisting Horizontal Force:		852.848 kN
Driving Horizontal Force:		564.99 kN
Passive Horizontal Support Force:		34.4111 kN
Maximum Single Support Force:		45.6314 kN
Total Support Force:		48.6646 kN
Total Slice Area:		80.6093 m <sup>2</sup>
Surface Horizontal Width:		18.1337 m
Surface Average Height:		4.44527 m

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.534	5.03	2.75568	2.27432	2.75568	2.27432	57.8918
186.254, 126.034	5.03	4.39976	0.630244	4.39976	0.630244	16.0426
184.754, 127.534	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0

### Method: janbu simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.534	5.03	3.23734	1.79266	3.23734	1.79266	45.6314
186.254, 126.034	5.03	4.91084	0.119163	4.91084	0.119163	3.03325
184.754, 127.534	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0



# Valid and Invalid Surfaces

---

## Method: bishop simplified

---

Number of Valid Surfaces:	8150
Number of Invalid Surfaces:	8

### Error Codes

Error Code -112 reported for 8 surfaces

## Method: janbu simplified

---

Number of Valid Surfaces:	8035
Number of Invalid Surfaces:	123

### Error Codes

Error Code -108 reported for 47 surfaces

Error Code -111 reported for 75 surfaces

Error Code -112 reported for 1 surface

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.64616

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.369811	3.82087	-69.1033	AC alt	16	24.7913	6.62025	10.898	-8.6868	0	-8.6868	8.65292	8.65292
2	0.369811	10.8838	-65.4026	AC alt	16	24.7913	10.1437	16.6982	5.12668	0	5.12668	27.2851	27.2851
3	0.369811	17.0188	-62.1721	AC alt	16	24.7913	13.4473	22.1365	18.0785	0	18.0785	43.5535	43.5535
4	0.369811	22.5036	-59.2589	AC alt	16	24.7913	16.565	27.2687	30.3013	0	30.3013	58.1544	58.1544
5	0.369811	27.4828	-56.5779	AC alt	16	24.7913	19.5177	32.1292	41.8768	0	41.8768	71.452	71.452
6	0.369811	32.0604	-54.076	AC alt	16	24.7913	22.3275	36.7547	52.8928	0	52.8928	83.7099	83.7099
7	0.369811	35.9521	-51.7172	AC alt	16	24.7913	24.8315	40.8766	62.7094	0	62.7094	94.1709	94.1709
8	0.369811	37.6946	-49.4761	AC alt	16	24.7913	26.2454	43.2042	68.2527	0	68.2527	98.9562	98.9562
9	0.369811	38.9224	-47.3334	AC alt	16	24.7913	27.3733	45.0609	72.6747	0	72.6747	102.374	102.374
10	0.369811	39.9366	-45.2747	AC alt	16	24.7913	28.3686	46.6993	76.5764	0	76.5764	105.218	105.218
11	0.369811	40.7601	-43.2882	AC alt	16	24.7913	29.2432	48.139	80.0052	0	80.0052	107.551	107.551
12	0.369811	41.4114	-41.3647	AC alt	16	24.7913	30.007	49.3963	82.9996	0	82.9996	109.422	109.422
13	0.369811	41.9058	-39.4966	AC alt	16	24.7913	30.668	50.4845	85.5914	0	85.5914	110.869	110.869
14	0.369811	42.2558	-37.6775	AC alt	16	24.7913	31.2333	51.415	87.8075	0	87.8075	111.928	111.928
15	0.369811	42.4721	-35.9021	AC alt	16	24.7913	31.7085	52.1973	89.6704	0	89.6704	112.625	112.625
16	0.369811	42.5637	-34.1656	AC alt	16	24.7913	32.0987	52.8396	91.2001	0	91.2001	112.986	112.986
17	0.369811	42.5382	-32.4642	AC alt	16	24.7913	32.408	53.3488	92.4128	0	92.4128	113.03	113.03
18	0.369811	42.4024	-30.7944	AC alt	16	24.7913	32.6402	53.731	93.323	0	93.323	112.776	112.776
19	0.369811	42.1622	-29.1531	AC alt	16	24.7913	32.7984	53.9914	93.9432	0	93.9432	112.238	112.238
20	0.369811	41.8224	-27.5377	AC alt	16	24.7913	32.8854	54.1347	94.2845	0	94.2845	111.431	111.431
21	0.369811	41.3877	-25.9457	AC alt	16	24.7913	32.9037	54.1647	94.3558	0	94.3558	110.365	110.365
22	0.369811	40.8619	-24.375	AC alt	16	24.7913	32.8552	54.0849	94.166	0	94.166	109.052	109.052
23	0.369811	40.2484	-22.8236	AC alt	16	24.7913	32.7418	53.8983	93.7216	0	93.7216	107.501	107.501
24	0.369811	39.5504	-21.2897	AC alt	16	24.7913	32.5652	53.6075	93.0288	0	93.0288	105.719	105.719
25	0.369811	38.7705	-19.7716	AC alt	16	24.7913	32.3266	53.2147	92.0933	0	92.0933	103.713	103.713
26	0.369811	37.9494	-18.2678	AC alt	16	24.7913	32.0512	52.7614	91.014	0	91.014	101.594	101.594
27	0.369811	38.2325	-16.777	AC alt	16	24.7913	32.4679	53.4474	92.6477	0	92.6477	102.436	102.436
28	0.369811	38.9992	-15.2978	AC alt	16	24.7913	33.1951	54.6444	95.4982	0	95.4982	104.578	104.578
29	0.369811	39.6922	-13.829	AC alt	16	24.7913	33.88	55.7719	98.1834	0	98.1834	106.523	106.523
30	0.369811	40.3128	-12.3694	AC alt	16	24.7913	38.9886	64.1814	118.211	0	118.211	126.762	126.762
31	0.369811	40.8625	-10.9179	AC alt	16	24.7913	35.1249	57.8212	103.064	0	103.064	109.839	109.839
32	0.369811	40.4909	-9.47349	AC alt	16	24.7913	35.1244	57.8204	103.062	0	103.062	108.923	108.923
33	0.369811	38.2887	-8.03512	AC alt	16	24.7913	33.9061	55.8149	98.286	0	98.286	103.072	103.072
34	0.369811	35.9644	-6.60183	AC alt	16	24.7913	32.5869	53.6433	93.1142	0	93.1142	96.8857	96.8857
35	0.369811	33.5726	-5.17269	AC alt	16	24.7913	31.2021	51.3637	87.6851	0	87.6851	90.5097	90.5097
36	0.369811	31.1139	-3.74677	AC alt	16	24.7913	29.7514	48.9755	81.9974	0	81.9974	83.9458	83.9458
37	0.369811	28.5884	-2.32317	AC alt	16	24.7913	45.1449	74.3157	142.347	0	142.347	144.178	144.178
38	0.369811	25.9967	-0.901004	AC alt	16	24.7913	26.6497	43.8697	69.8376	0	69.8376	70.2567	70.2567
39	0.369811	23.3387	0.520605	AC alt	16	24.7913	24.9972	41.1494	63.359	0	63.359	63.1318	63.1318
40	0.369811	20.6146	1.94254	AC alt	16	24.7913	23.2756	38.3153	56.6094	0	56.6094	55.8199	55.8199
41	0.369811	17.8241	3.36567	AC alt	16	24.7913	21.4835	35.3652	49.5838	0	49.5838	48.3203	48.3203
42	0.369811	14.9671	4.79088	AC alt	16	24.7913	19.6195	32.2968	42.2759	0	42.2759	40.6315	40.6315
43	0.369811	12.0432	6.21907	AC alt	16	24.7913	17.6818	29.107	34.6793	0	34.6793	32.7525	32.7525
44	0.369811	9.05197	7.65116	AC alt	16	24.7913	15.6684	25.7927	26.786	0	26.786	24.6811	24.6811
45	0.369811	6.08153	9.08807	AC alt	16	24.7913	13.6412	22.4555	18.8383	0	18.8383	16.6563	16.6563
46	0.369811	4.6466	10.5308	AC alt	16	24.7913	12.7015	20.9088	15.1546	0	15.1546	12.7935	12.7935
47	0.369811	3.73756	11.9803	AC alt	16	24.7913	12.1343	19.9751	12.9309	0	12.9309	10.356	10.356
48	0.369811	2.75781	13.4376	AC alt	16	24.7913	11.5074	18.943	10.473	0	10.473	7.72356	7.72356
49	0.369811	1.70611	14.9038	AC alt	16	24.7913	10.8183	17.8087	7.77159	0	7.77159	4.89228	4.89228
50	0.369811	0.581053	16.3801	AC alt	16	24.7913	10.0645	16.5677	4.81601	0	4.81601	1.85767	1.85767

**Global Minimum Query (janbu simplified) - Safety Factor: 1.50949**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.362675	4.97607	-74.6109	AC alt	16	24.7913	6.37067	9.61647	-11.7388	0	-11.7388	11.407	11.407
2	0.362675	13.7301	-69.4734	AC alt	16	24.7913	11.0978	16.752	5.25493	0	5.25493	34.8954	34.8954
3	0.362675	20.6453	-65.3968	AC alt	16	24.7913	15.2684	23.0475	20.248	0	20.248	53.5922	53.5922
4	0.362675	26.5357	-61.8867	AC alt	16	24.7913	19.0681	28.7831	33.9079	0	33.9079	69.5993	69.5993
5	0.362675	31.7384	-58.7448	AC alt	16	24.7913	22.5906	34.1003	46.5712	0	46.5712	83.7918	83.7918
6	0.362675	36.2002	-55.8668	AC alt	16	24.7913	25.7698	38.8993	58.0003	0	58.0003	96.0148	96.0148
7	0.362675	38.4712	-53.1893	AC alt	16	24.7913	27.7838	41.9394	65.2405	0	65.2405	102.365	102.365
8	0.362675	40.0392	-50.6704	AC alt	16	24.7913	29.3758	44.3425	70.9637	0	70.9637	106.816	106.816
9	0.362675	41.332	-48.2805	AC alt	16	24.7913	30.7756	46.4555	75.996	0	75.996	110.514	110.514
10	0.362675	42.3875	-45.9979	AC alt	16	24.7913	32.0065	48.3135	80.4208	0	80.4208	113.562	113.562
11	0.362675	43.2348	-43.8062	AC alt	16	24.7913	33.0864	49.9436	84.3032	0	84.3032	116.039	116.039
12	0.362675	43.8964	-41.6922	AC alt	16	24.7913	34.0297	51.3675	87.6942	0	87.6942	118.005	118.005
13	0.362675	44.3906	-39.6458	AC alt	16	24.7913	34.8479	52.6026	90.6357	0	90.6357	119.511	119.511
14	0.362675	44.7321	-37.6583	AC alt	16	24.7913	35.5506	53.6633	93.1618	0	93.1618	120.597	120.597
15	0.362675	44.9333	-35.7228	AC alt	16	24.7913	36.1457	54.5615	95.3008	0	95.3008	121.296	121.296
16	0.362675	45.0045	-33.8332	AC alt	16	24.7913	36.6397	55.3072	97.0767	0	97.0767	121.636	121.636
17	0.362675	44.9542	-31.9846	AC alt	16	24.7913	37.0382	55.9088	98.5096	0	98.5096	121.64	121.64
18	0.362675	44.7898	-30.1726	AC alt	16	24.7913	37.3461	56.3735	99.6163	0	99.6163	121.328	121.328
19	0.362675	44.5179	-28.3934	AC alt	16	24.7913	37.5674	56.7076	100.412	0	100.412	120.719	120.719
20	0.362675	44.1437	-26.6435	AC alt	16	24.7913	37.7056	56.9162	100.909	0	100.909	119.826	119.826
21	0.362675	43.6722	-24.9201	AC alt	16	24.7913	37.7637	57.0039	101.118	0	101.118	118.663	118.663
22	0.362675	43.1075	-23.2205	AC alt	16	24.7913	37.7443	56.9746	101.048	0	101.048	117.241	117.241
23	0.362675	42.4531	-21.5423	AC alt	16	24.7913	37.6495	56.8316	100.707	0	100.707	115.57	115.57
24	0.362675	41.7124	-19.8833	AC alt	16	24.7913	37.4813	56.5777	100.103	0	100.103	113.658	113.658
25	0.362675	40.8881	-18.2415	AC alt	16	24.7913	37.2413	56.2153	99.2394	0	99.2394	111.514	111.514
26	0.362675	40.4432	-16.6151	AC alt	16	24.7913	37.2541	56.2347	99.2857	0	99.2857	110.402	110.402
27	0.362675	41.1089	-15.0023	AC alt	16	24.7913	38.0464	57.4306	102.134	0	102.134	112.33	112.33
28	0.362675	41.7581	-13.4017	AC alt	16	24.7913	38.833	58.6181	104.962	0	104.962	114.215	114.215
29	0.362675	42.3319	-11.8116	AC alt	16	24.7913	40.5963	61.2797	111.301	0	111.301	119.79	119.79
30	0.362675	42.8315	-10.2307	AC alt	16	24.7913	40.2639	60.7779	110.106	0	110.106	117.372	117.372
31	0.362675	43.1967	-8.65767	AC alt	16	24.7913	40.8636	61.6832	112.262	0	112.262	118.484	118.484
32	0.362675	41.7686	-7.09118	AC alt	16	24.7913	40.1441	60.5971	109.675	0	109.675	114.669	114.669
33	0.362675	39.4874	-5.53001	AC alt	16	24.7913	38.7738	58.5287	104.749	0	104.749	108.503	108.503
34	0.362675	37.1358	-3.97294	AC alt	16	24.7913	37.3256	56.3426	99.5427	0	99.5427	102.135	102.135
35	0.362675	34.7141	-2.41882	AC alt	16	24.7913	35.7987	54.0378	94.0536	0	94.0536	95.5658	95.5658
36	0.362675	32.2228	-0.866469	AC alt	16	24.7913	50.511	76.2458	146.944	0	146.944	147.708	147.708
37	0.362675	29.662	0.685243	AC alt	16	24.7913	32.5053	49.0665	82.2143	0	82.2143	81.8255	81.8255
38	0.362675	27.0316	2.23746	AC alt	16	24.7913	30.7364	46.3963	75.855	0	75.855	74.6541	74.6541
39	0.362675	24.3316	3.79132	AC alt	16	24.7913	28.8838	43.5998	69.1946	0	69.1946	67.2806	67.2806
40	0.362675	21.5617	5.34798	AC alt	16	24.7913	26.9454	40.6738	62.2263	0	62.2263	59.7039	59.7039
41	0.362675	18.7214	6.90861	AC alt	16	24.7913	24.9189	37.6149	54.9414	0	54.9414	51.9221	51.9221
42	0.362675	15.81	8.47442	AC alt	16	24.7913	22.8016	34.4188	47.3298	0	47.3298	43.9324	43.9324
43	0.362675	12.8268	10.0466	AC alt	16	24.7913	20.5902	31.0807	39.3799	0	39.3799	35.732	35.732
44	0.362675	9.77085	11.6265	AC alt	16	24.7913	18.281	27.595	31.0785	0	31.0785	27.3171	27.3171
45	0.362675	6.84694	13.2155	AC alt	16	24.7913	16.0401	24.2123	23.0222	0	23.0222	19.2555	19.2555
46	0.362675	5.48856	14.8148	AC alt	16	24.7913	15.0648	22.7402	19.5163	0	19.5163	15.5318	15.5318
47	0.362675	4.40753	16.4261	AC alt	16	24.7913	14.3071	21.5964	16.7923	0	16.7923	12.5744	12.5744
48	0.362675	3.24773	18.0508	AC alt	16	24.7913	13.4702	20.3331	13.7837	0	13.7837	9.39373	9.39373
49	0.362675	2.00707	19.6907	AC alt	16	24.7913	12.5496	18.9435	10.4741	0	10.4741	5.98295	5.98295
50	0.362675	0.683117	21.3476	AC alt	16	24.7913	11.54	17.4195	6.84468	0	6.84468	2.33437	2.33437

# Interslice Data

**Global Minimum Query (bishop simplified) - Safety Factor: 1.64616**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	172.237	132.652	0	0	0
2	172.607	131.683	-10.8553	0	0
3	172.977	130.875	-10.4542	0	0
4	173.347	130.175	-2.74747	0	0
5	173.717	129.553	9.98603	0	0
6	174.086	128.993	26.2557	0	0
7	174.456	128.482	45.0202	0	0
8	174.826	128.014	65.2463	0	0
9	175.196	127.581	85.0963	0	0
10	175.566	127.18	104.162	0	0
11	175.935	126.807	122.292	0	0
12	176.305	126.458	139.379	0	0
13	176.675	126.133	155.341	0	0
14	177.045	125.828	170.121	0	0
15	177.415	125.542	183.681	0	0
16	177.784	125.274	195.995	0	0
17	178.154	125.023	207.05	0	0
18	178.524	124.788	216.842	0	0
19	178.894	124.568	225.374	0	0
20	179.264	124.361	232.659	0	0
21	179.633	124.169	238.713	0	0
22	180.003	123.989	243.557	0	0
23	180.373	123.821	247.221	0	0
24	180.743	123.666	249.733	0	0
25	181.113	123.521	251.131	0	0
26	181.483	123.388	251.453	0	0
27	181.852	123.266	250.745	0	0
28	182.222	123.155	249.101	0	0
29	182.592	123.054	246.521	0	0
30	182.962	122.963	242.966	0	0
31	183.332	122.882	231.285	0	0
32	183.701	122.81	225.685	0	0
33	184.071	122.749	219.092	0	0
34	184.441	122.696	211.721	0	0
35	184.811	122.654	203.69	0	0
36	185.181	122.62	195.119	0	0
37	185.55	122.596	186.135	0	0
38	185.92	122.581	146.756	0	0
39	186.29	122.575	137.335	0	0
40	186.66	122.578	127.904	0	0
41	187.03	122.591	118.612	0	0
42	187.4	122.613	109.611	0	0
43	187.769	122.644	101.066	0	0
44	188.139	122.684	93.1487	0	0
45	188.509	122.734	86.0403	0	0
46	188.879	122.793	79.8958	0	0
47	189.249	122.862	74.1704	0	0
48	189.618	122.94	68.6811	0	0
49	189.988	123.028	63.5125	0	0
50	190.358	123.127	58.7583	0	0
51	190.728	123.236	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.50949**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	172.612	132.744	0	0	0
2	172.975	131.427	-17.7782	0	0
3	173.338	130.458	-16.7127	0	0
4	173.7	129.666	-6.21278	0	0
5	174.063	128.987	9.89033	0	0
6	174.426	128.39	29.5261	0	0
7	174.788	127.855	51.2107	0	0
8	175.151	127.37	72.7507	0	0
9	175.514	126.927	93.5083	0	0
10	175.876	126.521	113.261	0	0
11	176.239	126.145	131.854	0	0
12	176.602	125.797	149.181	0	0
13	176.964	125.474	165.169	0	0
14	177.327	125.174	179.769	0	0
15	177.69	124.894	192.951	0	0
16	178.052	124.633	204.699	0	0
17	178.415	124.39	215.01	0	0
18	178.778	124.163	223.889	0	0
19	179.14	123.952	231.35	0	0
20	179.503	123.756	237.41	0	0
21	179.866	123.574	242.097	0	0
22	180.228	123.406	245.441	0	0
23	180.591	123.25	247.475	0	0
24	180.954	123.107	248.239	0	0
25	181.316	122.976	247.777	0	0
26	181.679	122.856	246.133	0	0
27	182.042	122.748	243.367	0	0
28	182.404	122.651	239.496	0	0
29	182.767	122.565	234.483	0	0
30	183.13	122.489	226.781	0	0
31	183.493	122.423	219.386	0	0
32	183.855	122.368	210.766	0	0
33	184.218	122.323	201.156	0	0
34	184.581	122.288	190.772	0	0
35	184.943	122.263	179.743	0	0
36	185.306	122.247	168.201	0	0
37	185.669	122.242	129.313	0	0
38	186.031	122.246	117.168	0	0
39	186.394	122.26	104.946	0	0
40	186.757	122.284	92.8083	0	0
41	187.119	122.318	80.9237	0	0
42	187.482	122.362	69.4723	0	0
43	187.845	122.416	58.6455	0	0
44	188.207	122.481	48.648	0	0
45	188.57	122.555	39.6991	0	0
46	188.933	122.64	31.9212	0	0
47	189.295	122.736	24.5858	0	0
48	189.658	122.843	17.6017	0	0
49	190.021	122.961	11.0874	0	0
50	190.383	123.091	5.17679	0	0
51	190.746	123.233	0	0	0

# Discharge Sections

---

## Entity Information

---

◆ **Group 1**

**Shared Entities**

Type	Coordinates (x,y)
	399, 180.567
	397.231, 179.672
	396.099, 179.015
	395.93, 178.92
	395.768, 178.818
	393.241, 177.47
	392.922, 177.311
	391.984, 176.818
	391.004, 176.301
	390.743, 176.173
	390.327, 175.962
	390.005, 175.812
	389.848, 175.745
	388.392, 175.078
	388.19, 174.996
	388.151, 174.983
	388.085, 174.96
	387.801, 174.818
	387.12, 174.564
	386.77, 174.444
	386.612, 174.376
	385.764, 174.1
	385.311, 173.902
	384.601, 173.681
	384.132, 173.556
	383.499, 173.312
	383.267, 173.23
	382.875, 173.127
	381.955, 172.845
	381.863, 172.818
	380.867, 172.583
	380.71, 172.529
	379.779, 172.283
	379.43, 172.177
	378.17, 171.773
	376.843, 171.422
	376.494, 171.335
	375.571, 171.107
	375.408, 171.069
	375.317, 171.049
	374.207, 170.818
	373.262, 170.643
	373.185, 170.614
	372.926, 170.521

371.813, 170.178  
371.535, 170.08  
371.109, 169.923  
370.926, 169.852  
369.985, 169.539  
369.105, 169.203  
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368.649, 169.069  
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368.026, 168.896  
367.788, 168.818  
366.603, 168.464  
366.418, 168.384  
365.539, 168.114  
365.266, 167.991  
364.268, 167.565  
363.456, 167.245  
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362.171, 166.68  
362.092, 166.654  
362.053, 166.639  
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356.928, 165.157  
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355.844, 164.826  
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353.317, 164.372  
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336.894, 160.948  
336.808, 160.919  
336.794, 160.915  
336.756, 160.903  
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333.37, 159.523

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External Boundary

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
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46.1411, 94.8183  
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32.39, 89.6769  
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	0, 80 0, 51.7177 0, 0 400, 0 400, 156.015 400, 180.994
Material Boundary	0, 51.7177 23.8544, 58.5651 54.2063, 69.5885 74.9871, 76.1091 106.116, 84.3885 157.58, 98.221 176.298, 103.272 200.082, 106.555 213.442, 107.649 253.942, 115.747 300.479, 126.58 334.36, 134.67 365.245, 142.996 400, 156.015

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 59.0531 23.8544, 65.9005 54.2063, 76.9239 74.9871, 83.4445 106.116, 91.7239 157.58, 105.556 176.298, 110.607 213.442, 114.984 253.942, 123.083 300.504, 135.071 332.797, 144.095 364.429, 153.064 400, 166.621	Assigned to:  AC  AC alt
Distributed Load	206.287, 123.735 190.75, 123.232	Constant DistributionOrientation: Normal to boundary Magnitude: 20 kN/m2 Creates Excess Pore Pressure: No
Distributed Load	216.158, 123.824 210.684, 123.745 208.049, 123.705 206.57, 123.593	Constant DistributionOrientation: Normal to boundary Magnitude: 20 kN/m2 Creates Excess Pore Pressure: No



4+525 sisma

Slide2 - An Interactive Slope Stability Program

Date Created: 06/09/2023, 16:11:56

Software Version: 9.027



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# Slide2 Analysis Information

## sisma

### Project Summary

---

File Name:	sisma.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:03.201s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	06/09/2023, 16:11:56

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)
Name:	M1+R2 fronti scavo sisma
Type	Partial Factor
Permanent Actions: Unfavourable	1
Permanent Actions: Favourable	1
Variable Actions: Unfavourable	1
Variable Actions: Favourable	0
Effective cohesion	1
Coefficient of shearing resistance	1
Undrained strength	1
Weight density	1
Shear strength (other models)	1
Earth resistance	1.2
Tensile and plate strength	1
Shear strength	1
Compressive strength	1
Bond strength	1
Seismic Coefficient	1

## Analysis Options

---

Slices Type:	Vertical
<b>Analysis Methods Used</b>	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading

---

2 Distributed Loads present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

## Distributed Load 2

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

# Materials

---

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

# Support

---

## Support 1

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	2.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	70 kN/m
Material Dependent	No

## Global Minimums

### Method: bishop simplified

	FS	1.552650
Center:	186.574, 137.853	
Radius:	15.708	
Left Slip Surface Endpoint:	171.791, 132.542	
Right Slip Surface Endpoint:	192.455, 123.288	
Resisting Moment:	19449.6 kN-m	
Driving Moment:	12526.7 kN-m	
Passive Support Moment:	531.575 kN-m	
Maximum Single Support Force:	47.9604 kN	
Total Support Force:	52.8624 kN	
Total Slice Area:	85.5026 m <sup>2</sup>	
Surface Horizontal Width:	20.6646 m	
Surface Average Height:	4.13763 m	

### Method: janbu simplified

	FS	1.446330
Center:	185.862, 135.756	
Radius:	13.827	
Left Slip Surface Endpoint:	172.380, 132.687	
Right Slip Surface Endpoint:	191.794, 123.266	
Resisting Horizontal Force:	1042.51 kN	
Driving Horizontal Force:	720.797 kN	
Passive Horizontal Support Force:	27.1485 kN	
Maximum Single Support Force:	38.3938 kN	
Total Support Force:	38.3938 kN	
Total Slice Area:	87.1254 m <sup>2</sup>	
Surface Horizontal Width:	19.4136 m	
Surface Average Height:	4.48785 m	

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.534	5.03	3.31713	1.71287	3.31713	1.71287	47.9604
186.254, 126.034	5.03	4.85493	0.175072	4.85493	0.175072	4.90201
184.754, 127.534	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0

### Method: janbu simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.534	5.03	3.65879	1.37121	3.65879	1.37121	38.3938
186.254, 126.034	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0
184.754, 127.534	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0

# Valid and Invalid Surfaces

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## Method: bishop simplified

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Number of Valid Surfaces:	9075
Number of Invalid Surfaces:	5

### Error Codes

Error Code -108 reported for 2 surfaces  
 Error Code -112 reported for 3 surfaces

## Method: janbu simplified

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Number of Valid Surfaces:	8953
Number of Invalid Surfaces:	127

### Error Codes

Error Code -108 reported for 29 surfaces  
 Error Code -111 reported for 80 surfaces  
 Error Code -112 reported for 18 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

- 108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 111 = Safety factor equation did not converge
- 112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

**Global Minimum Query (bishop simplified) - Safety Factor: 1.55265**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.413293	4.57541	-68.2068	AC alt	20	30	7.42941	11.5353	-10.6654	0	-10.6654	7.91576	7.91576
2	0.413293	13.0416	-64.4296	AC alt	20	30	11.8047	18.3285	3.45402	0	3.45402	28.1249	28.1249
3	0.413293	20.3651	-61.1221	AC alt	20	30	15.9603	24.7808	16.8649	0	16.8649	45.8034	45.8034
4	0.413293	26.9398	-58.1334	AC alt	20	30	19.9451	30.9677	29.724	0	29.724	61.8087	61.8087
5	0.413293	32.9262	-55.3788	AC alt	20	30	23.7674	36.9025	42.0593	0	42.0593	76.4848	76.4848
6	0.413293	38.428	-52.8051	AC alt	20	30	27.4373	42.6005	53.9024	0	53.9024	90.0564	90.0564
7	0.413293	43.5013	-50.3762	AC alt	20	30	30.9551	48.0625	65.2548	0	65.2548	102.642	102.642
8	0.413293	46.3154	-48.0663	AC alt	20	30	33.2841	51.6786	72.7708	0	72.7708	109.823	109.823
9	0.413293	47.6636	-45.856	AC alt	20	30	34.7884	54.0142	77.6255	0	77.6255	113.469	113.469
10	0.413293	48.7511	-43.7306	AC alt	20	30	36.1191	56.0803	81.9195	0	81.9195	116.473	116.473
11	0.413293	49.6053	-41.6782	AC alt	20	30	37.2904	57.8989	85.6995	0	85.6995	118.899	118.899
12	0.413293	50.2485	-39.6895	AC alt	20	30	38.3142	59.4885	89.0034	0	89.0034	120.801	120.801
13	0.413293	50.6988	-37.7566	AC alt	20	30	39.2001	60.8641	91.8627	0	91.8627	122.222	122.222
14	0.413293	50.9713	-35.873	AC alt	20	30	39.9566	62.0386	94.3037	0	94.3037	123.199	123.199
15	0.413293	51.0787	-34.0332	AC alt	20	30	40.5903	63.0226	96.349	0	96.349	123.762	123.762
16	0.413293	51.0319	-32.2325	AC alt	20	30	41.1074	63.8254	98.0176	0	98.0176	123.937	123.937
17	0.413293	50.84	-30.4669	AC alt	20	30	41.5128	64.4548	99.3259	0	99.3259	123.747	123.747
18	0.413293	50.5111	-28.7328	AC alt	20	30	41.8108	64.9176	100.288	0	100.288	123.209	123.209
19	0.413293	50.052	-27.027	AC alt	20	30	42.0052	65.2193	100.915	0	100.915	122.342	122.342
20	0.413293	49.4688	-25.3468	AC alt	20	30	42.0991	65.3651	101.218	0	101.218	121.16	121.16
21	0.413293	48.7668	-23.6896	AC alt	20	30	42.0951	65.359	101.205	0	101.205	119.674	119.674
22	0.413293	47.9505	-22.0532	AC alt	20	30	41.9956	65.2045	100.884	0	100.884	117.897	117.897
23	0.413293	47.024	-20.4356	AC alt	20	30	41.8026	64.9048	100.261	0	100.261	115.837	115.837
24	0.413293	45.991	-18.8348	AC alt	20	30	41.5175	64.4621	99.3409	0	99.3409	113.503	113.503
25	0.413293	45.6394	-17.2492	AC alt	20	30	41.6931	64.7348	99.9077	0	99.9077	112.853	112.853
26	0.413293	46.5957	-15.677	AC alt	20	30	42.7896	66.4372	103.446	0	103.446	115.455	115.455
27	0.413293	47.482	-14.1169	AC alt	20	30	45.3746	70.4508	111.788	0	111.788	123.2	123.2
28	0.413293	48.2721	-12.5674	AC alt	20	30	44.8486	69.6342	110.091	0	110.091	120.089	120.089
29	0.413293	48.9679	-11.0272	AC alt	20	30	45.7922	71.0992	113.136	0	113.136	122.06	122.06
30	0.413293	47.9009	-9.49506	AC alt	20	30	45.4466	70.5626	112.021	0	112.021	119.622	119.622
31	0.413293	45.0817	-7.96973	AC alt	20	30	43.7833	67.9802	106.653	0	106.653	112.783	112.783
32	0.413293	42.1724	-6.45006	AC alt	20	30	42.0155	65.2353	100.948	0	100.948	105.698	105.698
33	0.413293	39.1736	-4.93494	AC alt	20	30	55.9655	86.8949	145.967	0	145.967	150.799	150.799
34	0.413293	36.0863	-3.42328	AC alt	20	30	38.1617	59.2518	88.5116	0	88.5116	90.7944	90.7944
35	0.413293	32.9107	-1.914	AC alt	20	30	36.0732	56.009	81.7714	0	81.7714	82.9769	82.9769
36	0.413293	29.6474	-0.406046	AC alt	20	30	33.8743	52.5949	74.6752	0	74.6752	74.9153	74.9153
37	0.413293	26.2963	1.10163	AC alt	20	30	31.5627	49.0059	67.216	0	67.216	66.609	66.609
38	0.413293	22.8576	2.61006	AC alt	20	30	29.1359	45.2379	59.3841	0	59.3841	58.0559	58.0559
39	0.413293	19.3309	4.12031	AC alt	20	30	26.5905	41.2857	51.1698	0	51.1698	49.2543	49.2543
40	0.413293	15.7158	5.63343	AC alt	20	30	23.9228	37.1437	42.5607	0	42.5607	40.201	40.201
41	0.413293	12.0118	7.15051	AC alt	20	30	21.1285	32.8052	33.5431	0	33.5431	30.8925	30.8925
42	0.413293	9.38458	8.67265	AC alt	20	30	19.1715	29.7667	27.2278	0	27.2278	24.3035	24.3035
43	0.413293	8.34515	10.201	AC alt	20	30	18.5077	28.736	25.0856	0	25.0856	21.7552	21.7552
44	0.413293	7.22707	11.7367	AC alt	20	30	17.7654	27.5834	22.69	0	22.69	18.9991	18.9991
45	0.413293	6.01557	13.281	AC alt	20	30	16.9293	26.2853	19.9919	0	19.9919	15.9959	15.9959
46	0.413293	4.71361	14.8352	AC alt	20	30	15.9988	24.8405	16.9889	0	16.9889	12.7514	12.7514
47	0.413293	3.66875	16.4007	AC alt	20	30	15.276	23.7183	14.6565	0	14.6565	10.1603	10.1603
48	0.413293	2.74586	17.9789	AC alt	20	30	14.6484	22.7438	12.631	0	12.631	7.87739	7.87739
49	0.413293	1.72106	19.5713	AC alt	20	30	13.9175	21.609	10.2724	0	10.2724	5.32444	5.32444
50	0.413293	0.591421	21.1797	AC alt	20	30	13.0764	20.3031	7.55821	0	7.55821	2.49152	2.49152



**Global Minimum Query (janbu simplified) - Safety Factor: 1.44633**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.388272	5.56265	-74.2181	AC alt	20	30	6.84131	9.89479	-14.0751	0	-14.0751	10.1307	10.1307
2	0.388272	15.3319	-69.0122	AC alt	20	30	12.3741	17.8971	2.55734	0	2.55734	34.8136	34.8136
3	0.388272	23.0825	-64.8708	AC alt	20	30	17.39	25.1517	17.6357	0	17.6357	54.7102	54.7102
4	0.388272	29.691	-61.3006	AC alt	20	30	22.0376	31.8737	31.6071	0	31.6071	71.8607	71.8607
5	0.388272	35.5275	-58.1025	AC alt	20	30	26.3995	38.1824	44.7196	0	44.7196	87.1363	87.1363
6	0.388272	40.7318	-55.1711	AC alt	20	30	30.495	44.1059	57.0314	0	57.0314	100.861	100.861
7	0.388272	43.6566	-52.4425	AC alt	20	30	33.3145	48.1838	65.5069	0	65.5069	108.833	108.833
8	0.388272	45.3513	-49.8743	AC alt	20	30	35.3735	51.1618	71.6967	0	71.6967	113.666	113.666
9	0.388272	46.7349	-47.4365	AC alt	20	30	37.1973	53.7996	77.1792	0	77.1792	117.683	117.683
10	0.388272	47.85	-45.1071	AC alt	20	30	38.8126	56.1358	82.0351	0	82.0351	120.993	120.993
11	0.388272	48.729	-42.8695	AC alt	20	30	40.2401	58.2004	86.3261	0	86.3261	123.68	123.68
12	0.388272	49.3974	-40.7104	AC alt	20	30	41.4963	60.0173	90.1026	0	90.1026	125.808	125.808
13	0.388272	49.8755	-38.6194	AC alt	20	30	42.5946	61.6059	93.4043	0	93.4043	127.431	127.431
14	0.388272	50.18	-36.5877	AC alt	20	30	43.5461	62.9821	96.2646	0	96.2646	128.59	128.59
15	0.388272	50.3247	-34.6083	AC alt	20	30	44.36	64.1592	98.7113	0	98.7113	129.323	129.323
16	0.388272	50.3209	-32.6751	AC alt	20	30	45.0438	65.1482	100.767	0	100.767	129.657	129.657
17	0.388272	50.1785	-30.7828	AC alt	20	30	45.604	65.9584	102.451	0	102.451	129.618	129.618
18	0.388272	49.9056	-28.9272	AC alt	20	30	46.0461	66.5979	103.78	0	103.78	129.227	129.227
19	0.388272	49.5094	-27.1043	AC alt	20	30	46.3748	67.0732	104.768	0	104.768	128.504	128.504
20	0.388272	48.9961	-25.3106	AC alt	20	30	46.5939	67.3901	105.427	0	105.427	127.462	127.462
21	0.388272	48.3708	-23.5431	AC alt	20	30	46.7066	67.5532	105.766	0	105.766	126.116	126.116
22	0.388272	47.6383	-21.7991	AC alt	20	30	46.716	67.5667	105.794	0	105.794	124.478	124.478
23	0.388272	46.8026	-20.076	AC alt	20	30	46.6241	67.4338	105.517	0	105.517	122.557	122.557
24	0.388272	45.8672	-18.3718	AC alt	20	30	46.4329	67.1573	104.943	0	104.943	120.364	120.364
25	0.388272	45.4649	-16.6842	AC alt	20	30	46.6474	67.4676	105.588	0	105.588	119.569	119.569
26	0.388272	46.2609	-15.0114	AC alt	20	30	47.8219	69.1663	109.119	0	109.119	121.943	121.943
27	0.388272	47.0039	-13.3516	AC alt	20	30	48.967	70.8225	112.561	0	112.561	124.183	124.183
28	0.388272	47.6573	-11.7032	AC alt	20	30	50.0524	72.3923	115.824	0	115.824	126.192	126.192
29	0.388272	48.2226	-10.0646	AC alt	20	30	51.0785	73.8764	118.908	0	118.908	127.974	127.974
30	0.388272	48.0796	-8.43418	AC alt	20	30	51.5199	74.5148	120.235	0	120.235	127.874	127.874
31	0.388272	45.7129	-6.81067	AC alt	20	30	50.0637	72.4086	115.857	0	115.857	121.837	121.837
32	0.388272	43.0823	-5.19263	AC alt	20	30	48.3416	69.9179	110.681	0	110.681	115.074	115.074
33	0.388272	40.3681	-3.57874	AC alt	20	30	62.194	89.9531	152.323	0	152.323	156.213	156.213
34	0.388272	37.5708	-1.9677	AC alt	20	30	44.5498	64.4337	99.2818	0	99.2818	100.812	100.812
35	0.388272	34.6908	-0.358204	AC alt	20	30	42.4763	61.4347	93.0484	0	93.0484	93.314	93.314
36	0.388272	31.7281	1.251	AC alt	20	30	40.2809	58.2595	86.4492	0	86.4492	85.5695	85.5695
37	0.388272	28.6829	2.8612	AC alt	20	30	37.9607	54.9037	79.4741	0	79.4741	77.5769	77.5769
38	0.388272	25.5547	4.47367	AC alt	20	30	35.5117	51.3617	72.1122	0	72.1122	69.3337	69.3337
39	0.388272	22.3431	6.08969	AC alt	20	30	32.9298	47.6273	64.3503	0	64.3503	60.8371	60.8371
40	0.388272	19.0476	7.7106	AC alt	20	30	30.2096	43.693	56.173	0	56.173	52.0828	52.0828
41	0.388272	15.6671	9.33775	AC alt	20	30	27.3452	39.5502	47.5625	0	47.5625	43.0661	43.0661
42	0.388272	12.2007	10.9725	AC alt	20	30	24.3298	35.1889	38.4976	0	38.4976	33.7805	33.7805
43	0.388272	9.40055	12.6164	AC alt	20	30	21.8962	31.6691	31.1818	0	31.1818	26.2809	26.2809
44	0.388272	8.2157	14.271	AC alt	20	30	21.0125	30.391	28.5254	0	28.5254	23.1808	23.1808
45	0.388272	7.00515	15.9377	AC alt	20	30	20.0847	29.0491	25.7364	0	25.7364	20.0008	20.0008
46	0.388272	5.70169	17.6185	AC alt	20	30	19.0421	27.5412	22.6022	0	22.6022	16.5549	16.5549
47	0.388272	4.3028	19.3151	AC alt	20	30	17.8769	25.8559	19.0993	0	19.0993	12.8336	12.8336
48	0.388272	2.92683	21.0295	AC alt	20	30	16.7079	24.1652	15.5853	0	15.5853	9.1619	9.1619
49	0.388272	1.81514	22.7639	AC alt	20	30	15.7941	22.8435	12.8382	0	12.8382	6.21068	6.21068
50	0.388272	0.62295	24.5206	AC alt	20	30	14.7708	21.3634	9.76191	0	9.76191	3.02408	3.02408

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.55265

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	171.791	132.542	0	0	0
2	172.204	131.508	-13.6699	0	0
3	172.617	130.645	-14.3647	0	0
4	173.031	129.895	-6.45119	0	0
5	173.444	129.23	7.54241	0	0
6	173.857	128.632	25.9215	0	0
7	174.271	128.087	47.4658	0	0
8	174.684	127.588	71.2399	0	0
9	175.097	127.128	95.2177	0	0
10	175.51	126.702	118.273	0	0
11	175.924	126.307	140.213	0	0
12	176.337	125.939	160.892	0	0
13	176.75	125.596	180.202	0	0
14	177.164	125.276	198.064	0	0
15	177.577	124.977	214.42	0	0
16	177.99	124.698	229.233	0	0
17	178.404	124.437	242.478	0	0
18	178.817	124.194	254.145	0	0
19	179.23	123.967	264.233	0	0
20	179.643	123.757	272.753	0	0
21	180.057	123.561	279.72	0	0
22	180.47	123.379	285.161	0	0
23	180.883	123.212	289.108	0	0
24	181.297	123.058	291.599	0	0
25	181.71	122.917	292.679	0	0
26	182.123	122.789	292.47	0	0
27	182.536	122.673	291.075	0	0
28	182.95	122.569	286.083	0	0
29	183.363	122.477	282.136	0	0
30	183.776	122.396	276.832	0	0
31	184.19	122.327	270.204	0	0
32	184.603	122.269	262.434	0	0
33	185.016	122.222	253.673	0	0
34	185.429	122.187	217.54	0	0
35	185.843	122.162	207.284	0	0
36	186.256	122.148	196.542	0	0
37	186.669	122.145	185.498	0	0
38	187.083	122.153	174.349	0	0
39	187.496	122.172	163.303	0	0
40	187.909	122.202	152.58	0	0
41	188.323	122.243	142.416	0	0
42	188.736	122.294	133.062	0	0
43	189.149	122.357	124.299	0	0
44	189.562	122.432	115.565	0	0
45	189.976	122.518	106.953	0	0
46	190.389	122.615	98.5733	0	0
47	190.802	122.725	90.549	0	0
48	191.216	122.846	82.8044	0	0
49	191.629	122.98	75.3233	0	0
50	192.042	123.127	68.2348	0	0
51	192.455	123.288	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.44633**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	172.38	132.687	0	0	0
2	172.768	131.313	-21.4861	0	0
3	173.157	130.301	-22.3071	0	0
4	173.545	129.473	-12.3601	0	0
5	173.933	128.764	4.20138	0	0
6	174.321	128.14	25.0824	0	0
7	174.71	127.582	48.7751	0	0
8	175.098	127.077	72.8911	0	0
9	175.486	126.617	96.312	0	0
10	175.875	126.194	118.752	0	0
11	176.263	125.804	140.008	0	0
12	176.651	125.444	159.932	0	0
13	177.039	125.11	178.418	0	0
14	177.428	124.8	195.39	0	0
15	177.816	124.511	210.795	0	0
16	178.204	124.243	224.599	0	0
17	178.592	123.994	236.783	0	0
18	178.981	123.763	247.339	0	0
19	179.369	123.548	256.271	0	0
20	179.757	123.35	263.591	0	0
21	180.146	123.166	269.318	0	0
22	180.534	122.997	273.477	0	0
23	180.922	122.842	276.103	0	0
24	181.31	122.7	277.233	0	0
25	181.699	122.571	276.91	0	0
26	182.087	122.454	275.223	0	0
27	182.475	122.35	272.227	0	0
28	182.863	122.258	267.865	0	0
29	183.252	122.178	262.083	0	0
30	183.64	122.109	254.834	0	0
31	184.028	122.051	246.128	0	0
32	184.417	122.005	236.222	0	0
33	184.805	121.97	225.278	0	0
34	185.193	121.945	189.732	0	0
35	185.581	121.932	177.178	0	0
36	185.97	121.93	164.069	0	0
37	186.358	121.938	150.583	0	0
38	186.746	121.957	136.912	0	0
39	187.134	121.988	123.259	0	0
40	187.523	122.029	109.841	0	0
41	187.911	122.082	96.8922	0	0
42	188.299	122.146	84.6641	0	0
43	188.688	122.221	73.4298	0	0
44	189.076	122.308	63.0738	0	0
45	189.464	122.407	52.8458	0	0
46	189.852	122.517	42.8315	0	0
47	190.241	122.641	33.1699	0	0
48	190.629	122.777	24.0213	0	0
49	191.017	122.926	15.474	0	0
50	191.405	123.089	7.41519	0	0
51	191.794	123.266	0	0	0

## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	399, 180.567
	397.231, 179.672
	396.099, 179.015
	395.93, 178.92
	395.768, 178.818
	393.241, 177.47
	392.922, 177.311
	391.984, 176.818
	391.004, 176.301
	390.743, 176.173
	390.327, 175.962
	390.005, 175.812
	389.848, 175.745
	388.392, 175.078
	388.19, 174.996
	388.151, 174.983
	388.085, 174.96
	387.801, 174.818
	387.12, 174.564
	386.77, 174.444
	386.612, 174.376
	385.764, 174.1
	385.311, 173.902
	384.601, 173.681
	384.132, 173.556
	383.499, 173.312
	383.267, 173.23
	382.875, 173.127
	381.955, 172.845
	381.863, 172.818
	380.867, 172.583
	380.71, 172.529
	379.779, 172.283
	379.43, 172.177
	378.17, 171.773
	376.843, 171.422
	376.494, 171.335
	375.571, 171.107
	375.408, 171.069
	375.317, 171.049
	374.207, 170.818
	373.262, 170.643
	373.185, 170.614
	372.926, 170.521

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364.268, 167.565  
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362.053, 166.639  
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External Boundary

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
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	0, 80 0, 51.7177 0, 0 400, 0 400, 156.015 400, 180.994
Material Boundary	0, 51.7177 23.8544, 58.5651 54.2063, 69.5885 74.9871, 76.1091 106.116, 84.3885 157.58, 98.221 176.298, 103.272 200.082, 106.555 213.442, 107.649 253.942, 115.747 300.479, 126.58 334.36, 134.67 365.245, 142.996 400, 156.015

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 59.0531 23.8544, 65.9005 54.2063, 76.9239 74.9871, 83.4445 106.116, 91.7239 157.58, 105.556 176.298, 110.607 213.442, 114.984 253.942, 123.083 300.504, 135.071 332.797, 144.095 364.429, 153.064 400, 166.621	Assigned to:  AC  AC alt
Distributed Load	206.287, 123.735 190.75, 123.232	Constant DistributionOrientation: Normal to boundary Magnitude: 6 kN/m2 Creates Excess Pore Pressure: No
Distributed Load	216.158, 123.824 210.684, 123.745 208.049, 123.705 206.57, 123.593	Constant DistributionOrientation: Normal to boundary Magnitude: 6 kN/m2 Creates Excess Pore Pressure: No



4+950 statica

Slide2 - An Interactive Slope Stability Program

Date Created: 06/09/2023, 16:11:56

Software Version: 9.027

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# Slide2 Analysis Information

## statica

### Project Summary

---

File Name:	statica.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:03.25s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	06/09/2023, 16:11:56



## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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

# Loading

---

1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live



# Materials

---

**AC**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1


**AC alt**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

# Support

---

## Support 1

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	2.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	70 kN/m
Material Dependent	No

# Global Minimums

## Method: bishop simplified

	<b>FS</b>	<b>1.942690</b>
Center:		186.707, 131.816
Radius:		9.543
Left Slip Surface Endpoint:		177.401, 129.704
Right Slip Surface Endpoint:		190.756, 123.175
Resisting Moment:		6400.8 kN-m
Driving Moment:		3294.81 kN-m
Passive Support Moment:		377.201 kN-m
Maximum Single Support Force:		51.0139 kN
Total Support Force:		71.8677 kN
Total Slice Area:		46.1554 m <sup>2</sup>
Surface Horizontal Width:		13.3553 m
Surface Average Height:		3.45597 m

## Method: janbu simplified

	<b>FS</b>	<b>1.784620</b>
Center:		186.707, 131.816
Radius:		9.543
Left Slip Surface Endpoint:		177.401, 129.704
Right Slip Surface Endpoint:		190.756, 123.175
Resisting Horizontal Force:		575.391 kN
Driving Horizontal Force:		322.417 kN
Passive Horizontal Support Force:		50.8181 kN
Maximum Single Support Force:		51.0139 kN
Total Support Force:		71.8677 kN
Total Slice Area:		46.1554 m <sup>2</sup>
Surface Horizontal Width:		13.3553 m
Surface Average Height:		3.45597 m

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.476	5.03	3.02588	2.00412	3.02588	2.00412	51.0139
186.254, 125.976	5.03	4.29926	0.730743	4.29926	0.730743	18.6007
184.754, 127.476	5.03	4.94149	0.0885125	4.94149	0.0885125	2.25304

### Method: janbu simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.476	5.03	3.02588	2.00412	3.02588	2.00412	51.0139
186.254, 125.976	5.03	4.29926	0.730743	4.29926	0.730743	18.6007
184.754, 127.476	5.03	4.94149	0.0885125	4.94149	0.0885125	2.25304

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces:	8187
Number of Invalid Surfaces:	15

#### Error Codes

Error Code -112 reported for 15 surfaces

### Method: janbu simplified

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Number of Valid Surfaces:	8123
Number of Invalid Surfaces:	79

#### Error Codes

Error Code -108 reported for 34 surfaces

Error Code -111 reported for 45 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.94269

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.267105	2.77	-74.2544	AC alt	16	24.7913	5.2787	10.2549	-10.2185	0	-10.2185	8.5039	8.5039
2	0.267105	7.66012	-69.0547	AC alt	16	24.7913	8.44298	16.4021	4.42163	0	4.42163	26.4792	26.4792
3	0.267105	11.5693	-64.9191	AC alt	16	24.7913	11.1742	21.7081	17.0582	0	17.0582	40.9334	40.9334
4	0.267105	14.9346	-61.3543	AC alt	16	24.7913	13.638	26.4945	28.4573	0	28.4573	53.4239	53.4239
5	0.267105	17.9339	-58.1613	AC alt	16	24.7913	15.9095	30.9072	38.9667	0	38.9667	64.5874	64.5874
6	0.267105	20.5778	-55.2348	AC alt	16	24.7913	17.9813	34.9321	48.5521	0	48.5521	74.4573	74.4573
7	0.267105	21.9018	-52.5109	AC alt	16	24.7913	19.246	37.3891	54.4037	0	54.4037	79.4955	79.4955
8	0.267105	22.7082	-49.9471	AC alt	16	24.7913	20.162	39.1686	58.6417	0	58.6417	82.6249	82.6249
9	0.267105	23.3672	-47.5137	AC alt	16	24.7913	20.9571	40.7132	62.3203	0	62.3203	85.2019	85.2019
10	0.267105	23.899	-45.1886	AC alt	16	24.7913	21.6469	42.0533	65.5117	0	65.5117	87.3016	87.3016
11	0.267105	24.3189	-42.9552	AC alt	16	24.7913	22.2434	43.2121	68.2716	0	68.2716	88.9814	88.9814
12	0.267105	24.639	-40.8002	AC alt	16	24.7913	22.7561	44.2081	70.6435	0	70.6435	90.2862	90.2862
13	0.267105	24.8691	-38.7132	AC alt	16	24.7913	23.1926	45.056	72.6631	0	72.6631	91.2526	91.2526
14	0.267105	25.0169	-36.6856	AC alt	16	24.7913	23.559	45.7679	74.3585	0	74.3585	91.9096	91.9096
15	0.267105	25.089	-34.7102	AC alt	16	24.7913	24.4302	47.4603	78.3889	0	78.3889	95.3116	95.3116
16	0.267105	25.0909	-32.781	AC alt	16	24.7913	24.1015	46.8217	76.8678	0	76.8678	92.3888	92.3888
17	0.267105	25.2056	-30.8928	AC alt	16	24.7913	24.4118	47.4245	78.3036	0	78.3036	92.9095	92.9095
18	0.267105	25.9411	-29.0411	AC alt	16	24.7913	25.1583	48.8747	81.7574	0	81.7574	95.7264	95.7264
19	0.267105	26.6851	-27.2222	AC alt	16	24.7913	25.9123	50.3396	85.2461	0	85.2461	98.576	98.576
20	0.267105	27.3738	-25.4325	AC alt	16	24.7913	26.6282	51.7303	88.5581	0	88.5581	101.221	101.221
21	0.267105	28.0094	-23.6691	AC alt	16	24.7913	27.3073	53.0496	91.7	0	91.7	103.67	103.67
22	0.267105	28.5944	-21.9292	AC alt	16	24.7913	32.9497	64.011	117.806	0	117.806	131.071	131.071
23	0.267105	29.1305	-20.2103	AC alt	16	24.7913	28.5604	55.484	97.498	0	97.498	108.012	108.012
24	0.267105	29.6073	-18.5102	AC alt	16	24.7913	29.1274	56.5855	100.121	0	100.121	109.873	109.873
25	0.267105	29.1828	-16.8268	AC alt	16	24.7913	29.016	56.3691	99.6058	0	99.6058	108.381	108.381
26	0.267105	28.1904	-15.1583	AC alt	16	24.7913	28.4657	55.3001	97.0598	0	97.0598	104.772	104.772
27	0.267105	27.1547	-13.5029	AC alt	16	24.7913	27.8699	54.1426	94.3031	0	94.3031	100.996	100.996
28	0.267105	26.0766	-11.8589	AC alt	16	24.7913	27.2292	52.8979	91.3387	0	91.3387	97.0564	97.0564
29	0.267105	24.9569	-10.2247	AC alt	16	24.7913	26.5442	51.5671	88.1693	0	88.1693	92.9571	92.9571
30	0.267105	23.7963	-8.59895	AC alt	16	24.7913	25.8152	50.1509	84.7966	0	84.7966	88.7003	88.7003
31	0.267105	22.5954	-6.98012	AC alt	16	24.7913	39.6389	77.0061	148.754	0	148.754	153.607	153.607
32	0.267105	21.3547	-5.36687	AC alt	16	24.7913	24.2264	47.0643	77.446	0	77.446	79.7219	79.7219
33	0.267105	20.0745	-3.75789	AC alt	16	24.7913	23.3666	45.3941	73.4681	0	73.4681	75.0029	75.0029
34	0.267105	18.7551	-2.15187	AC alt	16	24.7913	22.4631	43.6389	69.2878	0	69.2878	70.1319	70.1319
35	0.267105	17.3967	-0.547536	AC alt	16	24.7913	21.5156	41.7982	64.9044	0	64.9044	65.1101	65.1101
36	0.267105	15.9993	1.05636	AC alt	16	24.7913	20.5237	39.8712	60.3151	0	60.3151	59.9366	59.9366
37	0.267105	14.5629	2.66109	AC alt	16	24.7913	19.4867	37.8566	55.5171	0	55.5171	54.6114	54.6114
38	0.267105	13.0874	4.26792	AC alt	16	24.7913	18.404	35.7532	50.5074	0	50.5074	49.134	49.134
39	0.267105	11.5726	5.87811	AC alt	16	24.7913	17.2745	33.559	45.2821	0	45.2821	43.5036	43.5036
40	0.267105	10.0183	7.49299	AC alt	16	24.7913	16.0973	31.272	39.8351	0	39.8351	37.7179	37.7179
41	0.267105	8.42398	9.11388	AC alt	16	24.7913	14.8709	28.8896	34.1615	0	34.1615	31.7759	31.7759
42	0.267105	6.78919	10.7422	AC alt	16	24.7913	13.594	26.409	28.2538	0	28.2538	25.6748	25.6748
43	0.267105	5.21527	12.3793	AC alt	16	24.7913	12.3518	23.9958	22.5065	0	22.5065	19.7954	19.7954
44	0.267105	4.48598	14.0267	AC alt	16	24.7913	11.8191	22.9609	20.0419	0	20.0419	17.0892	17.0892
45	0.267105	3.91954	15.6861	AC alt	16	24.7913	11.4213	22.1881	18.2013	0	18.2013	14.9939	14.9939
46	0.267105	3.30944	17.3592	AC alt	16	24.7913	10.9812	21.333	16.1649	0	16.1649	12.7322	12.7322
47	0.267105	2.65451	19.0476	AC alt	16	24.7913	10.4967	20.3918	13.9234	0	13.9234	10.2994	10.2994
48	0.267105	1.95344	20.7534	AC alt	16	24.7913	9.96558	19.36	11.4662	0	11.4662	7.68988	7.68988
49	0.267105	1.20471	22.4787	AC alt	16	24.7913	9.38517	18.2325	8.78077	0	8.78077	4.89739	4.89739
50	0.267105	0.406623	24.2258	AC alt	16	24.7913	8.85851	17.2093	6.34413	0	6.34413	2.35815	2.35815

**Global Minimum Query (janbu simplified) - Safety Factor: 1.78462**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.267105	2.77	-74.2544	AC alt	16	24.7913	5.52234	9.85527	-11.1701	0	-11.1701	8.41639	8.41639
2	0.267105	7.66012	-69.0547	AC alt	16	24.7913	8.88896	15.8634	3.13871	0	3.13871	26.3614	26.3614
3	0.267105	11.5693	-64.9191	AC alt	16	24.7913	11.8114	21.0788	15.5595	0	15.5595	40.7959	40.7959
4	0.267105	14.9346	-61.3543	AC alt	16	24.7913	14.4574	25.801	26.8057	0	26.8057	53.2723	53.2723
5	0.267105	17.9339	-58.1613	AC alt	16	24.7913	16.9039	30.167	37.2036	0	37.2036	64.4258	64.4258
6	0.267105	20.5778	-55.2348	AC alt	16	24.7913	19.1412	34.1597	46.7125	0	46.7125	74.2888	74.2888
7	0.267105	21.9918	-52.5109	AC alt	16	24.7913	20.5204	36.6211	52.5747	0	52.5747	79.3279	79.3279
8	0.267105	22.7082	-49.9471	AC alt	16	24.7913	21.5273	38.418	56.8541	0	56.8541	82.4613	82.4613
9	0.267105	23.3672	-47.5137	AC alt	16	24.7913	22.4042	39.983	60.5811	0	60.5811	85.0427	85.0427
10	0.267105	23.899	-45.1886	AC alt	16	24.7913	23.1678	41.3457	63.8265	0	63.8265	87.1473	87.1473
11	0.267105	24.3189	-42.9552	AC alt	16	24.7913	23.8308	42.529	66.6446	0	66.6446	88.8324	88.8324
12	0.267105	24.639	-40.8002	AC alt	16	24.7913	24.4035	43.5509	69.0783	0	69.0783	90.1429	90.1429
13	0.267105	24.8691	-38.7132	AC alt	16	24.7913	24.8938	44.4259	71.1621	0	71.1621	91.1152	91.1152
14	0.267105	25.0169	-36.6856	AC alt	16	24.7913	25.3082	45.1656	72.924	0	72.924	91.7783	91.7783
15	0.267105	25.089	-34.7102	AC alt	16	24.7913	26.3192	46.9698	77.2207	0	77.2207	95.4519	95.4519
16	0.267105	25.0909	-32.781	AC alt	16	24.7913	25.9311	46.2771	75.571	0	75.571	92.2702	92.2702
17	0.267105	25.2056	-30.8928	AC alt	16	24.7913	26.2839	46.9068	77.0705	0	77.0705	92.7966	92.7966
18	0.267105	25.9411	-29.0411	AC alt	16	24.7913	27.1065	48.3748	80.5669	0	80.5669	95.6178	95.6178
19	0.267105	26.6851	-27.2222	AC alt	16	24.7913	27.9377	49.8581	84.0996	0	84.0996	98.4713	98.4713
20	0.267105	27.3738	-25.4325	AC alt	16	24.7913	28.7281	51.2688	87.4589	0	87.4589	101.12	101.12
21	0.267105	28.0094	-23.6691	AC alt	16	24.7913	29.4794	52.6096	90.6521	0	90.6521	103.574	103.574
22	0.267105	28.5944	-21.9292	AC alt	16	24.7913	36.0712	64.3734	118.669	0	118.669	133.191	133.191
23	0.267105	29.1305	-20.2103	AC alt	16	24.7913	30.8699	55.0911	96.562	0	96.562	107.926	107.926
24	0.267105	29.6073	-18.5102	AC alt	16	24.7913	31.5015	56.2182	99.2463	0	99.2463	109.793	109.793
25	0.267105	29.1828	-16.8268	AC alt	16	24.7913	31.3994	56.036	98.8124	0	98.8124	108.308	108.308
26	0.267105	28.1904	-15.1583	AC alt	16	24.7913	30.8217	55.0051	96.3573	0	96.3573	104.707	104.707
27	0.267105	27.1547	-13.5029	AC alt	16	24.7913	30.1939	53.8847	93.689	0	93.689	100.94	100.94
28	0.267105	26.0766	-11.8589	AC alt	16	24.7913	29.5166	52.6759	90.8103	0	90.8103	97.0083	97.0083
29	0.267105	24.9569	-10.2247	AC alt	16	24.7913	28.7903	51.3798	87.7234	0	87.7234	92.9165	92.9165
30	0.267105	23.7963	-8.59895	AC alt	16	24.7913	28.0155	49.9971	84.4305	0	84.4305	88.6669	88.6669
31	0.267105	22.5954	-6.98012	AC alt	16	24.7913	44.4469	79.3208	154.267	0	154.267	159.709	159.709
32	0.267105	21.3547	-5.36687	AC alt	16	24.7913	26.3212	46.9734	77.2294	0	77.2294	79.7021	79.7021
33	0.267105	20.0745	-3.75789	AC alt	16	24.7913	25.4017	45.3323	73.3209	0	73.3209	74.9894	74.9894
34	0.267105	18.7551	-2.15187	AC alt	16	24.7913	24.4336	43.6047	69.2067	0	69.2067	70.1248	70.1248
35	0.267105	17.3967	-0.547536	AC alt	16	24.7913	23.4166	41.7898	64.8842	0	64.8842	65.108	65.108
36	0.267105	15.9993	1.05636	AC alt	16	24.7913	22.3503	39.8868	60.3521	0	60.3521	59.94	59.94
37	0.267105	14.5629	2.66109	AC alt	16	24.7913	21.2338	37.8942	55.6064	0	55.6064	54.6195	54.6195
38	0.267105	13.0874	4.26792	AC alt	16	24.7913	20.0662	35.8105	50.644	0	50.644	49.1466	49.1466
39	0.267105	11.5726	5.87811	AC alt	16	24.7913	18.8465	33.6338	45.4601	0	45.4601	43.5197	43.5197
40	0.267105	10.0183	7.49299	AC alt	16	24.7913	17.5733	31.3617	40.0489	0	40.0489	37.7375	37.7375
41	0.267105	8.42398	9.11388	AC alt	16	24.7913	16.2452	28.9915	34.4042	0	34.4042	31.7981	31.7981
42	0.267105	6.78919	10.7422	AC alt	16	24.7913	14.8603	26.52	28.5181	0	28.5181	25.6989	25.6989
43	0.267105	5.21527	12.3793	AC alt	16	24.7913	13.5118	24.1134	22.7867	0	22.7867	19.821	19.821
44	0.267105	4.48598	14.0267	AC alt	16	24.7913	12.9384	23.0901	20.3496	0	20.3496	17.1173	17.1173
45	0.267105	3.91954	15.6861	AC alt	16	24.7913	12.5123	22.3297	18.5385	0	18.5385	15.0247	15.0247
46	0.267105	3.30944	17.3592	AC alt	16	24.7913	12.0395	21.4859	16.529	0	16.529	12.7655	12.7655
47	0.267105	2.65451	19.0476	AC alt	16	24.7913	11.5177	20.5547	14.3114	0	14.3114	10.3348	10.3348
48	0.267105	1.95344	20.7534	AC alt	16	24.7913	10.9443	19.5314	11.8743	0	11.8743	7.72715	7.72715
49	0.267105	1.20471	22.4787	AC alt	16	24.7913	10.3162	18.4105	9.20472	0	9.20472	4.9361	4.9361
50	0.267105	0.406623	24.2258	AC alt	16	24.7913	9.74661	17.394	6.78387	0	6.78387	2.39828	2.39828

# Interslice Data

**Global Minimum Query (bishop simplified) - Safety Factor: 1.94269**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	177.401	129.704	0	0	0
2	177.668	128.757	-11.0901	0	0
3	177.935	128.059	-10.2592	0	0
4	178.202	127.488	-3.50784	0	0
5	178.469	126.999	6.76535	0	0
6	178.736	126.569	19.2784	0	0
7	179.003	126.184	33.1603	0	0
8	179.27	125.836	46.9662	0	0
9	179.537	125.518	60.2143	0	0
10	179.805	125.226	72.7928	0	0
11	180.072	124.958	84.6265	0	0
12	180.339	124.709	95.6652	0	0
13	180.606	124.478	105.876	0	0
14	180.873	124.264	115.24	0	0
15	181.14	124.065	123.745	0	0
16	181.407	123.88	130.905	0	0
17	181.674	123.708	137.692	0	0
18	181.941	123.548	143.687	0	0
19	182.208	123.4	149.094	0	0
20	182.476	123.263	153.888	0	0
21	182.743	123.136	158.026	0	0
22	183.01	123.019	161.47	0	0
23	183.277	122.911	158.569	0	0
24	183.544	122.813	160.53	0	0
25	183.811	122.723	161.705	0	0
26	184.078	122.643	162.003	0	0
27	184.345	122.57	161.425	0	0
28	184.612	122.506	160.032	0	0
29	184.88	122.45	157.884	0	0
30	185.147	122.402	155.043	0	0
31	185.414	122.361	151.575	0	0
32	185.681	122.329	127.286	0	0
33	185.948	122.304	122.761	0	0
34	186.215	122.286	117.81	0	0
35	186.482	122.276	112.507	0	0
36	186.749	122.273	106.927	0	0
37	187.016	122.278	101.15	0	0
38	187.283	122.291	95.2569	0	0
39	187.551	122.311	89.3357	0	0
40	187.818	122.338	83.4776	0	0
41	188.085	122.373	77.7797	0	0
42	188.352	122.416	72.3449	0	0
43	188.619	122.467	67.2831	0	0
44	188.886	122.526	62.6653	0	0
45	189.153	122.592	58.1719	0	0
46	189.42	122.667	53.7567	0	0
47	189.687	122.751	49.4747	0	0
48	189.955	122.843	45.3877	0	0
49	190.222	122.944	41.566	0	0
50	190.489	123.055	38.0894	0	0
51	190.756	123.175	0	0	0



**Global Minimum Query (janbu simplified) - Safety Factor: 1.78462**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	177.401	129.704	0	0	0
2	177.668	128.757	-12.0569	0	0
3	177.935	128.059	-12.2404	0	0
4	178.202	127.488	-6.51474	0	0
5	178.469	126.999	2.73187	0	0
6	178.736	126.569	14.2208	0	0
7	179.003	126.184	27.0847	0	0
8	179.27	125.836	39.9131	0	0
9	179.537	125.518	52.2283	0	0
10	179.805	125.226	63.9128	0	0
11	180.072	124.958	74.8869	0	0
12	180.339	124.709	85.0967	0	0
13	180.606	124.478	94.5065	0	0
14	180.873	124.264	103.094	0	0
15	181.14	124.065	110.847	0	0
16	181.407	123.88	117.213	0	0
17	181.674	123.708	123.287	0	0
18	181.941	123.548	128.585	0	0
19	182.208	123.4	133.295	0	0
20	182.476	123.263	137.39	0	0
21	182.743	123.136	140.827	0	0
22	183.01	123.019	143.568	0	0
23	183.277	122.911	139.326	0	0
24	183.544	122.813	140.577	0	0
25	183.811	122.723	141.04	0	0
26	184.078	122.643	140.637	0	0
27	184.345	122.57	139.379	0	0
28	184.612	122.506	137.325	0	0
29	184.88	122.45	134.535	0	0
30	185.147	122.402	131.073	0	0
31	185.414	122.361	127.002	0	0
32	185.681	122.329	99.9646	0	0
33	185.948	122.304	94.8735	0	0
34	186.215	122.286	89.3763	0	0
35	186.482	122.276	83.546	0	0
36	186.749	122.273	77.4582	0	0
37	187.016	122.278	71.1923	0	0
38	187.283	122.291	64.8316	0	0
39	187.551	122.311	58.4634	0	0
40	187.818	122.338	52.1803	0	0
41	188.085	122.373	46.0804	0	0
42	188.352	122.416	40.268	0	0
43	188.619	122.467	34.8544	0	0
44	188.886	122.526	29.9102	0	0
45	189.153	122.592	25.0971	0	0
46	189.42	122.667	20.3652	0	0
47	189.687	122.751	15.7699	0	0
48	189.955	122.843	11.3743	0	0
49	190.222	122.944	7.24981	0	0
50	190.489	123.055	3.47756	0	0
51	190.756	123.175	0	0	0

# Discharge Sections

---

## Entity Information

---

◆ **Group 1**

**Shared Entities**

Type	Coordinates (x,y)
	399.915, 186.348
	398.807, 186.243
	398.437, 186.203
	397.422, 186.095
	397.04, 186.061
	395.954, 185.921
	395.073, 185.833
	394.238, 185.75
	393.793, 185.711
	393.545, 185.683
	392.942, 185.578
	392.34, 185.509
	391.594, 185.406
	391.147, 185.331
	390.412, 185.248
	390.076, 185.184
	389.433, 185.134
	389.033, 185.08
	388.497, 185.028
	387.114, 184.837
	386.896, 184.804
	386.217, 184.729
	385.495, 184.668
	385.482, 184.666
	384.926, 184.633
	384.749, 184.621
	384.743, 184.621
	384.741, 184.621
	383.458, 184.518
	383.381, 184.511
	382.596, 184.419
	382.467, 184.407
	381.068, 184.261
	380.725, 184.226
	379.714, 184.101
	379.361, 184.06
	378.512, 183.985
	378.303, 183.957
	377.801, 183.877
	377.389, 183.829
	377.024, 183.78
	376.49, 183.682
	375.893, 183.577
	374.923, 183.376

374.656, 183.32
374.042, 183.2
373.342, 183.079
372.788, 182.957
371.357, 182.753
371.29, 182.74
371.255, 182.734
370.572, 182.633
369.097, 182.399
368.954, 182.375
368.873, 182.361
368.839, 182.354
368.684, 182.321
367.663, 182.103
367.308, 182.011
366.801, 181.859
365.97, 181.653
365.34, 181.412
365.173, 181.353
364.687, 181.23
364.554, 181.204
363.778, 180.937
363.646, 180.904
363.376, 180.84
363.255, 180.811
363.231, 180.805
363.168, 180.793
363.157, 180.792
362.713, 180.791
362.633, 180.775
361.973, 180.791
361.309, 180.773
361.031, 180.747
360.303, 180.633
360.292, 180.631
359.234, 180.398
359.082, 180.374
358.979, 180.356
358.899, 180.34
357.906, 180.096
357.539, 180.009
356.671, 179.769
355.309, 179.413
354.87, 179.289
353.776, 179.021
353.519, 178.949
353.336, 178.903
352.918, 178.815
352.808, 178.797
352.748, 178.793
351.982, 178.638
351.98, 178.638
351.953, 178.633
349.432, 178.299
348.83, 178.189
348.384, 178.099
347.189, 177.877
346.603, 177.765
345.906, 177.649

345.255, 177.514  
344.717, 177.443  
344.14, 177.385  
343.123, 177.16  
342.123, 176.929  
341.998, 176.907  
341.948, 176.896  
341.888, 176.879  
340.943, 176.633  
339.629, 176.322  
339.429, 176.256  
338.669, 176.072  
338.283, 175.96  
337.673, 175.813  
337.191, 175.705  
336.565, 175.546  
335.746, 175.326  
335.003, 175.162  
333.996, 174.929  
333.944, 174.916  
333.817, 174.883  
332.826, 174.633  
331.569, 174.382  
331.43, 174.357  
331.237, 174.319  
330.237, 174.09  
329.781, 173.98  
328.932, 173.811  
328.488, 173.694  
328.035, 173.611  
327.828, 173.569  
326.681, 173.296  
326.193, 173.202  
325.897, 173.153  
324.41, 172.786  
324.321, 172.772  
324.262, 172.76  
323.594, 172.633  
323.457, 172.615  
323.446, 172.612  
322.652, 172.53  
322.26, 172.5  
321.286, 172.49  
321.267, 172.485  
321.185, 172.464  
320.915, 172.452  
320.803, 172.42  
320.368, 172.366  
320.091, 172.321  
319.88, 172.269  
319.416, 172.168  
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317.735, 171.819  
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316.519, 171.584  
315.933, 171.466  
314.996, 171.376  
314.643, 171.313

313.811, 171.178
313.619, 171.141
312.632, 170.967
312.549, 170.953
311.361, 170.731
311.301, 170.719
310.867, 170.633
310.177, 170.484
310.053, 170.464
308.983, 170.275
308.54, 170.197
306.651, 169.928
306.079, 169.817
305.651, 169.74
305.237, 169.651
304.982, 169.601
304.279, 169.432
303.803, 169.324
302.782, 169.1
302.529, 169.037
301.513, 168.849
301.377, 168.815
300.402, 168.633
300.154, 168.588
300.125, 168.584
299.082, 168.375
298.906, 168.35
297.906, 168.175
297.622, 168.121
297.248, 168.065
296.875, 167.986
296.284, 167.887
295.772, 167.781
294.958, 167.627
293.23, 167.287
292.651, 167.184
292.002, 167.082
291.811, 167.049
290.699, 166.893
290.508, 166.858
289.997, 166.784
289.931, 166.774
289.088, 166.633
288.759, 166.564
288.715, 166.551
287.575, 166.274
286.993, 166.106
286.029, 165.849
285.582, 165.708
284.24, 165.265
284.068, 165.209
283.719, 165.091
282.291, 164.633
282.165, 164.594
282.134, 164.585
279.959, 163.969
279.513, 163.853
278.855, 163.647
277.615, 163.353

External Boundary

277.18, 163.216  
275.622, 162.837  
275.488, 162.797  
274.865, 162.633  
274.152, 162.437  
273.993, 162.397  
273.775, 162.334  
271.601, 161.67  
270.737, 161.418  
270.608, 161.386  
269.916, 161.246  
269.668, 161.206  
268.771, 160.955  
268.63, 160.927  
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267.467, 160.557  
267.384, 160.515  
267.16, 160.39  
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264.489, 158.958  
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263.318, 158.053  
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256.407, 152.06  
254.986, 150.633  
253.639, 149.641  
252.29, 148.633  
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248.163, 146.559  
247.679, 146.165  
245.969, 144.633  
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243.725, 142.633  
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241.505, 140.633  
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238.461, 136.633  
237.458, 135.412  
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209.588, 122.715  
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209.102, 122.774  
208.305, 123.022  
208.253, 123.047  
208.187, 123.075  
208.11, 123.109  
208.004, 123.151  
207.913, 123.192  
207.772, 123.247  
207.676, 123.279  
201.171, 123.435  
190.75, 123.175  
188.776, 123.455  
183.776, 128.455  
181.776, 128.455  
178.915, 130.363  
176.763, 129.426  
174.932, 128.648

174.896, 128.633  
173.706, 128.123  
172.856, 127.785  
172.304, 127.552  
171.117, 127.08  
170.02, 126.633  
169.225, 126.238  
168.817, 126.08  
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165.137, 124.633  
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163.394, 123.872  
163.153, 123.783  
162.499, 123.546  
161.682, 123.17  
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160.098, 122.668  
159.944, 122.633  
158.807, 122.369  
158.534, 122.274  
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156.998, 121.777  
156.003, 121.42  
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155, 121.057  
153.405, 120.633  
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152.611, 120.404  
152.236, 120.3  
149.79, 119.565  
147.038, 118.856  
146.822, 118.794  
146.204, 118.633  
145.044, 118.234  
144.611, 118.091  
143.577, 117.733  
143.426, 117.679  
140.48, 116.633  
139.393, 116.229  
137.93, 115.741  
136.594, 115.267  
135.552, 114.93  
134.678, 114.633  
134.443, 114.552  
134.344, 114.522  
133.048, 114.083  
132.936, 114.047  
132.272, 113.845  
131.368, 113.54  
129.413, 112.922  
129.168, 112.84  
128.53, 112.633  
127.668, 112.198  
124.848, 110.898  
124.719, 110.837  
124.466, 110.715





124.275, 110.633  
123.283, 110.246  
121.78, 109.669  
118.801, 108.633  
118.67, 108.595  
118.526, 108.551  
116.439, 107.903  
115.431, 107.617  
114.556, 107.373  
113.99, 107.221  
112.678, 106.891  
112.251, 106.79  
111.543, 106.633  
111.083, 106.522  
111.002, 106.505  
109.241, 106.054  
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106.207, 105.398  
106.015, 105.373  
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100.708, 104.778  
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100.483, 104.772  
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99.5043, 104.701  
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98.3048, 104.65  
98.2986, 104.65  
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96.1581, 104.699  
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95.4446, 104.73  
95.409, 104.733  
94.7331, 104.775  
94.5941, 104.786  
93.9272, 104.837  
93.2597, 104.881  
93.1234, 104.891  
92.6488, 104.931  
92.5341, 104.941  
92.4088, 104.955  
91.0182, 105.06  
90.6327, 105.092  
90.1872, 105.13  
89.4418, 105.202  
89.2551, 105.219  
88.8711, 105.246  
86.8508, 105.445

86.2777, 105.488
85.9131, 105.512
85.0257, 105.585
84.6691, 105.614
84.193, 105.645
84.0232, 105.657
83.6341, 105.676
82.8162, 105.72
82.4183, 105.734
82.2071, 105.748
81.7918, 105.761
81.0251, 105.776
80.8255, 105.784
80.2951, 105.789
79.0069, 105.804
77.157, 105.845
76.9574, 105.851
76.7846, 105.86
76.4278, 105.873
75.5917, 105.837
75.2157, 105.855
74.9429, 105.861
74.3704, 105.851
73.7709, 105.855
73.4484, 105.831
73.1362, 105.811
72.5911, 105.821
72.0376, 105.758
71.1687, 105.783
70.8688, 105.79
70.3447, 105.782
70.0253, 105.767
69.6142, 105.696
68.8054, 105.67
63.5696, 104.633
60.2622, 104.633
58.7911, 104.228
53.354, 102.633
52.5574, 102.368
52.258, 102.265
50.9293, 101.808
49.4159, 101.305
48.901, 101.125
47.4335, 100.633
47.2945, 100.584
47.1987, 100.551
44.3108, 99.5314
43.2075, 99.1477
42.9253, 99.0516
41.6961, 98.6328
41.1608, 98.4203
40.0413, 98.0077
36.8167, 96.965
36.4444, 96.8399
35.8295, 96.6328
35.677, 96.5723
34.9384, 96.2761
34.0972, 95.9561
33.0195, 95.5291

	31.7387, 95.0596 30.6247, 94.6328 29.7631, 94.1182 29.0106, 93.7087 28.1346, 93.2018 27.8159, 93.0242 27.761, 92.9982 26.9696, 92.6328 25.5062, 91.8619 24.9882, 91.5652 23.3884, 90.6328 22.2825, 90.2271 20.9052, 89.7522 19.9936, 89.4261 18.5962, 88.9169 18.3649, 88.8326 17.8569, 88.6328 16.2197, 87.7869 14.532, 86.8429 14.3098, 86.7203 14.1595, 86.6328 12.7586, 86.0744 11.763, 85.7132 10.7948, 85.3332 8.86198, 84.6328 8.40391, 84.3964 5.1807, 82.6328 4.46831, 82.2737 3.74502, 81.9053 1.26902, 80.6328 1.06007, 80.5268 0, 80 0, 33.7565 0, 0 400, 0 400, 143.659 400, 186.359
Material Boundary	0, 33.7565 27.7251, 42.7726 50.8851, 49.9156 64.6181, 53.2001 88.1056, 58.7636 100.519, 61.3219 148.294, 74.0133 172.408, 81.5464 234.004, 97.3055 259.001, 106.985 281.185, 113.997 319.283, 125.343 359.736, 134.566 400, 143.659

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 57.6016 27.7251, 64.543 100.519, 84.3934 148.294, 97.0848 172.408, 104.618 234.004, 120.377 259.001, 130.057 281.185, 137.068 360.386, 158.72 400, 167.187	Assigned to:  AC  AC alt
Distributed Load	220.07, 123.15 218.947, 123.106 217.608, 123.059 217.553, 123.056 217.514, 123.055 217.469, 123.053 214.945, 122.959 214.764, 122.956 214.603, 122.951 214.294, 122.942 214.111, 122.936 213.379, 122.922 213.231, 122.914 212.94, 122.897 212.498, 122.881 212.457, 122.879 212.389, 122.872 212.291, 122.864 212.088, 122.844 211.817, 122.822 211.742, 122.815 211.742, 122.802 210.722, 122.709 210.663, 122.731 210.375, 122.717 209.864, 122.704 209.758, 122.709 209.588, 122.715 209.445, 122.733 209.304, 122.691 209.102, 122.774 208.305, 123.022 208.253, 123.047 208.187, 123.075 208.11, 123.109 208.004, 123.151 207.913, 123.192 207.772, 123.247 207.676, 123.279 201.171, 123.435 190.75, 123.175	Constant DistributionOrientation: Normal to boundaryMagnitude: 20 kN/m2Creates Excess Pore Pressure: No



4+950 sisma

Slide2 - An Interactive Slope Stability Program

Date Created: 06/09/2023, 16:11:56

Software Version: 9.027

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# Slide2 Analysis Information

## sisma

### Project Summary

---

File Name:	sisma.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:03.493s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	06/09/2023, 16:11:56

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right



## Design Standard

Selected Type:	Eurocode 7 (User Defined)
Name:	M1+R2 fronti scavo sisma
Type	Partial Factor
Permanent Actions: Unfavourable	1
Permanent Actions: Favourable	1
Variable Actions: Unfavourable	1
Variable Actions: Favourable	0
Effective cohesion	1
Coefficient of shearing resistance	1
Undrained strength	1
Weight density	1
Shear strength (other models)	1
Earth resistance	1.2
Tensile and plate strength	1
Shear strength	1
Compressive strength	1
Bond strength	1
Seismic Coefficient	1

## Analysis Options

---

Slices Type:	Vertical
<b>Analysis Methods Used</b>	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading

---

1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

# Materials

---

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1



# Support

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## Support 1

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	2.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	70 kN/m
Material Dependent	No

## Global Minimums

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### Method: bishop simplified

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	<b>FS</b>	<b>1.836340</b>
Center:		187.469, 133.437
Radius:		11.401
Left Slip Surface Endpoint:		176.792, 129.439
Right Slip Surface Endpoint:		192.526, 123.219
Resisting Moment:		9585.03 kN-m
Driving Moment:		5219.63 kN-m
Passive Support Moment:		415.067 kN-m
Maximum Single Support Force:		51.1082 kN
Total Support Force:		69.4317 kN
Total Slice Area:		51.2508 m <sup>2</sup>
Surface Horizontal Width:		15.7348 m
Surface Average Height:		3.25717 m

### Method: janbu simplified

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	<b>FS</b>	<b>1.693350</b>
Center:		186.931, 131.914
Radius:		10.151
Left Slip Surface Endpoint:		177.058, 129.555
Right Slip Surface Endpoint:		192.153, 123.210
Resisting Horizontal Force:		734.875 kN
Driving Horizontal Force:		433.978 kN
Passive Horizontal Support Force:		33.0592 kN
Maximum Single Support Force:		39.3657 kN
Total Support Force:		46.7528 kN
Total Slice Area:		54.2907 m <sup>2</sup>
Surface Horizontal Width:		15.0949 m
Surface Average Height:		3.59663 m

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.476	5.03	3.20471	1.82529	3.20471	1.82529	51.1082
186.254, 125.976	5.03	4.37559	0.654411	4.37559	0.654411	18.3235
184.754, 127.476	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0

### Method: janbu simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
187.754, 124.476	5.03	3.62408	1.40592	3.62408	1.40592	39.3657
186.254, 125.976	5.03	4.76617	0.263826	4.76617	0.263826	7.38713
184.754, 127.476	5.03	Not Effective	Not Effective	Not Effective	Not Effective	0

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces:	9230
Number of Invalid Surfaces:	9

#### Error Codes

Error Code -108 reported for 4 surfaces  
 Error Code -112 reported for 5 surfaces

### Method: janbu simplified

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Number of Valid Surfaces:	9088
Number of Invalid Surfaces:	151

#### Error Codes

Error Code -108 reported for 26 surfaces  
 Error Code -111 reported for 99 surfaces  
 Error Code -112 reported for 26 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

- 108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 111 = Safety factor equation did not converge
- 112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.83634

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.314696	2.74126	-67.4113	AC alt	20	30	6.52858	11.9887	-9.72304	0	-9.72304	5.96962	5.96962
2	0.314696	7.84585	-63.5751	AC alt	20	30	9.74101	17.8878	2.53802	0	2.53802	22.1398	22.1398
3	0.314696	12.3159	-60.2064	AC alt	20	30	12.777	23.463	14.1258	0	14.1258	36.4416	36.4416
4	0.314696	16.3388	-57.1566	AC alt	20	30	15.6641	28.7647	25.1452	0	25.1452	49.4108	49.4108
5	0.314696	20.021	-54.3419	AC alt	20	30	18.4236	33.832	35.6774	0	35.6774	61.3561	61.3561
6	0.314696	23.4305	-51.7091	AC alt	20	30	21.072	38.6953	45.7856	0	45.7856	72.476	72.476
7	0.314696	26.5453	-49.2221	AC alt	20	30	23.5786	43.2983	55.3528	0	55.3528	82.6901	82.6901
8	0.314696	28.0003	-46.8549	AC alt	20	30	25.0398	45.9815	60.9296	0	60.9296	87.6455	87.6455
9	0.314696	28.6942	-44.5881	AC alt	20	30	25.9887	47.724	64.5514	0	64.5514	90.1691	90.1691
10	0.314696	29.2398	-42.4068	AC alt	20	30	26.8169	49.2449	67.7124	0	67.7124	92.2054	92.2054
11	0.314696	29.6525	-40.2989	AC alt	20	30	27.535	50.5636	70.4533	0	70.4533	93.8038	93.8038
12	0.314696	29.9446	-38.255	AC alt	20	30	28.1516	51.696	72.8071	0	72.8071	95.0041	95.0041
13	0.314696	30.1262	-36.2672	AC alt	20	30	28.674	52.6553	74.8009	0	74.8009	95.8389	95.8389
14	0.314696	30.206	-34.3289	AC alt	20	30	29.1081	53.4524	76.4575	0	76.4575	96.3352	96.3352
15	0.314696	30.1909	-32.4344	AC alt	20	30	29.4589	54.0965	77.7964	0	77.7964	96.5163	96.5163
16	0.314696	30.1039	-30.5789	AC alt	20	30	29.743	54.6182	78.8808	0	78.8808	96.456	96.456
17	0.314696	30.7522	-28.7584	AC alt	20	30	30.5597	56.118	81.9979	0	81.9979	98.7694	98.7694
18	0.314696	31.7735	-26.9691	AC alt	20	30	31.6566	58.1323	86.1847	0	86.1847	102.293	102.293
19	0.314696	32.7193	-25.2078	AC alt	20	30	32.7039	60.0554	90.1817	0	90.1817	105.576	105.576
20	0.314696	33.5931	-23.4717	AC alt	20	30	33.703	61.8901	93.9949	0	93.9949	108.63	108.63
21	0.314696	34.3978	-21.7582	AC alt	20	30	39.8734	73.2211	117.546	0	117.546	133.461	133.461
22	0.314696	35.1359	-20.0649	AC alt	20	30	35.5623	65.3045	101.092	0	101.092	114.081	114.081
23	0.314696	35.1811	-18.3897	AC alt	20	30	35.9298	65.9794	102.495	0	102.495	114.44	114.44
24	0.314696	33.8972	-16.7307	AC alt	20	30	35.238	64.709	99.854	0	99.854	110.446	110.446
25	0.314696	32.5166	-15.0859	AC alt	20	30	34.4476	63.2575	96.8373	0	96.8373	106.123	106.123
26	0.314696	31.0767	-13.4539	AC alt	20	30	33.588	61.6789	93.556	0	93.556	101.591	101.591
27	0.314696	29.5788	-11.8329	AC alt	20	30	32.6596	59.9742	90.013	0	90.013	96.8555	96.8555
28	0.314696	28.0241	-10.2214	AC alt	20	30	47.1646	86.6103	145.375	0	145.375	153.879	153.879
29	0.314696	26.4134	-8.61808	AC alt	20	30	30.5987	56.1896	82.1466	0	82.1466	86.7841	86.7841
30	0.314696	24.7475	-7.02155	AC alt	20	30	29.4662	54.11	77.8245	0	77.8245	81.4538	81.4538
31	0.314696	23.0271	-5.43047	AC alt	20	30	28.2656	51.9052	73.2418	0	73.2418	75.9289	75.9289
32	0.314696	21.2526	-3.8436	AC alt	20	30	26.9962	49.5742	68.3971	0	68.3971	70.2109	70.2109
33	0.314696	19.4244	-2.25967	AC alt	20	30	25.6575	47.1159	63.2875	0	63.2875	64.2999	64.2999
34	0.314696	17.5428	-0.677465	AC alt	20	30	24.2486	44.5286	57.9097	0	57.9097	58.1964	58.1964
35	0.314696	15.6078	0.90422	AC alt	20	30	22.7682	41.8101	52.2596	0	52.2596	51.9002	51.9002
36	0.314696	13.6195	2.48659	AC alt	20	30	21.2149	38.9578	46.331	0	46.331	45.4097	45.4097
37	0.314696	11.5777	4.07087	AC alt	20	30	19.5871	35.9685	40.118	0	40.118	38.724	38.724
38	0.314696	9.48216	5.65827	AC alt	20	30	17.8826	32.8386	33.6125	0	33.6125	31.8407	31.8407
39	0.314696	8.03145	7.25005	AC alt	20	30	16.7327	30.7269	29.2235	0	29.2235	27.0948	27.0948
40	0.314696	7.47891	8.84748	AC alt	20	30	16.3845	30.0875	27.8946	0	27.8946	25.3442	25.3442
41	0.314696	6.87661	10.4519	AC alt	20	30	15.9857	29.3552	26.3726	0	26.3726	23.4237	23.4237
42	0.314696	6.21822	12.0646	AC alt	20	30	15.5293	28.5171	24.6305	0	24.6305	21.3114	21.3114
43	0.314696	5.50281	13.6871	AC alt	20	30	15.0128	27.5686	22.6592	0	22.6592	19.003	19.003
44	0.314696	4.72924	15.3209	AC alt	20	30	14.4335	26.5047	20.448	0	20.448	16.4938	16.4938
45	0.314696	3.9632	16.9676	AC alt	20	30	13.8526	25.4381	18.231	0	18.231	14.0044	14.0044
46	0.314696	3.37106	18.6288	AC alt	20	30	13.4321	24.666	16.6262	0	16.6262	12.0982	12.0982
47	0.314696	2.73655	20.3065	AC alt	20	30	12.9648	23.8078	14.8425	0	14.8425	10.045	10.045
48	0.314696	2.03736	22.0025	AC alt	20	30	12.4269	22.82	12.7894	0	12.7894	7.76797	7.76797
49	0.314696	1.27123	23.7191	AC alt	20	30	11.8135	21.6935	10.4481	0	10.4481	5.25765	5.25765
50	0.314696	0.435562	25.4587	AC alt	20	30	11.1188	20.418	7.79686	0	7.79686	2.50328	2.50328

**Global Minimum Query (janbu simplified) - Safety Factor: 1.69335**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.301898	3.39638	-73.5496	AC alt	20	30	6.11851	10.3608	-13.1066	0	-13.1066	7.61504	7.61504
2	0.301898	9.40591	-68.2405	AC alt	20	30	10.2978	17.4378	1.60262	0	1.60262	27.4018	27.4018
3	0.301898	14.2277	-63.9977	AC alt	20	30	14.0298	23.7573	14.7375	0	14.7375	43.4998	43.4998
4	0.301898	18.3831	-60.3322	AC alt	20	30	17.468	29.5794	26.8387	0	26.8387	57.5033	57.5033
5	0.301898	22.0874	-57.0441	AC alt	20	30	20.687	35.0303	38.168	0	38.168	70.0768	70.0768
6	0.301898	25.456	-54.0269	AC alt	20	30	23.7316	40.1859	48.8838	0	48.8838	81.5799	81.5799
7	0.301898	27.8523	-51.2159	AC alt	20	30	26.1434	44.27	57.3725	0	57.3725	89.9069	89.9069
8	0.301898	28.8017	-48.5679	AC alt	20	30	27.5336	46.624	62.2652	0	62.2652	93.4606	93.4606
9	0.301898	29.5449	-46.0524	AC alt	20	30	28.7363	48.6606	66.4982	0	66.4982	96.3099	96.3099
10	0.301898	30.129	-43.647	AC alt	20	30	29.7876	50.4408	70.1983	0	70.1983	98.6112	98.6112
11	0.301898	30.5728	-41.3346	AC alt	20	30	30.7035	51.9918	73.422	0	73.422	100.429	100.429
12	0.301898	30.8913	-39.1018	AC alt	20	30	31.4968	53.3351	76.2137	0	76.2137	101.812	101.812
13	0.301898	31.0962	-36.9377	AC alt	20	30	32.1775	54.4878	78.6098	0	78.6098	102.802	102.802
14	0.301898	31.1972	-34.8336	AC alt	20	30	32.7541	55.4641	80.6387	0	80.6387	103.432	103.432
15	0.301898	31.2025	-32.782	AC alt	20	30	33.2332	56.2755	82.3255	0	82.3255	103.728	103.728
16	0.301898	31.2011	-30.7768	AC alt	20	30	33.6884	57.0462	83.927	0	83.927	103.991	103.991
17	0.301898	31.9863	-28.8125	AC alt	20	30	34.779	58.893	87.7657	0	87.7657	106.895	106.895
18	0.301898	32.9257	-26.8847	AC alt	20	30	36.0018	60.9636	92.0695	0	92.0695	110.322	110.322
19	0.301898	33.7904	-24.9893	AC alt	20	30	37.1689	62.94	96.1771	0	96.1771	113.501	113.501
20	0.301898	34.584	-23.1228	AC alt	20	30	40.8164	69.1164	109.015	0	109.015	126.444	126.444
21	0.301898	35.3096	-21.2818	AC alt	20	30	39.3443	66.6237	103.834	0	103.834	119.159	119.159
22	0.301898	35.9698	-19.4637	AC alt	20	30	40.3561	68.337	107.395	0	107.395	121.657	121.657
23	0.301898	36.069	-17.6657	AC alt	20	30	40.8776	69.22	109.23	0	109.23	122.249	122.249
24	0.301898	34.8839	-15.8856	AC alt	20	30	40.2457	68.15	107.006	0	107.006	118.459	118.459
25	0.301898	33.5831	-14.1211	AC alt	20	30	39.4845	66.8611	104.327	0	104.327	114.26	114.26
26	0.301898	32.2242	-12.3701	AC alt	20	30	38.6451	65.4397	101.373	0	101.373	109.848	109.848
27	0.301898	30.8087	-10.6309	AC alt	20	30	52.2666	88.5056	149.314	0	149.314	159.125	159.125
28	0.301898	29.3374	-8.90146	AC alt	20	30	36.7339	62.2034	94.6462	0	94.6462	100.4	100.4
29	0.301898	27.8112	-7.18021	AC alt	20	30	35.6627	60.3895	90.876	0	90.876	95.3688	95.3688
30	0.301898	26.2309	-5.46545	AC alt	20	30	34.5144	58.4449	86.8343	0	86.8343	90.1367	90.1367
31	0.301898	24.597	-3.75559	AC alt	20	30	33.2883	56.3688	82.5193	0	82.5193	84.7044	84.7044
32	0.301898	22.9099	-2.04908	AC alt	20	30	31.9838	54.1598	77.9279	0	77.9279	79.0722	79.0722
33	0.301898	21.1697	-0.344384	AC alt	20	30	30.5999	51.8163	73.0569	0	73.0569	73.2408	73.2408
34	0.301898	19.3767	1.36	AC alt	20	30	29.135	49.3357	67.9013	0	67.9013	67.2096	67.2096
35	0.301898	17.5307	3.0656	AC alt	20	30	27.5873	46.715	62.4542	0	62.4542	60.9768	60.9768
36	0.301898	15.6317	4.77392	AC alt	20	30	25.9549	43.9507	56.709	0	56.709	54.5414	54.5414
37	0.301898	13.6791	6.48651	AC alt	20	30	24.235	41.0384	50.6555	0	50.6555	47.9	47.9
38	0.301898	11.6727	8.20494	AC alt	20	30	22.4247	37.9728	44.284	0	44.284	41.0506	41.0506
39	0.301898	9.63825	9.93085	AC alt	20	30	20.548	34.7949	37.6789	0	37.6789	34.0813	34.0813
40	0.301898	8.54252	11.6659	AC alt	20	30	19.6253	33.2325	34.4314	0	34.4314	30.3793	30.3793
41	0.301898	7.89509	13.4119	AC alt	20	30	19.1651	32.4532	32.8117	0	32.8117	28.2417	28.2417
42	0.301898	7.19018	15.1707	AC alt	20	30	18.6366	31.5583	30.9515	0	30.9515	25.8983	25.8983
43	0.301898	6.42643	16.9443	AC alt	20	30	18.036	30.5413	28.8379	0	28.8379	23.3429	23.3429
44	0.301898	5.60224	18.7348	AC alt	20	30	17.3593	29.3954	26.456	0	26.456	20.5685	20.5685
45	0.301898	4.71576	20.5444	AC alt	20	30	16.6014	28.1119	23.7884	0	23.7884	17.5668	17.5668
46	0.301898	3.8269	22.3758	AC alt	20	30	15.8274	26.8014	21.0646	0	21.0646	14.5488	14.5488
47	0.301898	3.08707	24.2317	AC alt	20	30	15.2127	25.7605	18.9011	0	18.9011	12.0541	12.0541
48	0.301898	2.29592	26.115	AC alt	20	30	14.5285	24.6018	16.4927	0	16.4927	9.37059	9.37059
49	0.301898	1.43164	28.0293	AC alt	20	30	13.745	23.2751	13.7353	0	13.7353	6.41798	6.41798
50	0.301898	0.490389	29.9783	AC alt	20	30	12.8521	21.7632	10.5928	0	10.5928	3.17915	3.17915

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.83634

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	176.792	129.439	0	0	0
2	177.106	128.682	-9.15926	0	0
3	177.421	128.049	-9.90265	0	0
4	177.736	127.499	-5.03764	0	0
5	178.05	127.012	3.77945	0	0
6	178.365	126.573	15.454	0	0
7	178.68	126.175	29.2071	0	0
8	178.994	125.81	44.4009	0	0
9	179.309	125.474	59.529	0	0
10	179.624	125.164	73.988	0	0
11	179.939	124.877	87.6743	0	0
12	180.253	124.61	100.512	0	0
13	180.568	124.362	112.446	0	0
14	180.883	124.131	123.437	0	0
15	181.197	123.916	133.459	0	0
16	181.512	123.716	142.496	0	0
17	181.827	123.53	150.546	0	0
18	182.141	123.357	157.892	0	0
19	182.456	123.197	164.625	0	0
20	182.771	123.049	170.673	0	0
21	183.086	122.912	175.971	0	0
22	183.4	122.787	174.265	0	0
23	183.715	122.672	177.894	0	0
24	184.03	122.567	180.515	0	0
25	184.344	122.472	181.96	0	0
26	184.659	122.388	182.296	0	0
27	184.974	122.312	181.6	0	0
28	185.288	122.246	179.951	0	0
29	185.603	122.19	156.233	0	0
30	185.918	122.142	152.928	0	0
31	186.232	122.103	148.926	0	0
32	186.547	122.073	144.32	0	0
33	186.862	122.052	139.207	0	0
34	187.177	122.04	133.688	0	0
35	187.491	122.036	127.871	0	0
36	187.806	122.041	121.869	0	0
37	188.121	122.055	115.801	0	0
38	188.435	122.077	109.794	0	0
39	188.75	122.108	103.983	0	0
40	189.065	122.148	98.2795	0	0
41	189.379	122.197	92.439	0	0
42	189.694	122.255	86.5046	0	0
43	190.009	122.323	80.5281	0	0
44	190.324	122.399	74.5691	0	0
45	190.638	122.485	68.6957	0	0
46	190.953	122.581	62.9478	0	0
47	191.268	122.687	57.265	0	0
48	191.582	122.804	51.7068	0	0
49	191.897	122.931	46.3563	0	0
50	192.212	123.069	41.3107	0	0
51	192.526	123.219	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.69335**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	177.058	129.555	0	0	0
2	177.36	128.532	-14.9386	0	0
3	177.662	127.776	-15.979	0	0
4	177.964	127.157	-9.79808	0	0
5	178.266	126.627	0.825626	0	0
6	178.568	126.161	14.3645	0	0
7	178.869	125.746	29.8499	0	0
8	179.171	125.37	46.0475	0	0
9	179.473	125.028	61.6548	0	0
10	179.775	124.715	76.496	0	0
11	180.077	124.427	90.4606	0	0
12	180.379	124.161	103.471	0	0
13	180.681	123.916	115.475	0	0
14	180.983	123.689	126.434	0	0
15	181.285	123.479	136.327	0	0
16	181.587	123.284	145.141	0	0
17	181.888	123.104	152.901	0	0
18	182.19	122.938	159.888	0	0
19	182.492	122.785	166.108	0	0
20	182.794	122.645	171.496	0	0
21	183.096	122.516	173.291	0	0
22	183.398	122.398	176.838	0	0
23	183.7	122.291	179.388	0	0
24	184.002	122.195	180.833	0	0
25	184.304	122.109	181.052	0	0
26	184.605	122.033	180.113	0	0
27	184.907	121.967	178.092	0	0
28	185.209	121.91	157.141	0	0
29	185.511	121.863	153.197	0	0
30	185.813	121.825	148.419	0	0
31	186.115	121.796	142.896	0	0
32	186.417	121.776	136.721	0	0
33	186.719	121.766	129.993	0	0
34	187.021	121.764	122.815	0	0
35	187.323	121.771	115.297	0	0
36	187.624	121.787	107.555	0	0
37	187.926	121.812	99.7125	0	0
38	188.228	121.847	91.903	0	0
39	188.53	121.89	84.2683	0	0
40	188.832	121.943	76.9511	0	0
41	189.134	122.005	69.6582	0	0
42	189.436	122.077	62.2293	0	0
43	189.738	122.159	54.7243	0	0
44	190.04	122.251	47.2123	0	0
45	190.342	122.354	39.7731	0	0
46	190.643	122.467	32.4995	0	0
47	190.945	122.591	25.452	0	0
48	191.247	122.727	18.5725	0	0
49	191.549	122.875	11.955	0	0
50	191.851	123.036	5.72862	0	0
51	192.153	123.21	0	0	0



## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	399.915, 186.348
	398.807, 186.243
	398.437, 186.203
	397.422, 186.095
	397.04, 186.061
	395.954, 185.921
	395.073, 185.833
	394.238, 185.75
	393.793, 185.711
	393.545, 185.683
	392.942, 185.578
	392.34, 185.509
	391.594, 185.406
	391.147, 185.331
	390.412, 185.248
	390.076, 185.184
	389.433, 185.134
	389.033, 185.08
	388.497, 185.028
	387.114, 184.837
	386.896, 184.804
	386.217, 184.729
	385.495, 184.668
	385.482, 184.666
	384.926, 184.633
	384.749, 184.621
	384.743, 184.621
	384.741, 184.621
	383.458, 184.518
	383.381, 184.511
	382.596, 184.419
	382.467, 184.407
	381.068, 184.261
	380.725, 184.226
	379.714, 184.101
	379.361, 184.06
	378.512, 183.985
	378.303, 183.957
	377.801, 183.877
	377.389, 183.829
	377.024, 183.78
	376.49, 183.682
	375.893, 183.577
	374.923, 183.376

374.656, 183.32
374.042, 183.2
373.342, 183.079
372.788, 182.957
371.357, 182.753
371.29, 182.74
371.255, 182.734
370.572, 182.633
369.097, 182.399
368.954, 182.375
368.873, 182.361
368.839, 182.354
368.684, 182.321
367.663, 182.103
367.308, 182.011
366.801, 181.859
365.97, 181.653
365.34, 181.412
365.173, 181.353
364.687, 181.23
364.554, 181.204
363.778, 180.937
363.646, 180.904
363.376, 180.84
363.255, 180.811
363.231, 180.805
363.168, 180.793
363.157, 180.792
362.713, 180.791
362.633, 180.775
361.973, 180.791
361.309, 180.773
361.031, 180.747
360.303, 180.633
360.292, 180.631
359.234, 180.398
359.082, 180.374
358.979, 180.356
358.899, 180.34
357.906, 180.096
357.539, 180.009
356.671, 179.769
355.309, 179.413
354.87, 179.289
353.776, 179.021
353.519, 178.949
353.336, 178.903
352.918, 178.815
352.808, 178.797
352.748, 178.793
351.982, 178.638
351.98, 178.638
351.953, 178.633
349.432, 178.299
348.83, 178.189
348.384, 178.099
347.189, 177.877
346.603, 177.765
345.906, 177.649

345.255, 177.514  
344.717, 177.443  
344.14, 177.385  
343.123, 177.16  
342.123, 176.929  
341.998, 176.907  
341.948, 176.896  
341.888, 176.879  
340.943, 176.633  
339.629, 176.322  
339.429, 176.256  
338.669, 176.072  
338.283, 175.96  
337.673, 175.813  
337.191, 175.705  
336.565, 175.546  
335.746, 175.326  
335.003, 175.162  
333.996, 174.929  
333.944, 174.916  
333.817, 174.883  
332.826, 174.633  
331.569, 174.382  
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331.237, 174.319  
330.237, 174.09  
329.781, 173.98  
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328.035, 173.611  
327.828, 173.569  
326.681, 173.296  
326.193, 173.202  
325.897, 173.153  
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324.321, 172.772  
324.262, 172.76  
323.594, 172.633  
323.457, 172.615  
323.446, 172.612  
322.652, 172.53  
322.26, 172.5  
321.286, 172.49  
321.267, 172.485  
321.185, 172.464  
320.915, 172.452  
320.803, 172.42  
320.368, 172.366  
320.091, 172.321  
319.88, 172.269  
319.416, 172.168  
318.361, 171.919  
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317.735, 171.819  
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315.933, 171.466  
314.996, 171.376  
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279.513, 163.853  
278.855, 163.647  
277.615, 163.353

External Boundary

277.18, 163.216  
275.622, 162.837  
275.488, 162.797  
274.865, 162.633  
274.152, 162.437  
273.993, 162.397  
273.775, 162.334  
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270.737, 161.418  
270.608, 161.386  
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256.407, 152.06  
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252.29, 148.633  
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248.163, 146.559  
247.679, 146.165  
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241.661, 140.775  
241.505, 140.633  
240.609, 139.458  
239.952, 138.633  
238.993, 137.346  
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237.458, 135.412  
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235, 132.784  
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234.152, 131.907  
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208.253, 123.047  
208.187, 123.075  
208.11, 123.109  
208.004, 123.151  
207.913, 123.192  
207.772, 123.247  
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201.171, 123.435  
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188.776, 123.455  
183.776, 128.455  
181.776, 128.455  
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176.763, 129.426  
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171.117, 127.08  
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168.817, 126.08  
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129.168, 112.84  
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124.466, 110.715



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112.251, 106.79  
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90.1872, 105.13  
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89.2551, 105.219  
88.8711, 105.246  
86.8508, 105.445



86.2777, 105.488  
85.9131, 105.512  
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84.6691, 105.614  
84.193, 105.645  
84.0232, 105.657  
83.6341, 105.676  
82.8162, 105.72  
82.4183, 105.734  
82.2071, 105.748  
81.7918, 105.761  
81.0251, 105.776  
80.8255, 105.784  
80.2951, 105.789  
79.0069, 105.804  
77.157, 105.845  
76.9574, 105.851  
76.7846, 105.86  
76.4278, 105.873  
75.5917, 105.837  
75.2157, 105.855  
74.9429, 105.861  
74.3704, 105.851  
73.7709, 105.855  
73.4484, 105.831  
73.1362, 105.811  
72.5911, 105.821  
72.0376, 105.758  
71.1687, 105.783  
70.8688, 105.79  
70.3447, 105.782  
70.0253, 105.767  
69.6142, 105.696  
68.8054, 105.67  
63.5696, 104.633  
60.2622, 104.633  
58.7911, 104.228  
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52.5574, 102.368  
52.258, 102.265  
50.9293, 101.808  
49.4159, 101.305  
48.901, 101.125  
47.4335, 100.633  
47.2945, 100.584  
47.1987, 100.551  
44.3108, 99.5314  
43.2075, 99.1477  
42.9253, 99.0516  
41.6961, 98.6328  
41.1608, 98.4203  
40.0413, 98.0077  
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36.4444, 96.8399  
35.8295, 96.6328  
35.677, 96.5723  
34.9384, 96.2761  
34.0972, 95.9561  
33.0195, 95.5291

	31.7387, 95.0596 30.6247, 94.6328 29.7631, 94.1182 29.0106, 93.7087 28.1346, 93.2018 27.8159, 93.0242 27.761, 92.9982 26.9696, 92.6328 25.5062, 91.8619 24.9882, 91.5652 23.3884, 90.6328 22.2825, 90.2271 20.9052, 89.7522 19.9936, 89.4261 18.5962, 88.9169 18.3649, 88.8326 17.8569, 88.6328 16.2197, 87.7869 14.532, 86.8429 14.3098, 86.7203 14.1595, 86.6328 12.7586, 86.0744 11.763, 85.7132 10.7948, 85.3332 8.86198, 84.6328 8.40391, 84.3964 5.1807, 82.6328 4.46831, 82.2737 3.74502, 81.9053 1.26902, 80.6328 1.06007, 80.5268 0, 80 0, 33.7565 0, 0 400, 0 400, 143.659 400, 186.359
Material Boundary	0, 33.7565 27.7251, 42.7726 50.8851, 49.9156 64.6181, 53.2001 88.1056, 58.7636 100.519, 61.3219 148.294, 74.0133 172.408, 81.5464 234.004, 97.3055 259.001, 106.985 281.185, 113.997 319.283, 125.343 359.736, 134.566 400, 143.659

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 57.6016 27.7251, 64.543 100.519, 84.3934 148.294, 97.0848 172.408, 104.618 234.004, 120.377 259.001, 130.057 281.185, 137.068 360.386, 158.72 400, 167.187	Assigned to:  AC  AC alt
Distributed Load	220.07, 123.15 218.947, 123.106 217.608, 123.059 217.553, 123.056 217.514, 123.055 217.469, 123.053 214.945, 122.959 214.764, 122.956 214.603, 122.951 214.294, 122.942 214.111, 122.936 213.379, 122.922 213.231, 122.914 212.94, 122.897 212.498, 122.881 212.457, 122.879 212.389, 122.872 212.291, 122.864 212.088, 122.844 211.817, 122.822 211.742, 122.815 211.742, 122.802 210.722, 122.709 210.663, 122.731 210.375, 122.717 209.864, 122.704 209.758, 122.709 209.588, 122.715 209.445, 122.733 209.304, 122.691 209.102, 122.774 208.305, 123.022 208.253, 123.047 208.187, 123.075 208.11, 123.109 208.004, 123.151 207.913, 123.192 207.772, 123.247 207.676, 123.279 201.171, 123.435 190.75, 123.175	Constant DistributionOrientation: Normal to boundaryMagnitude: 6 kN/m2Creates Excess Pore Pressure: No



5+275 sisma

Slide2 - An Interactive Slope Stability Program

Date Created: 06/09/2023, 16:11:56

Software Version: 9.027

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# Slide2 Analysis Information

## sisma

### Project Summary

---

File Name:	sisma.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.447s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	06/09/2023, 16:11:56

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	M1+R2 fronti scavo sisma	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1	
Variable Actions: Favourable	1	
Effective cohesion	1	
Coefficient of shearing resistance	1	
Undrained strength	1	
Weight density	1	
Shear strength (other models)	1	
Earth resistance	1.2	
Tensile and plate strength	1	
Shear strength	1	
Compressive strength	1	
Bond strength	1	
Seismic Coefficient	1	



## Analysis Options

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Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

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Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

# Random Numbers

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Pseudo-random Seed:

10116

Random Number Generation Method:

Park and Miller v.3

## Surface Options

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Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

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Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Materials

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**AC alt**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	None
Ru Value	0

# Support

---

## Support 1

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	2.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	70 kN/m
Material Dependent	No

## Global Minimums

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### Method: bishop simplified

---

FS	1.885950
Center:	30.814, 37.252
Radius:	12.087
Left Slip Surface Endpoint:	19.512, 32.965
Right Slip Surface Endpoint:	36.433, 26.550
Resisting Moment:	11219.9 kN-m
Driving Moment:	5949.23 kN-m
Passive Support Moment:	484.235 kN-m
Maximum Single Support Force:	53.2202 kN
Total Support Force:	68.2047 kN
Total Slice Area:	57.3372 m <sup>2</sup>
Surface Horizontal Width:	16.9205 m
Surface Average Height:	3.38862 m

### Method: janbu simplified

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FS	1.737240
Center:	30.272, 35.514
Radius:	10.607
Left Slip Surface Endpoint:	19.961, 33.023
Right Slip Surface Endpoint:	35.931, 26.543
Resisting Horizontal Force:	798.051 kN
Driving Horizontal Force:	459.377 kN
Passive Horizontal Support Force:	32.9583 kN
Maximum Single Support Force:	42.212 kN
Total Support Force:	46.6101 kN
Total Slice Area:	59.391 m <sup>2</sup>
Surface Horizontal Width:	15.9699 m
Surface Average Height:	3.71893 m



## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
31.7106, 27.4491	5.02843	3.1277	1.90072	3.1277	1.90072	53.2202
30.2106, 28.9491	5.02843	4.49327	0.535159	4.49327	0.535159	14.9845
28.7106, 30.4491	5.02843	Not Effective	Not Effective	Not Effective	Not Effective	0

### Method: janbu simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
31.7106, 27.4491	5.02843	3.52086	1.50757	3.52086	1.50757	42.212
30.2106, 28.9491	5.02843	4.87135	0.157078	4.87135	0.157078	4.39818
28.7106, 30.4491	5.02843	Not Effective	Not Effective	Not Effective	Not Effective	0

# Valid and Invalid Surfaces

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## Method: bishop simplified

---

Number of Valid Surfaces:	11445
Number of Invalid Surfaces:	2

### Error Codes

Error Code -112 reported for 2 surfaces

## Method: janbu simplified

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Number of Valid Surfaces:	11248
Number of Invalid Surfaces:	199

### Error Codes

Error Code -108 reported for 177 surfaces

Error Code -111 reported for 22 surfaces

## Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.88595

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.338411	2.93355	-67.1623	AC alt	20	30	6.45624	12.1761	-9.33343	0	-9.33343	5.99709	5.99709
2	0.338411	7.98338	-63.3094	AC alt	20	30	9.40241	17.7325	2.21519	0	2.21519	20.9174	20.9174
3	0.338411	12.4751	-59.9228	AC alt	20	30	12.2115	23.0302	13.2264	0	13.2264	34.3117	34.3117
4	0.338411	16.4773	-56.8551	AC alt	20	30	14.8552	28.0161	23.5893	0	23.5893	46.3381	46.3381
5	0.338411	20.0896	-54.0226	AC alt	20	30	17.349	32.7193	33.3646	0	33.3646	57.2632	57.2632
6	0.338411	23.3893	-51.3722	AC alt	20	30	19.7126	37.177	42.6299	0	42.6299	67.299	67.299
7	0.338411	26.4295	-48.8679	AC alt	20	30	21.9615	41.4182	51.445	0	51.445	76.5914	76.5914
8	0.338411	29.2483	-46.4836	AC alt	20	30	24.1076	45.4657	59.8577	0	59.8577	85.2472	85.2472
9	0.338411	31.8744	-44.1998	AC alt	20	30	26.1609	49.3381	67.9061	0	67.9061	93.3463	93.3463
10	0.338411	33.9417	-42.0016	AC alt	20	30	27.8895	52.5982	74.6823	0	74.6823	99.7955	99.7955
11	0.338411	34.5058	-39.877	AC alt	20	30	28.6853	54.099	77.8016	0	77.8016	101.767	101.767
12	0.338411	34.8158	-37.8165	AC alt	20	30	29.3033	55.2646	80.2242	0	80.2242	102.968	102.968
13	0.338411	34.9985	-35.812	AC alt	20	30	29.8224	56.2435	82.2588	0	82.2588	103.777	103.777
14	0.338411	35.0638	-33.857	AC alt	20	30	30.2486	57.0474	83.9297	0	83.9297	104.223	104.223
15	0.338411	35.0196	-31.9459	AC alt	20	30	30.5873	57.6862	85.2574	0	85.2574	104.33	104.33
16	0.338411	34.8729	-30.0737	AC alt	20	30	30.8429	58.1682	86.2592	0	86.2592	104.119	104.119
17	0.338411	34.6296	-28.2364	AC alt	20	30	31.0193	58.5008	86.9505	0	86.9505	103.608	103.608
18	0.338411	34.2947	-26.4303	AC alt	20	30	31.1195	58.6898	87.3433	0	87.3433	102.812	102.812
19	0.338411	34.1581	-24.652	AC alt	20	30	31.3436	59.1124	88.2217	0	88.2217	102.606	102.606
20	0.338411	35.0342	-22.8988	AC alt	20	30	32.2651	60.8504	91.8339	0	91.8339	105.462	105.462
21	0.338411	35.9382	-21.1679	AC alt	20	30	33.2122	62.6366	95.5465	0	95.5465	108.407	108.407
22	0.338411	36.765	-19.4571	AC alt	20	30	34.1115	64.3326	99.0715	0	99.0715	111.122	111.122
23	0.338411	37.5172	-17.7642	AC alt	20	30	38.8201	73.2127	117.529	0	117.529	129.966	129.966
24	0.338411	38.1969	-16.0872	AC alt	20	30	35.7705	67.4613	105.575	0	105.575	115.891	115.891
25	0.338411	38.2446	-14.4242	AC alt	20	30	36.1218	68.1239	106.952	0	106.952	116.243	116.243
26	0.338411	36.6462	-12.7736	AC alt	20	30	35.2596	66.4979	103.572	0	103.572	111.566	111.566
27	0.338411	34.8859	-11.1336	AC alt	20	30	34.2561	64.6053	99.6385	0	99.6385	106.38	106.38
28	0.338411	33.0594	-9.5029	AC alt	20	30	33.1806	62.577	95.4228	0	95.4228	100.977	100.977
29	0.338411	31.1677	-7.87992	AC alt	20	30	32.0334	60.4134	90.9259	0	90.9259	95.3594	95.3594
30	0.338411	29.2116	-6.26327	AC alt	20	30	45.3642	85.5547	143.181	0	143.181	148.16	148.16
31	0.338411	27.1918	-4.65163	AC alt	20	30	29.5231	55.679	81.0856	0	81.0856	83.4877	83.4877
32	0.338411	25.1089	-3.04366	AC alt	20	30	28.1591	53.1067	75.739	0	75.739	77.2363	77.2363
33	0.338411	22.9631	-1.4381	AC alt	20	30	26.7217	50.3957	70.1045	0	70.1045	70.7754	70.7754
34	0.338411	20.7547	0.166336	AC alt	20	30	25.2097	47.5442	64.1777	0	64.1777	64.1045	64.1045
35	0.338411	18.4838	1.7709	AC alt	20	30	23.6218	44.5496	57.9533	0	57.9533	57.223	57.223
36	0.338411	16.1502	3.37686	AC alt	20	30	21.9565	41.4088	51.4255	0	51.4255	50.1299	50.1299
37	0.338411	13.7537	4.98548	AC alt	20	30	20.2117	38.1183	44.5864	0	44.5864	42.8232	42.8232
38	0.338411	11.294	6.59806	AC alt	20	30	18.3853	34.6737	37.4269	0	37.4269	35.3003	35.3003
39	0.338411	8.77047	8.2159	AC alt	20	30	16.4745	31.07	29.9365	0	29.9365	27.5579	27.5579
40	0.338411	7.20625	9.84038	AC alt	20	30	15.3279	28.9076	25.4423	0	25.4423	22.7836	22.7836
41	0.338411	6.89399	11.4729	AC alt	20	30	15.2132	28.6913	24.9927	0	24.9927	21.905	21.905
42	0.338411	6.52034	13.1149	AC alt	20	30	15.0467	28.3774	24.3403	0	24.3403	20.8347	20.8347
43	0.338411	6.07896	14.768	AC alt	20	30	14.822	27.9535	23.4592	0	23.4592	19.5519	19.5519
44	0.338411	5.56838	16.4337	AC alt	20	30	14.5361	27.4144	22.3387	0	22.3387	18.0512	18.0512
45	0.338411	4.98648	18.1139	AC alt	20	30	14.1857	26.7536	20.9652	0	20.9652	16.3248	16.3248
46	0.338411	4.28214	19.8104	AC alt	20	30	13.7237	25.8822	19.154	0	19.154	14.2104	14.2104
47	0.338411	3.46867	21.5251	AC alt	20	30	13.1582	24.8157	16.9374	0	16.9374	11.7476	11.7476
48	0.338411	2.57747	23.2604	AC alt	20	30	12.5141	23.6009	14.4126	0	14.4126	9.03338	9.03338
49	0.338411	1.60555	25.0186	AC alt	20	30	11.7855	22.2269	11.5567	0	11.5567	6.05634	6.05634
50	0.338411	0.549507	26.8024	AC alt	20	30	10.9657	20.6807	8.34292	0	8.34292	2.80318	2.80318

**Global Minimum Query (janbu simplified) - Safety Factor: 1.73724**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.319398	3.49248	-73.3966	AC alt	20	30	6.03411	10.4827	-12.8532	0	-12.8532	7.38343	7.38343
2	0.319398	9.62276	-68.0662	AC alt	20	30	10.0336	17.4308	1.5882	0	1.5882	26.5051	26.5051
3	0.319398	14.4389	-63.8017	AC alt	20	30	13.5358	23.5149	14.2337	0	14.2337	41.7441	41.7441
4	0.319398	18.5158	-60.1157	AC alt	20	30	16.7094	29.0282	25.6929	0	25.6929	54.7699	54.7699
5	0.319398	22.0916	-56.8081	AC alt	20	30	19.6369	34.114	36.2637	0	36.2637	66.2813	66.2813
6	0.319398	25.2942	-53.7723	AC alt	20	30	22.3682	38.8589	46.1256	0	46.1256	76.6569	76.6569
7	0.319398	28.2022	-50.9433	AC alt	20	30	24.9365	43.3207	55.3992	0	55.3992	86.131	86.131
8	0.319398	30.868	-48.2777	AC alt	20	30	27.3657	47.5408	64.1705	0	64.1705	94.8611	94.8611
9	0.319398	33.1245	-45.7452	AC alt	20	30	29.5355	51.3102	72.0053	0	72.0053	102.319	102.319
10	0.319398	33.965	-43.323	AC alt	20	30	30.7374	53.3983	76.3452	0	76.3452	105.334	105.334
11	0.319398	34.4407	-40.9942	AC alt	20	30	31.6583	54.9981	79.6704	0	79.6704	107.185	107.185
12	0.319398	34.7765	-38.7451	AC alt	20	30	32.4522	56.3772	82.5366	0	82.5366	108.578	108.578
13	0.319398	34.9855	-36.5648	AC alt	20	30	33.1295	57.5539	84.9824	0	84.9824	109.555	109.555
14	0.319398	35.0786	-34.4446	AC alt	20	30	33.6989	58.5431	87.0386	0	87.0386	110.151	110.151
15	0.319398	35.0645	-32.377	AC alt	20	30	34.1675	59.3572	88.7306	0	88.7306	110.395	110.395
16	0.319398	34.9509	-30.3558	AC alt	20	30	34.5413	60.0065	90.0802	0	90.0802	110.31	110.31
17	0.319398	34.7438	-28.3755	AC alt	20	30	34.8251	60.4996	91.1048	0	91.1048	109.915	109.915
18	0.319398	34.4486	-26.4316	AC alt	20	30	35.0231	60.8436	91.82	0	91.82	109.23	109.23
19	0.319398	34.6463	-24.52	AC alt	20	30	35.5924	61.8326	93.8756	0	93.8756	110.111	110.111
20	0.319398	35.5117	-22.6371	AC alt	20	30	36.6876	63.7352	97.83	0	97.83	113.129	113.129
21	0.319398	36.3039	-20.7797	AC alt	20	30	37.7317	65.549	101.6	0	101.6	115.918	115.918
22	0.319398	37.0227	-18.9449	AC alt	20	30	40.1169	69.6927	110.212	0	110.212	123.983	123.983
23	0.319398	37.6707	-17.13	AC alt	20	30	39.6654	68.9083	108.582	0	108.582	120.808	120.808
24	0.319398	38.25	-15.3328	AC alt	20	30	40.5575	70.4581	111.803	0	111.803	122.924	122.924
25	0.319398	38.3156	-13.5509	AC alt	20	30	41.0263	71.2726	113.496	0	113.496	123.384	123.384
26	0.319398	36.8816	-11.7822	AC alt	20	30	40.2247	69.8799	110.602	0	110.602	118.992	118.992
27	0.319398	35.2756	-10.0249	AC alt	20	30	39.2518	68.1898	107.089	0	107.089	114.028	114.028
28	0.319398	33.6068	-8.27709	AC alt	20	30	38.1988	66.3605	103.287	0	103.287	108.844	108.844
29	0.319398	31.8762	-6.53699	AC alt	20	30	51.4149	89.3201	151.007	0	151.007	156.899	156.899
30	0.319398	30.0844	-4.80293	AC alt	20	30	35.8527	62.2847	94.8151	0	94.8151	97.8276	97.8276
31	0.319398	28.2321	-3.07328	AC alt	20	30	34.5587	60.0367	90.143	0	90.143	91.9985	91.9985
32	0.319398	26.3196	-1.34643	AC alt	20	30	33.1831	57.647	85.176	0	85.176	85.9559	85.9559
33	0.319398	24.3471	0.379196	AC alt	20	30	31.7247	55.1135	79.91	0	79.91	79.7001	79.7001
34	0.319398	22.3146	2.10517	AC alt	20	30	30.182	52.4334	74.3396	0	74.3396	73.2302	73.2302
35	0.319398	20.2221	3.83305	AC alt	20	30	28.553	49.6034	68.4577	0	68.4577	66.5447	66.5447
36	0.319398	18.0693	5.56444	AC alt	20	30	26.8353	46.6194	62.2553	0	62.2553	59.6409	59.6409
37	0.319398	15.8557	7.30095	AC alt	20	30	25.0262	43.4765	55.7233	0	55.7233	52.5169	52.5169
38	0.319398	13.5806	9.04423	AC alt	20	30	23.1223	40.169	48.8486	0	48.8486	45.1681	45.1681
39	0.319398	11.2433	10.796	AC alt	20	30	21.1196	36.6899	41.6176	0	41.6176	37.5903	37.5903
40	0.319398	8.84305	12.5581	AC alt	20	30	19.014	33.0318	34.0143	0	34.0143	29.7788	29.7788
41	0.319398	7.45598	14.3323	AC alt	20	30	17.8666	31.0385	29.8712	0	29.8712	25.3063	25.3063
42	0.319398	7.01513	16.1207	AC alt	20	30	17.6449	30.6534	29.0707	0	29.0707	23.9709	23.9709
43	0.319398	6.50666	17.9254	AC alt	20	30	17.355	30.1498	28.024	0	28.024	22.41	22.41
44	0.319398	5.92858	19.7487	AC alt	20	30	16.9929	29.5207	26.7165	0	26.7165	20.6159	20.6159
45	0.319398	5.27859	21.5931	AC alt	20	30	16.5538	28.758	25.1312	0	25.1312	18.5794	18.5794
46	0.319398	4.55399	23.4613	AC alt	20	30	16.0323	27.8519	23.2481	0	23.2481	16.2899	16.2899
47	0.319398	3.72564	25.3564	AC alt	20	30	15.3937	26.7425	20.9422	0	20.9422	13.647	13.647
48	0.319398	2.7683	27.2818	AC alt	20	30	14.605	25.3724	18.0945	0	18.0945	10.5622	10.5622
49	0.319398	1.72447	29.2411	AC alt	20	30	13.7059	23.8104	14.848	0	14.848	7.17511	7.17511
50	0.319398	0.590314	31.2388	AC alt	20	30	12.6853	22.0375	11.1629	0	11.1629	3.46868	3.46868

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.88595

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	19.5121	32.9653	0	0	0
2	19.8505	32.1617	-9.41739	0	0
3	20.1889	31.4886	-10.3809	0	0
4	20.5273	30.9043	-5.64863	0	0
5	20.8657	30.386	3.04962	0	0
6	21.2041	29.9199	14.5617	0	0
7	21.5425	29.4964	28.0744	0	0
8	21.8809	29.1089	42.9837	0	0
9	22.2193	28.7525	58.8226	0	0
10	22.5578	28.4234	75.2193	0	0
11	22.8962	28.1187	91.6296	0	0
12	23.2346	27.8359	107.061	0	0
13	23.573	27.5733	121.386	0	0
14	23.9114	27.3291	134.567	0	0
15	24.2498	27.1021	146.579	0	0
16	24.5882	26.8911	157.408	0	0
17	24.9266	26.6951	167.05	0	0
18	25.265	26.5134	175.508	0	0
19	25.6034	26.3452	182.793	0	0
20	25.9419	26.1898	188.998	0	0
21	26.2803	26.0469	194.397	0	0
22	26.6187	25.9159	198.951	0	0
23	26.9571	25.7963	202.6	0	0
24	27.2955	25.6879	200.005	0	0
25	27.6339	25.5903	201.682	0	0
26	27.9723	25.5033	202.25	0	0
27	28.3107	25.4265	201.602	0	0
28	28.6491	25.3599	199.823	0	0
29	28.9876	25.3033	197.011	0	0
30	29.326	25.2564	193.268	0	0
31	29.6644	25.2193	165.942	0	0
32	30.0028	25.1918	160.661	0	0
33	30.3412	25.1738	154.781	0	0
34	30.6796	25.1653	148.426	0	0
35	31.018	25.1663	141.722	0	0
36	31.3564	25.1767	134.806	0	0
37	31.6948	25.1967	127.82	0	0
38	32.0332	25.2262	120.918	0	0
39	32.3717	25.2654	114.26	0	0
40	32.7101	25.3142	108.022	0	0
41	33.0485	25.3729	101.998	0	0
42	33.3869	25.4416	95.7618	0	0
43	33.7253	25.5204	89.3454	0	0
44	34.0637	25.6097	82.7911	0	0
45	34.4021	25.7095	76.15	0	0
46	34.7405	25.8202	69.4835	0	0
47	35.0789	25.9421	62.8951	0	0
48	35.4174	26.0756	56.4983	0	0
49	35.7558	26.221	50.4024	0	0
50	36.0942	26.379	44.7359	0	0
51	36.4326	26.5499	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.73724**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	19.9615	33.0231	0	0	0
2	20.2809	31.9519	-15.3771	0	0
3	20.6003	31.1587	-16.4459	0	0
4	20.9197	30.5096	-10.2147	0	0
5	21.2391	29.9538	0.414438	0	0
6	21.5585	29.4655	13.8593	0	0
7	21.8779	29.0296	29.1268	0	0
8	22.1973	28.6359	45.5364	0	0
9	22.5167	28.2777	62.5925	0	0
10	22.8361	27.9499	79.7793	0	0
11	23.1554	27.6487	96.0516	0	0
12	23.4748	27.3711	111.192	0	0
13	23.7942	27.1148	125.147	0	0
14	24.1136	26.8779	137.883	0	0
15	24.433	26.6588	149.381	0	0
16	24.7524	26.4563	159.63	0	0
17	25.0718	26.2693	168.63	0	0
18	25.3912	26.0967	176.388	0	0
19	25.7106	25.938	182.917	0	0
20	26.03	25.7923	188.38	0	0
21	26.3494	25.6591	192.926	0	0
22	26.6688	25.5379	196.494	0	0
23	26.9882	25.4283	197.345	0	0
24	27.3076	25.3298	198.795	0	0
25	27.627	25.2422	199.115	0	0
26	27.9464	25.1653	198.237	0	0
27	28.2658	25.0986	196.116	0	0
28	28.5852	25.0422	192.838	0	0
29	28.9046	24.9957	188.497	0	0
30	29.224	24.9591	163.324	0	0
31	29.5434	24.9323	157.157	0	0
32	29.8628	24.9151	150.236	0	0
33	30.1822	24.9076	142.673	0	0
34	30.5016	24.9097	134.589	0	0
35	30.821	24.9215	126.108	0	0
36	31.1404	24.9429	117.365	0	0
37	31.4598	24.974	108.502	0	0
38	31.7792	25.0149	99.673	0	0
39	32.0986	25.0657	91.0413	0	0
40	32.418	25.1267	82.7853	0	0
41	32.7374	25.1978	75.0979	0	0
42	33.0568	25.2794	67.6331	0	0
43	33.3762	25.3717	59.9531	0	0
44	33.6956	25.475	52.1075	0	0
45	34.015	25.5897	44.1569	0	0
46	34.3344	25.7161	36.1739	0	0
47	34.6538	25.8547	28.2458	0	0
48	34.9732	26.0061	20.4991	0	0
49	35.2926	26.1708	13.1063	0	0
50	35.612	26.3496	6.23139	0	0
51	35.9314	26.5434	0	0	0

## Discharge Sections

---

### Entity Information

---

#### ◆ **Group 1**

##### Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 0
	61.4593, 0
	61.4593, 25.7004
	46.1619, 26.7199
	39.8533, 26.5946
	34.7066, 26.5274
	32.7323, 26.4274
	27.7323, 31.4274
	25.7323, 31.4274
	22.6771, 33.4652
	19.967, 33.0231
	19.8939, 33.0231
	19.688, 33.0231
	17.1776, 32.1987
	15.6802, 31.6109
	14.1827, 31.0231
	12.992, 30.3141
	12.0098, 29.75
	10.818, 29.0231
	9.83968, 28.5302
8.86138, 28.0373	
6.66276, 27.0231	
5.63886, 26.7138	
5.39343, 26.6817	
2.69671, 26.0853	
0, 25.4889	



5+275 statica

Slide2 - An Interactive Slope Stability Program

Date Created: 06/09/2023, 16:11:56

Software Version: 9.027



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# Slide2 Analysis Information

## statica

### Project Summary

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File Name:	statica.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.320s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	06/09/2023, 16:11:56

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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

---


**AC alt**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	None
Ru Value	0

# Support

---

## Support 1

Color	
Type	Soil Nail
Force Application	Passive (Method B)
Force Orientation	Parallel to Reinforcement
Out-Of-Plane Spacing	2.5 m
Tensile Capacity	1000 kN
Plate Capacity	1000 kN
Bond Strength	70 kN/m
Material Dependent	No

# Global Minimums

## Method: bishop simplified

	<b>FS</b>	<b>1.986630</b>
Center:		30.709, 35.530
Radius:		10.409
Left Slip Surface Endpoint:		20.582, 33.123
Right Slip Surface Endpoint:		35.963, 26.544
Resisting Moment:		7852.56 kN-m
Driving Moment:		3952.71 kN-m
Passive Support Moment:		362.117 kN-m
Maximum Single Support Force:		46.9182 kN
Total Support Force:		61.0538 kN
Total Slice Area:		52.3799 m <sup>2</sup>
Surface Horizontal Width:		15.3808 m
Surface Average Height:		3.40554 m

## Method: janbu simplified

	<b>FS</b>	<b>1.822580</b>
Center:		30.648, 35.533
Radius:		10.462
Left Slip Surface Endpoint:		20.472, 33.105
Right Slip Surface Endpoint:		36.000, 26.544
Resisting Horizontal Force:		653.488 kN
Driving Horizontal Force:		358.551 kN
Passive Horizontal Support Force:		40.4798 kN
Maximum Single Support Force:		45.0971 kN
Total Support Force:		57.2471 kN
Total Slice Area:		53.7553 m <sup>2</sup>
Surface Horizontal Width:		15.5279 m
Surface Average Height:		3.46186 m

## Global Minimum Support Data

### Method: bishop simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
31.7106, 27.4491	5.02843	3.18521	1.84321	3.18521	1.84321	46.9182
30.2106, 28.9491	5.02843	4.4731	0.555328	4.4731	0.555328	14.1356
28.7106, 30.4491	5.02843	Not Effective	Not Effective	Not Effective	Not Effective	0

### Method: janbu simplified

Number of Supports: 3						
Support 1						
Support Type: Soil Nail						
Start (x, y)	Length (m)	L Inside SS (m)	L Outside SS (m)	Li (m)	Lo (m)	Force (kN)
31.7106, 27.4491	5.02843	3.25675	1.77167	3.25675	1.77167	45.0971
30.2106, 28.9491	5.02843	4.55111	0.477322	4.55111	0.477322	12.15
28.7106, 30.4491	5.02843	Not Effective	Not Effective	Not Effective	Not Effective	0

# Valid and Invalid Surfaces

---

## Method: bishop simplified

---

Number of Valid Surfaces:	9250
Number of Invalid Surfaces:	7

### Error Codes

Error Code -112 reported for 7 surfaces

## Method: janbu simplified

---

Number of Valid Surfaces:	9211
Number of Invalid Surfaces:	46

### Error Codes

Error Code -108 reported for 34 surfaces

Error Code -111 reported for 12 surfaces

## Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.98663

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.307615	3.29081	-73.6273	AC alt	16	24.7913	5.35009	10.6286	-9.32828	0	-9.32828	8.8818	8.8818
2	0.307615	9.05402	-68.3293	AC alt	16	24.7913	8.54444	16.9747	5.78519	0	5.78519	27.2884	27.2884
3	0.307615	13.5768	-64.0977	AC alt	16	24.7913	11.2605	22.3704	18.6354	0	18.6354	41.823	41.823
4	0.307615	17.4046	-60.4428	AC alt	16	24.7913	13.6751	27.1673	30.0597	0	30.0597	54.174	54.174
5	0.307615	20.7622	-57.1647	AC alt	16	24.7913	15.8707	31.5293	40.448	0	40.448	65.0414	65.0414
6	0.307615	23.7701	-54.1572	AC alt	16	24.7913	17.8955	35.5517	50.0279	0	50.0279	74.8016	74.8016
7	0.307615	26.4749	-51.3555	AC alt	16	24.7913	19.7661	39.268	58.8784	0	58.8784	83.5996	83.5996
8	0.307615	27.9528	-48.7164	AC alt	16	24.7913	20.975	41.6695	64.5977	0	64.5977	88.4868	88.4868
9	0.307615	28.7352	-46.2097	AC alt	16	24.7913	21.7835	43.2758	68.4234	0	68.4234	91.1467	91.1467
10	0.307615	29.352	-43.8129	AC alt	16	24.7913	22.4768	44.653	71.7031	0	71.7031	93.2673	93.2673
11	0.307615	29.8229	-41.509	AC alt	16	24.7913	23.0675	45.8265	74.498	0	74.498	94.9128	94.9128
12	0.307615	30.1634	-39.2845	AC alt	16	24.7913	23.5657	46.8164	76.8555	0	76.8555	96.1332	96.1332
13	0.307615	30.3859	-37.1287	AC alt	16	24.7913	23.9797	47.6387	78.8136	0	78.8136	96.9682	96.9682
14	0.307615	30.5004	-35.0328	AC alt	16	24.7913	24.3158	48.3065	80.4043	0	80.4043	97.4512	97.4512
15	0.307615	30.5154	-32.9895	AC alt	16	24.7913	24.5797	48.8307	81.6528	0	81.6528	97.6086	97.6086
16	0.307615	30.4377	-30.9924	AC alt	16	24.7913	24.7758	49.2204	82.5808	0	82.5808	97.4632	97.4632
17	0.307615	30.314	-29.0364	AC alt	16	24.7913	24.9328	49.5323	83.3234	0	83.3234	97.1646	97.1646
18	0.307615	30.959	-27.1169	AC alt	16	24.7913	25.5518	50.7619	86.2517	0	86.2517	99.3367	99.3367
19	0.307615	31.8662	-25.2297	AC alt	16	24.7913	26.3325	52.3129	89.9455	0	89.9455	102.353	102.353
20	0.307615	32.6996	-23.3715	AC alt	16	24.7913	27.0701	53.7782	93.4354	0	93.4354	105.134	105.134
21	0.307615	33.4625	-21.539	AC alt	16	24.7913	27.766	55.1607	96.7281	0	96.7281	107.687	107.687
22	0.307615	34.1575	-19.7293	AC alt	16	24.7913	31.6118	62.801	114.924	0	114.924	126.261	126.261
23	0.307615	34.7871	-17.94	AC alt	16	24.7913	29.0382	57.6881	102.747	0	102.747	112.149	112.149
24	0.307615	34.8268	-16.1686	AC alt	16	24.7913	29.2777	58.1639	103.88	0	103.88	112.369	112.369
25	0.307615	33.5414	-14.4129	AC alt	16	24.7913	28.6558	56.9284	100.938	0	100.938	108.302	108.302
26	0.307615	32.1407	-12.671	AC alt	16	24.7913	27.9448	55.5159	97.5739	0	97.5739	103.857	103.857
27	0.307615	30.6812	-10.9409	AC alt	16	24.7913	27.1811	53.9987	93.9605	0	93.9605	99.2149	99.2149
28	0.307615	29.1641	-9.22089	AC alt	16	24.7913	26.3651	52.3777	90.1	0	90.1	94.3801	94.3801
29	0.307615	27.5903	-7.50921	AC alt	16	24.7913	36.6277	72.7657	138.655	0	138.655	143.483	143.483
30	0.307615	25.9604	-5.80426	AC alt	16	24.7913	24.5781	48.8275	81.645	0	81.645	84.1434	84.1434
31	0.307615	24.2752	-4.10444	AC alt	16	24.7913	23.6071	46.8986	77.0512	0	77.0512	78.7453	78.7453
32	0.307615	22.535	-2.40825	AC alt	16	24.7913	22.5844	44.8669	72.2124	0	72.2124	73.1623	73.1623
33	0.307615	20.7401	-0.714161	AC alt	16	24.7913	21.5096	42.7316	67.1273	0	67.1273	67.3954	67.3954
34	0.307615	18.8906	0.979299	AC alt	16	24.7913	20.3821	40.4917	61.7928	0	61.7928	61.4444	61.4444
35	0.307615	16.9865	2.67362	AC alt	16	24.7913	19.2013	38.1458	56.2057	0	56.2057	55.3091	55.3091
36	0.307615	15.0276	4.37028	AC alt	16	24.7913	17.9662	35.6921	50.362	0	50.362	48.9889	48.9889
37	0.307615	13.0138	6.07079	AC alt	16	24.7913	16.6755	33.1281	44.2556	0	44.2556	42.4821	42.4821
38	0.307615	10.9444	7.7767	AC alt	16	24.7913	15.328	30.4511	37.8802	0	37.8802	35.7869	35.7869
39	0.307615	8.81896	9.48958	AC alt	16	24.7913	13.922	27.6579	31.228	0	31.228	28.9009	28.9009
40	0.307615	6.88029	11.2111	AC alt	16	24.7913	12.631	25.0931	25.1197	0	25.1197	22.6162	22.6162
41	0.307615	6.33782	12.9429	AC alt	16	24.7913	12.3353	24.5056	23.7206	0	23.7206	20.8858	20.8858
42	0.307615	5.97743	14.6868	AC alt	16	24.7913	12.1701	24.1776	22.9394	0	22.9394	19.7496	19.7496
43	0.307615	5.55675	16.4448	AC alt	16	24.7913	11.9602	23.7606	21.9463	0	21.9463	18.416	18.416
44	0.307615	5.07422	18.2189	AC alt	16	24.7913	11.7035	23.2506	20.7317	0	20.7317	16.8795	16.8795
45	0.307615	4.52799	20.0112	AC alt	16	24.7913	11.3976	22.6429	19.2846	0	19.2846	15.1336	15.1336
46	0.307615	3.91573	21.8243	AC alt	16	24.7913	11.0398	21.9319	17.5912	0	17.5912	13.1702	13.1702
47	0.307615	3.19525	23.6606	AC alt	16	24.7913	10.5963	21.0508	15.4929	0	15.4929	10.8502	10.8502
48	0.307615	2.37458	25.5232	AC alt	16	24.7913	10.0709	20.0072	13.0074	0	13.0074	8.19885	8.19885
49	0.307615	1.4796	27.4151	AC alt	16	24.7913	9.4814	18.836	10.2182	0	10.2182	5.30037	5.30037
50	0.307615	0.50655	29.3401	AC alt	16	24.7913	8.8224	17.5268	7.10027	0	7.10027	2.14125	2.14125

**Global Minimum Query (janbu simplified) - Safety Factor: 1.82258**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.310558	3.3428	-73.5726	AC alt	16	24.7913	5.62626	10.2543	-10.2198	0	-10.2198	8.86295	8.86295
2	0.310558	9.19801	-68.2668	AC alt	16	24.7913	9.05162	16.4973	4.64834	0	4.64834	27.3557	27.3557
3	0.310558	13.7941	-64.0272	AC alt	16	24.7913	11.9824	21.8389	17.3698	0	17.3698	41.9671	41.9671
4	0.310558	17.6842	-60.3649	AC alt	16	24.7913	14.5986	26.6071	28.7255	0	28.7255	54.387	54.387
5	0.310558	21.0964	-57.0797	AC alt	16	24.7913	16.9848	30.9562	39.0831	0	39.0831	65.3173	65.3173
6	0.310558	24.153	-54.0655	AC alt	16	24.7913	19.1907	34.9766	48.6581	0	48.6581	75.1354	75.1354
7	0.310558	26.9292	-51.2572	AC alt	16	24.7913	21.2489	38.7278	57.5917	0	57.5917	84.0741	84.0741
8	0.310558	28.8449	-48.6118	AC alt	16	24.7913	22.8191	41.5897	64.4076	0	64.4076	90.3016	90.3016
9	0.310558	29.6427	-46.0988	AC alt	16	24.7913	23.7253	43.2413	68.341	0	68.341	92.9943	92.9943
10	0.310558	30.2639	-43.696	AC alt	16	24.7913	24.501	44.655	71.708	0	71.708	95.1183	95.1183
11	0.310558	30.7366	-41.3861	AC alt	16	24.7913	25.1647	45.8646	74.5885	0	74.5885	96.7633	96.7633
12	0.310558	31.0766	-39.1558	AC alt	16	24.7913	25.7272	46.8899	77.0305	0	77.0305	97.98	97.98
13	0.310558	31.2963	-36.9942	AC alt	16	24.7913	26.1974	47.7469	79.0715	0	79.0715	98.8085	98.8085
14	0.310558	31.4061	-34.8924	AC alt	16	24.7913	26.5824	48.4486	80.7424	0	80.7424	99.2814	99.2814
15	0.310558	31.4145	-32.8433	AC alt	16	24.7913	26.8881	49.0057	82.0694	0	82.0694	99.4263	99.4263
16	0.310558	31.3286	-30.8405	AC alt	16	24.7913	27.1194	49.4272	83.0731	0	83.0731	99.2655	99.2655
17	0.310558	31.1566	-28.8787	AC alt	16	24.7913	27.2819	49.7234	83.7787	0	83.7787	98.8259	98.8259
18	0.310558	31.5999	-26.9533	AC alt	16	24.7913	27.8368	50.7348	86.1871	0	86.1871	100.342	100.342
19	0.310558	32.5178	-25.0604	AC alt	16	24.7913	28.7035	52.3144	89.9493	0	89.9493	103.371	103.371
20	0.310558	33.3605	-23.1962	AC alt	16	24.7913	29.5236	53.8092	93.5095	0	93.5095	106.161	106.161
21	0.310558	34.1312	-21.3578	AC alt	16	24.7913	33.4795	61.019	110.68	0	110.68	123.772	123.772
22	0.310558	34.8326	-19.5422	AC alt	16	24.7913	31.0306	56.5557	100.05	0	100.05	111.064	111.064
23	0.310558	35.4674	-17.7468	AC alt	16	24.7913	31.7199	57.8121	103.042	0	103.042	113.194	113.194
24	0.310558	35.6752	-15.9692	AC alt	16	24.7913	32.1175	58.5368	104.768	0	104.768	113.959	113.959
25	0.310558	34.4371	-14.2073	AC alt	16	24.7913	31.5066	57.4233	102.116	0	102.116	110.093	110.093
26	0.310558	33.0022	-12.459	AC alt	16	24.7913	30.7422	56.0302	98.7985	0	98.7985	105.591	105.591
27	0.310558	31.5073	-10.7225	AC alt	16	24.7913	29.9187	54.5293	95.2242	0	95.2242	100.89	100.89
28	0.310558	29.9536	-8.99586	AC alt	16	24.7913	29.0368	52.9219	91.396	0	91.396	95.9928	95.9928
29	0.310558	28.3418	-7.27744	AC alt	16	24.7913	40.665	74.1153	141.87	0	141.87	147.063	147.063
30	0.310558	26.6728	-5.56558	AC alt	16	24.7913	27.0986	49.3894	82.9831	0	82.9831	85.6237	85.6237
31	0.310558	24.9472	-3.8587	AC alt	16	24.7913	26.0425	47.4645	78.3989	0	78.3989	80.1555	80.1555
32	0.310558	23.1653	-2.15524	AC alt	16	24.7913	24.9279	45.4331	73.561	0	73.561	74.4992	74.4992
33	0.310558	21.3275	-0.453687	AC alt	16	24.7913	23.7546	43.2946	68.4679	0	68.4679	68.656	68.656
34	0.310558	19.4337	1.24746	AC alt	16	24.7913	22.5216	41.0474	63.116	0	63.116	62.6256	62.6256
35	0.310558	17.4841	2.94972	AC alt	16	24.7913	21.2281	38.69	57.5018	0	57.5018	56.4079	56.4079
36	0.310558	15.4784	4.65458	AC alt	16	24.7913	19.873	36.2202	51.6199	0	51.6199	50.0019	50.0019
37	0.310558	13.4163	6.36359	AC alt	16	24.7913	18.4548	33.6353	45.4636	0	45.4636	43.4055	43.4055
38	0.310558	11.2972	8.07831	AC alt	16	24.7913	16.9717	30.9322	39.026	0	39.026	36.6172	36.6172
39	0.310558	9.12062	9.80035	AC alt	16	24.7913	15.4216	28.1071	32.2979	0	32.2979	29.634	29.634
40	0.310558	7.15334	11.5314	AC alt	16	24.7913	14.0115	25.5371	26.1773	0	26.1773	23.3186	23.3186
41	0.310558	6.6078	13.2732	AC alt	16	24.7913	13.7014	24.9719	24.8313	0	24.8313	21.5992	21.5992
42	0.310558	6.22878	15.0276	AC alt	16	24.7913	13.5211	24.6432	24.0483	0	24.0483	20.4184	20.4184
43	0.310558	5.78775	16.7965	AC alt	16	24.7913	13.2906	24.2232	23.0481	0	23.0481	19.0363	19.0363
44	0.310558	5.28303	18.5821	AC alt	16	24.7913	13.0077	23.7076	21.8201	0	21.8201	17.4471	17.4471
45	0.310558	4.71269	20.3866	AC alt	16	24.7913	12.6696	23.0913	20.3524	0	20.3524	15.644	15.644
46	0.310558	4.07355	22.2126	AC alt	16	24.7913	12.2722	22.367	18.6274	0	18.6274	13.6161	13.6161
47	0.310558	3.31896	24.0626	AC alt	16	24.7913	11.7749	21.4606	16.4688	0	16.4688	11.2109	11.2109
48	0.310558	2.4662	25.9398	AC alt	16	24.7913	11.1891	20.393	13.9261	0	13.9261	8.48341	8.48341
49	0.310558	1.53656	27.8474	AC alt	16	24.7913	10.5299	19.1915	11.0648	0	11.0648	5.50192	5.50192
50	0.310558	0.526029	29.7892	AC alt	16	24.7913	9.79083	17.8446	7.85696	0	7.85696	2.25214	2.25214



# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.98663

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	20.5819	33.1234	0	0	0
2	20.8896	32.0764	-11.4124	0	0
3	21.1972	31.3022	-9.56146	0	0
4	21.5048	30.6688	-1.21998	0	0
5	21.8124	30.1263	10.8801	0	0
6	22.12	29.6496	25.28	0	0
7	22.4276	29.2238	41.0808	0	0
8	22.7352	28.8391	57.6542	0	0
9	23.0429	28.4887	73.8356	0	0
10	23.3505	28.1678	89.0924	0	0
11	23.6581	27.8727	103.341	0	0
12	23.9657	27.6005	116.529	0	0
13	24.2733	27.3488	128.621	0	0
14	24.5809	27.1159	139.602	0	0
15	24.8886	26.9003	149.463	0	0
16	25.1962	26.7006	158.209	0	0
17	25.5038	26.5158	165.849	0	0
18	25.8114	26.345	172.41	0	0
19	26.119	26.1875	178.139	0	0
20	26.4266	26.0426	183.078	0	0
21	26.7342	25.9096	187.174	0	0
22	27.0419	25.7882	190.379	0	0
23	27.3495	25.6779	188.304	0	0
24	27.6571	25.5783	189.607	0	0
25	27.9647	25.4891	189.867	0	0
26	28.2723	25.41	189.034	0	0
27	28.5799	25.3409	187.189	0	0
28	28.8876	25.2814	184.417	0	0
29	29.1952	25.2315	180.808	0	0
30	29.5028	25.1909	158.466	0	0
31	29.8104	25.1597	153.46	0	0
32	30.118	25.1376	147.901	0	0
33	30.4256	25.1246	141.889	0	0
34	30.7332	25.1208	135.532	0	0
35	31.0409	25.1261	128.939	0	0
36	31.3485	25.1404	122.226	0	0
37	31.6561	25.1639	115.517	0	0
38	31.9637	25.1967	108.94	0	0
39	32.2713	25.2387	102.635	0	0
40	32.5789	25.2901	96.7478	0	0
41	32.8866	25.3511	91.3317	0	0
42	33.1942	25.4218	85.8612	0	0
43	33.5018	25.5024	80.2689	0	0
44	33.8094	25.5932	74.5979	0	0
45	34.117	25.6944	68.8995	0	0
46	34.4246	25.8065	63.2338	0	0
47	34.7322	25.9297	57.6716	0	0
48	35.0399	26.0644	52.3247	0	0
49	35.3475	26.2113	47.317	0	0
50	35.6551	26.3709	42.7707	0	0
51	35.9627	26.5438	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.82258**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	20.4717	33.1054	0	0	0
2	20.7822	32.0521	-12.5114	0	0
3	21.0928	31.273	-11.7001	0	0
4	21.4034	30.6355	-4.34666	0	0
5	21.7139	30.0896	6.80252	0	0
6	22.0245	29.6099	20.2769	0	0
7	22.335	29.1814	35.1679	0	0
8	22.6456	28.7944	50.8618	0	0
9	22.9561	28.442	66.4752	0	0
10	23.2667	28.1193	81.1635	0	0
11	23.5773	27.8226	94.8354	0	0
12	23.8878	27.5489	107.435	0	0
13	24.1984	27.296	118.928	0	0
14	24.5089	27.062	129.295	0	0
15	24.8195	26.8455	138.531	0	0
16	25.1301	26.645	146.636	0	0
17	25.4406	26.4596	153.621	0	0
18	25.7512	26.2883	159.501	0	0
19	26.0617	26.1303	164.47	0	0
20	26.3723	25.9851	168.621	0	0
21	26.6828	25.8521	171.899	0	0
22	26.9934	25.7306	170.233	0	0
23	27.304	25.6204	171.628	0	0
24	27.6145	25.521	172.022	0	0
25	27.9251	25.4321	171.362	0	0
26	28.2356	25.3535	169.61	0	0
27	28.5462	25.2849	166.845	0	0
28	28.8567	25.2261	163.157	0	0
29	29.1673	25.1769	158.636	0	0
30	29.4779	25.1372	134.141	0	0
31	29.7884	25.107	128.24	0	0
32	30.099	25.086	121.797	0	0
33	30.4095	25.0744	114.918	0	0
34	30.7201	25.0719	107.712	0	0
35	31.0306	25.0787	100.293	0	0
36	31.3412	25.0947	92.7827	0	0
37	31.6518	25.1199	85.3079	0	0
38	31.9623	25.1546	78.004	0	0
39	32.2729	25.1987	71.0149	0	0
40	32.5834	25.2523	64.4947	0	0
41	32.894	25.3157	58.4862	0	0
42	33.2045	25.3889	52.4135	0	0
43	33.5151	25.4723	46.2109	0	0
44	33.8257	25.566	39.9243	0	0
45	34.1362	25.6704	33.6079	0	0
46	34.4468	25.7859	27.3257	0	0
47	34.7573	25.9127	21.1536	0	0
48	35.0679	26.0513	15.2142	0	0
49	35.3784	26.2024	9.63683	0	0
50	35.689	26.3665	4.55247	0	0
51	35.9996	26.5443	0	0	0

## Discharge Sections

---

### Entity Information

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#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 0
	61.4593, 0
	61.4593, 25.7004
	46.1619, 26.7199
	39.8533, 26.5946
	34.7066, 26.5274
	32.7323, 26.4274
	27.7323, 31.4274
	25.7323, 31.4274
	22.6771, 33.4652
	19.967, 33.0231
	19.8939, 33.0231
	19.688, 33.0231
	17.1776, 32.1987
	15.6802, 31.6109
	14.1827, 31.0231
	12.992, 30.3141
	12.0098, 29.75
	10.818, 29.0231
	9.83968, 28.5302
8.86138, 28.0373	
6.66276, 27.0231	
5.63886, 26.7138	
5.39343, 26.6817	
2.69671, 26.0853	
0, 25.4889	



8+050 - sisma

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 8+050 - sisma

### Project Summary

---

File Name:	8+050 - sisma.slmd
Last saved with Slide2 version:	9.027
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	M1+R2 fronti scavo sisma	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1	
Variable Actions: Favourable	1	
Effective cohesion	1	
Coefficient of shearing resistance	1	
Undrained strength	1	
Weight density	1	
Shear strength (other models)	1	
Earth resistance	1.2	
Tensile and plate strength	1	
Shear strength	1	
Compressive strength	1	
Bond strength	1	
Seismic Coefficient	1	



## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	5
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.091
Seismic Load Coefficient (Vertical):	0.045

# Loading





---

1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	6
Orientation:	Normal to boundary
Load Action:	Live

## Materials

<b>AC</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>AC alt</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>LS</b>	
Color	
Strength Type	Undrained
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	50
Cohesion Type	Constant
Water Surface	Water Table
Hu Value	1
<b>R</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

# Entity Information

## ◆ Group 1

### Shared Entities

Type	Coordinates (x,y)
	75.8307, 41.3725
	75.492, 41.3654
	75, 41.3283
	73.8203, 41.1375
	73.2685, 40.9291
	72.5131, 40.2601
	72.2596, 40.1793
	72.1464, 40.131
	71.8271, 40.0469
	71.7236, 40.0078
	68.7677, 38
	68.4195, 37.8777
	68.3178, 37.7956
	68.1664, 37.7261
	63.3632, 36.0652
	60.4722, 35.9308
	60.3268, 35.8382
	60.2434, 35.7142
	59.8927, 35.6386
	59.7639, 35.6325
	59.1164, 35.6659
	54.1274, 37.0029
	50.5394, 38
	50.2829, 38.176
	47.7289, 40
	47.2434, 40.3928
	46.7973, 40.7383
	46.4927, 40.9476
	46.2528, 41.0868
	46.1763, 41.1231
	45.8698, 41.32
	44.7746, 42.0512
	32.4406, 42.5861
	31.757, 42.3387
	22.2389, 43.2511
	13.6721, 44
	10.1653, 44
	9.45321, 43.9359
	9.2804, 43.959
	8.9946, 43.9712
	8.63167, 43.864
	8.22634, 43.9982
	7.59379, 43.9916
	7.50894, 44.0087
	7.01952, 44.0358
	6.90772, 44.0531
	6.27405, 44.1057
	5.02345, 44.2192
	4.47653, 44.3019





External Boundary



EXTERNAL DOWNDRAW	
	3.96063, 44.3437
	3.49715, 44.3704
	2.96629, 44.4536
	2.19792, 44.521
	1.25195, 44.6798
	1.07831, 44.7025
	0.273425, 44.8434
	0, 44.882
	0, 39.0402
	0, 34.942
	0, 0
	184.033, 0
	184.033, 57.0138
	184.033, 58.7814
	184.033, 67.3978
	183.553, 67.3197
	182.412, 67.0572
	181.546, 66.897
	178.324, 66.0876
	177.982, 66
	168.946, 64
	166.783, 64
	162.684, 63.0179
	161.296, 62.6642
	160, 62.3876
	158.236, 62
	157.263, 62
	151.341, 60.5201
	147.146, 59.6041
	140.595, 58
	140.57, 58
	136.459, 56
	133.521, 56
	128.89, 54.9608
	128.146, 54.886
	127.335, 54.6957
	127.24, 54.6825
	125.015, 54
	124.3, 54
	124.056, 53.941
	118.215, 52.6661
	111.16, 47.9533
	109.157, 47.9496
	101.731, 42.9894
	98.2594, 43.1936
	89.7386, 43.6946
	87.3391, 43.5443
	75.8307, 43.9816
	75.8307, 41.3708

	2.19792, 44.521 7.62157, 43.1311 11.057, 42.3609 20.6808, 41.0948 32.8917, 39.6207 35.451, 39.2837 42.7849, 38.8162 47.5118, 37.8074 50.3677, 36.0605 55.4394, 34.8303 58.7039, 34.479 60.8212, 34.233 68.1579, 34.9957 71.4076, 36.2259 75.2237, 37.2592 76.7255, 38.2434 85.9134, 38.7628 91.8663, 40.0135 95.7433, 41.3708 98.2594, 43.1936
Material Boundary	
Material Boundary	68.1664, 37.7261 76.7255, 38.2434
Material Boundary	0, 34.942 18.1595, 33.4518 33.9424, 32.1729 41.0874, 31.6401 45.1398, 30.7875 49.1922, 29.0823 53.1379, 28.1232 56.977, 27.4837 61.136, 27.4837 68.6009, 28.4429 73.2931, 29.402 80.8647, 29.8283 87.5831, 30.4678 92.5952, 31.3204 97.3941, 32.3861 111.257, 40.6988 152.472, 51.1008 174.851, 56.0102 184.033, 57.0138
Material Boundary	31.757, 42.3387 32.1835, 42.0541 45.8698, 41.32
Material Boundary	75.8307, 41.3708 95.7433, 41.3708

### Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 39.0402 27.4391, 37.4188 40, 37.2582 50.3677, 36.0605 59.2604, 35.4166 64.1277, 35.4089 70, 35.693 90.4393, 37.2582 100.081, 39.3746 115.903, 44.3676 126.373, 46.2146 139.632, 50.3076 149.474, 52.0458 155.707, 53.5523 184.033, 58.7814	Assigned to:  AC  AC alt  LS  R
Distributed Load	99.9371, 43.0949 98.2594, 43.1936 89.7386, 43.6946 87.3391, 43.5443 77.0914, 43.9337	Constant DistributionOrientation: Normal to boundaryMagnitude: 6 kN/m2Creates Excess Pore Pressure: No



8+050

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 8+050

### Project Summary

---

File Name:	8+050.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:00.958s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Right to Left

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	



## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	5
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Loading





---

1 Distributed Load present

## Distributed Load 1

Distribution:	Constant
Magnitude [kPa]:	20
Orientation:	Normal to boundary
Load Action:	Live

## Materials

<b>AC</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>AC alt</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1
<b>LS</b>	
Color	
Strength Type	Undrained
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	50
Cohesion Type	Constant
Water Surface	Water Table
Hu Value	1
<b>R</b>	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

## Global Minimums

---

### Method: bishop simplified

---

FS	1.587750
Center:	104.102, 66.428
Radius:	23.561
Left Slip Surface Endpoint:	101.662, 42.994
Right Slip Surface Endpoint:	124.087, 53.949
Resisting Moment:	22955.1 kN-m
Driving Moment:	14457.6 kN-m
Total Slice Area:	78.1034 m <sup>2</sup>
Surface Horizontal Width:	22.4255 m
Surface Average Height:	3.4828 m

### Method: janbu simplified

---

FS	1.520600
Center:	108.288, 57.865
Radius:	16.898
Left Slip Surface Endpoint:	100.096, 43.086
Right Slip Surface Endpoint:	124.738, 54.000
Resisting Horizontal Force:	1264.52 kN
Driving Horizontal Force:	831.592 kN
Total Slice Area:	137.063 m <sup>2</sup>
Surface Horizontal Width:	24.6418 m
Surface Average Height:	5.56223 m



## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 3803

Number of Invalid Surfaces: 2

#### Error Codes

Error Code -112 reported for 2 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 3803

Number of Invalid Surfaces: 2

#### Error Codes

Error Code -108 reported for 2 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.58775

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.44851	1.08929	-5.39808	AC alt	16	24.7913	10.0803	16.005	3.47594	0	3.47594	2.52342	2.52342
2	0.44851	4.0084	-4.3034	AC alt	16	24.7913	11.7824	18.7074	9.91196	0	9.91196	9.02533	9.02533
3	0.44851	6.88616	-3.2103	AC alt	16	24.7913	13.4406	21.3403	16.1823	0	16.1823	15.4284	15.4284
4	0.44851	9.68887	-2.11837	AC alt	16	24.7913	15.0357	23.8729	22.2138	0	22.2138	21.6577	21.6577
5	0.44851	12.4167	-1.0272	AC alt	16	24.7913	16.5688	26.3071	28.0112	0	28.0112	27.7141	27.7141
6	0.44851	15.0699	0.063589	AC alt	16	24.7913	18.041	28.6446	33.5778	0	33.5778	33.5979	33.5979
7	0.44851	17.6484	1.1544	AC alt	16	24.7913	19.4532	30.8868	38.9179	0	38.9179	39.3099	39.3099
8	0.44851	20.1521	2.24564	AC alt	16	24.7913	20.8062	33.035	44.0341	0	44.0341	44.85	44.85
9	0.44851	22.5809	3.33768	AC alt	16	24.7913	22.1008	35.0906	48.9294	0	48.9294	50.2183	50.2183
10	0.44851	24.9347	4.43095	AC alt	16	24.7913	23.3376	37.0543	53.6062	0	53.6062	55.4146	55.4146
11	0.44851	27.2132	5.52583	AC alt	16	24.7913	24.5172	38.9272	58.0667	0	58.0667	60.4386	60.4386
12	0.44851	29.4159	6.62275	AC alt	16	24.7913	25.6401	40.71	62.3127	0	62.3127	65.2896	65.2896
13	0.44851	31.5424	7.7221	AC alt	16	24.7913	26.7066	42.4034	66.3454	0	66.3454	69.9668	69.9668
14	0.44851	33.5921	8.82433	AC alt	16	24.7913	27.717	44.0077	70.1662	0	70.1662	74.4691	74.4691
15	0.44851	35.5644	9.92986	AC alt	16	24.7913	28.6716	45.5233	73.776	0	73.776	78.7954	78.7954
16	0.44851	37.4586	11.0391	AC alt	16	24.7913	29.5705	46.9506	77.175	0	77.175	82.9439	82.9439
17	0.44851	39.1648	12.1526	AC alt	16	24.7913	30.3535	48.1937	80.1356	0	80.1356	86.672	86.672
18	0.44851	38.948	13.2708	AC alt	16	24.7913	30.0644	47.7348	79.0425	0	79.0425	86.1332	86.1332
19	0.44851	37.9893	14.3941	AC alt	16	24.7913	29.3692	46.631	76.4139	0	76.4139	83.9514	83.9514
20	0.44851	36.9484	15.5232	AC alt	16	24.7913	28.6345	45.4645	73.6358	0	73.6358	81.5893	81.5893
21	0.44851	35.824	16.6584	AC alt	16	24.7913	27.8602	44.2351	70.7077	0	70.7077	79.0442	79.0442
22	0.44851	35.501	17.8004	AC alt	16	24.7913	27.5242	43.7015	69.4369	0	69.4369	78.2741	78.2741
23	0.44851	36.7775	18.9498	AC alt	16	24.7913	28.0464	44.5307	71.4118	0	71.4118	81.0414	81.0414
24	0.44851	38.0063	20.1071	AC alt	16	24.7913	28.5336	45.3043	73.2542	0	73.2542	83.7001	83.7001
25	0.44851	39.1449	21.2731	AC alt	16	24.7913	28.9634	45.9866	74.8793	0	74.8793	86.156	86.156
26	0.44851	40.1912	22.4484	AC alt	16	24.7913	29.3351	46.5768	76.2848	0	76.2848	88.4049	88.4049
27	0.44851	41.1428	23.6338	AC alt	16	24.7913	29.648	47.0736	77.4681	0	77.4681	90.4418	90.4418
28	0.44851	41.9973	24.8299	AC alt	16	24.7913	29.9013	47.4758	78.4259	0	78.4259	92.2612	92.2612
29	0.44851	42.7518	26.0378	AC alt	16	24.7913	30.0941	47.7819	79.1548	0	79.1548	93.8573	93.8573
30	0.44851	43.4034	27.2582	AC alt	16	24.7913	30.2253	47.9902	79.6509	0	79.6509	95.2234	95.2234
31	0.44851	43.9485	28.4922	AC alt	16	24.7913	30.2937	48.0988	79.9095	0	79.9095	96.3523	96.3523
32	0.44851	44.3836	29.7408	AC alt	16	24.7913	30.298	48.1057	79.9259	0	79.9259	97.2362	97.2362
33	0.44851	44.7046	31.0052	AC alt	16	24.7913	30.2368	48.0084	79.6942	0	79.6942	97.866	97.866
34	0.44851	44.9068	32.2865	AC alt	16	24.7913	30.1083	47.8045	79.2085	0	79.2085	98.2323	98.2323
35	0.44851	44.9854	33.5863	AC alt	16	24.7913	29.9108	47.4909	78.4617	0	78.4617	98.3241	98.3241
36	0.44851	44.9347	34.9059	AC alt	16	24.7913	29.6422	47.0644	77.4461	0	77.4461	98.1294	98.1294
37	0.44851	44.7408	36.2471	AC alt	16	24.7913	29.2966	46.5156	76.139	0	76.139	97.6179	97.6179
38	0.44851	43.3732	37.6118	AC alt	16	24.7913	28.3783	45.0577	72.667	0	72.667	94.5305	94.5305
39	0.44851	41.13	39.002	AC alt	16	24.7913	27.0446	42.94	67.6234	0	67.6234	89.5252	89.5252
40	0.44851	38.7275	40.4201	AC alt	16	24.7913	25.6455	40.7186	62.3329	0	62.3329	84.1745	84.1745
41	0.44851	36.1554	41.8688	AC alt	16	24.7913	24.1786	38.3896	56.7863	0	56.7863	78.4568	78.4568
42	0.44851	33.4022	43.3511	AC alt	16	24.7913	22.6413	35.9488	50.9734	0	50.9734	72.3477	72.3477
43	0.44851	30.4544	44.8706	AC alt	16	24.7913	21.0307	33.3915	44.883	0	44.883	65.8189	65.8189
44	0.44851	27.2963	46.4314	AC alt	16	24.7913	19.3433	30.7124	38.5025	0	38.5025	58.8373	58.8373
45	0.44851	23.9094	48.0383	AC alt	16	24.7913	17.5757	27.9058	31.8184	0	31.8184	51.3644	51.3644
46	0.44851	20.272	49.6971	AC alt	16	24.7913	15.7238	24.9654	24.8156	0	24.8156	43.3545	43.3545
47	0.44851	16.3575	51.4146	AC alt	16	24.7913	13.7832	21.8842	17.4777	0	17.4777	34.7526	34.7526
48	0.44851	12.1339	53.1995	AC alt	16	24.7913	11.7492	18.6547	9.78645	0	9.78645	25.4916	25.4916
49	0.44851	7.56083	55.0622	AC alt	16	24.7913	9.61665	15.2688	1.72268	0	1.72268	15.4885	15.4885
50	0.44851	2.58769	57.0163	AC alt	16	24.7913	7.38038	11.7182	-6.73342	0	-6.73342	4.63844	4.63844

## Global Minimum Query (janbu simplified) - Safety Factor: 1.5206

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.470302	1.02443	-28.0948	AC alt	16	24.7913	12.1347	18.452	9.30365	0	9.30365	2.82575	2.82575
2	0.470302	2.98795	-26.3014	AC alt	16	24.7913	13.3196	20.2538	13.5947	0	13.5947	7.01132	7.01132
3	0.470302	4.78465	-24.5355	AC alt	16	24.7913	14.3669	21.8462	17.3872	0	17.3872	10.8291	10.8291
4	0.470302	6.85105	-22.7941	AC alt	16	24.7913	15.5764	23.6855	21.7675	0	21.7675	15.2216	15.2216
5	0.470302	11.1133	-21.0747	AC alt	16	24.7913	18.2238	27.7111	31.3549	0	31.3549	24.3322	24.3322
6	0.470302	15.5837	-19.3749	AC alt	16	24.7913	20.9536	31.8621	41.2407	0	41.2407	33.872	33.872
7	0.470302	19.911	-17.6928	AC alt	16	24.7913	23.5368	35.79	50.5954	0	50.5954	43.0872	43.0872
8	0.470302	24.0993	-16.0262	AC alt	16	24.7913	25.9822	39.5086	59.4514	0	59.4514	51.9883	51.9883
9	0.470302	28.1523	-14.3735	AC alt	16	24.7913	28.2977	43.0295	67.8367	0	67.8367	60.585	60.585
10	0.470302	32.0732	-12.7329	AC alt	16	24.7913	30.4899	46.3629	75.7755	0	75.7755	68.8859	68.8859
11	0.470302	35.8647	-11.1029	AC alt	16	24.7913	32.5644	49.5175	83.2884	0	83.2884	76.8978	76.8978
12	0.470302	39.529	-9.48192	AC alt	16	24.7913	34.5264	52.5009	90.3934	0	90.3934	84.6268	84.6268
13	0.497772	45.6893	-7.82167	AC alt	16	24.7913	36.1129	54.9133	97.2442	1.10558	96.1386	92.2835	91.1779
14	0.497772	49.5076	-6.12104	AC alt	16	24.7913	37.3505	56.7951	103.864	3.24372	100.62	99.8587	96.615
15	0.497772	53.1809	-4.42581	AC alt	16	24.7913	38.5274	58.5848	110.118	5.23543	104.883	107.136	101.901
16	0.497772	56.7106	-2.73446	AC alt	16	24.7913	39.645	60.2842	116.012	7.08193	108.93	114.118	107.036
17	0.497772	60.0975	-1.0455	AC alt	16	24.7913	40.7043	61.8949	121.55	8.78401	112.766	120.807	112.023
18	0.497772	63.3418	0.642561	AC alt	16	24.7913	41.7061	63.4183	126.736	10.3421	116.394	127.204	116.862
19	0.497772	66.4145	2.33118	AC alt	16	24.7913	42.6351	64.8309	131.514	11.7562	119.758	133.25	121.494
20	0.497772	67.3601	4.02182	AC alt	16	24.7913	42.43	64.5191	132.042	13.0261	119.016	135.025	121.999
21	0.497772	66.9573	5.71599	AC alt	16	24.7913	41.5393	63.1646	129.941	14.1509	115.79	134.099	119.948
22	0.497772	66.41	7.41518	AC alt	16	24.7913	40.6225	61.7705	127.599	15.1297	112.47	132.886	117.757
23	0.497772	65.7367	9.12097	AC alt	16	24.7913	39.6897	60.3522	125.053	15.9608	109.092	131.425	115.464
24	0.497772	66.8435	10.835	AC alt	16	24.7913	39.7408	60.4298	125.919	16.6425	109.277	133.525	116.883
25	0.497772	69.0704	12.5588	AC alt	16	24.7913	40.406	61.4414	128.858	17.1721	111.686	137.859	120.687
26	0.497772	71.1441	14.2944	AC alt	16	24.7913	41.013	62.3643	131.431	17.547	113.884	141.881	124.334
27	0.497772	73.0613	16.0434	AC alt	16	24.7913	41.5606	63.197	133.631	17.7638	115.867	145.582	127.818
28	0.497772	74.818	17.8079	AC alt	16	24.7913	42.0477	63.9377	135.449	17.8183	117.631	148.956	131.138
29	0.497772	76.4097	19.5901	AC alt	16	24.7913	42.4729	64.5843	136.877	17.706	119.171	151.992	134.286
30	0.497772	77.831	21.3923	AC alt	16	24.7913	42.8344	65.134	137.902	17.4215	120.48	154.681	137.26
31	0.497772	79.0758	23.217	AC alt	16	24.7913	43.1301	65.5836	138.509	16.9586	121.551	157.01	140.051
32	0.497772	80.137	25.067	AC alt	16	24.7913	43.3575	65.9294	138.685	16.3102	122.374	158.964	142.654
33	0.497772	81.0064	26.9454	AC alt	16	24.7913	43.5269	66.187	138.401	15.4127	122.988	160.526	145.114
34	0.497772	81.6747	28.8557	AC alt	16	24.7913	43.769	66.5551	137.552	13.6877	123.865	161.67	147.982
35	0.497772	82.1307	30.8018	AC alt	16	24.7913	43.9285	66.7977	136.19	11.7482	124.442	162.379	150.631
36	0.497772	82.3617	32.7882	AC alt	16	24.7913	44.0005	66.9071	134.284	9.58134	124.703	162.628	153.046
37	0.497772	82.3527	34.8201	AC alt	16	24.7913	43.9788	66.8741	131.796	7.17183	124.624	162.385	155.213
38	0.497772	81.1303	36.9035	AC alt	16	24.7913	43.4246	66.0315	127.119	4.50167	122.617	159.727	155.226
39	0.497772	78.4156	39.0456	AC alt	16	24.7913	42.2335	64.2203	119.853	1.54936	118.304	154.109	152.56
40	0.505302	76.5065	41.2721	AC alt	16	24.7913	40.5617	61.6781	112.25	0	112.25	147.849	147.849
41	0.505302	73.0381	43.595	AC alt	16	24.7913	38.3799	58.3605	104.348	0	104.348	140.891	140.891
42	0.505302	69.1756	46.0115	AC alt	16	24.7913	36.031	54.7888	95.8422	0	95.8422	133.168	133.168
43	0.505302	64.8658	48.539	AC alt	16	24.7913	33.4973	50.936	86.6666	0	86.6666	124.58	124.58
44	0.505302	60.0385	51.2003	AC alt	16	24.7913	30.7562	46.7679	76.7399	0	76.7399	114.993	114.993
45	0.505302	54.5993	54.0261	AC alt	16	24.7913	27.7786	42.2401	65.9566	0	65.9566	104.227	104.227
46	0.505302	48.414	57.0603	AC alt	16	24.7913	24.5254	37.2933	54.1754	0	54.1754	92.0283	92.0283
47	0.505302	41.2818	60.3689	AC alt	16	24.7913	20.9421	31.8445	41.1988	0	41.1988	78.0169	78.0169
48	0.505302	32.8739	64.0607	AC alt	16	24.7913	16.9477	25.7707	26.7336	0	26.7336	61.5752	61.5752
49	0.505302	22.581	68.3413	AC alt	16	24.7913	12.4121	18.8738	10.3081	0	10.3081	41.5638	41.5638
50	0.505302	8.51399	73.7205	AC alt	16	24.7913	6.9695	10.5978	-9.4017	0	-9.4017	14.4638	14.4638

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.58775

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	101.662	42.9935	0	0	0
2	102.11	42.9511	4.66623	0	0
3	102.559	42.9174	10.2827	0	0
4	103.007	42.8922	16.7151	0	0
5	103.456	42.8756	23.824	0	0
6	103.904	42.8676	31.4769	0	0
7	104.353	42.8681	39.5478	0	0
8	104.801	42.8771	47.9168	0	0
9	105.25	42.8947	56.4696	0	0
10	105.698	42.9209	65.0973	0	0
11	106.147	42.9556	73.6963	0	0
12	106.595	42.999	82.1677	0	0
13	107.044	43.0511	90.417	0	0
14	107.492	43.1119	98.3544	0	0
15	107.941	43.1815	105.894	0	0
16	108.389	43.2601	112.955	0	0
17	108.838	43.3476	119.458	0	0
18	109.286	43.4441	125.326	0	0
19	109.735	43.5499	130.442	0	0
20	110.183	43.665	134.812	0	0
21	110.632	43.7896	138.475	0	0
22	111.081	43.9238	141.476	0	0
23	111.529	44.0678	143.815	0	0
24	111.978	44.2218	145.391	0	0
25	112.426	44.386	146.155	0	0
26	112.875	44.5606	146.063	0	0
27	113.323	44.7459	145.078	0	0
28	113.772	44.9422	143.164	0	0
29	114.22	45.1497	140.294	0	0
30	114.669	45.3689	136.44	0	0
31	115.117	45.5999	131.584	0	0
32	115.566	45.8434	125.711	0	0
33	116.014	46.0996	118.813	0	0
34	116.463	46.3692	110.886	0	0
35	116.911	46.6526	101.937	0	0
36	117.36	46.9504	91.977	0	0
37	117.808	47.2633	81.0283	0	0
38	118.257	47.5922	69.1252	0	0
39	118.705	47.9377	56.7372	0	0
40	119.154	48.3009	44.2988	0	0
41	119.602	48.6829	31.9853	0	0
42	120.051	49.0849	19.9971	0	0
43	120.499	49.5083	8.56439	0	0
44	120.948	49.9548	-2.04746	0	0
45	121.396	50.4263	-11.5299	0	0
46	121.845	50.9251	-19.5216	0	0
47	122.293	51.4539	-25.5955	0	0
48	122.742	52.016	-29.2414	0	0
49	123.19	52.6156	-29.8416	0	0
50	123.639	53.2576	-26.6365	0	0
51	124.087	53.9487	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.5206**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	100.096	43.0856	0	0	0
2	100.566	42.8345	8.04254	0	0
3	101.037	42.6021	17.4666	0	0
4	101.507	42.3874	27.9558	0	0
5	101.977	42.1898	39.5833	0	0
6	102.447	42.0085	53.8363	0	0
7	102.918	41.8431	70.5111	0	0
8	103.388	41.6931	89.1708	0	0
9	103.858	41.558	109.421	0	0
10	104.329	41.4375	130.905	0	0
11	104.799	41.3312	153.296	0	0
12	105.269	41.2389	176.298	0	0
13	105.74	41.1604	199.636	0	0
14	106.237	41.092	224.26	0	0
15	106.735	41.0386	248.396	0	0
16	107.233	41.0001	271.816	0	0
17	107.731	40.9763	294.307	0	0
18	108.228	40.9672	315.672	0	0
19	108.726	40.9728	335.724	0	0
20	109.224	40.9931	354.281	0	0
21	109.722	41.0281	370.779	0	0
22	110.22	41.0779	384.981	0	0
23	110.717	41.1427	396.935	0	0
24	111.215	41.2226	406.697	0	0
25	111.713	41.3179	414.481	0	0
26	112.211	41.4288	420.305	0	0
27	112.708	41.5556	424.05	0	0
28	113.206	41.6987	425.609	0	0
29	113.704	41.8586	424.881	0	0
30	114.202	42.0358	421.774	0	0
31	114.699	42.2308	416.204	0	0
32	115.197	42.4443	408.098	0	0
33	115.695	42.6771	397.39	0	0
34	116.193	42.9301	384.036	0	0
35	116.691	43.2044	368.094	0	0
36	117.188	43.5012	349.545	0	0
37	117.686	43.8218	328.389	0	0
38	118.184	44.168	304.649	0	0
39	118.682	44.5418	278.748	0	0
40	119.179	44.9456	251.38	0	0
41	119.685	45.3891	222.094	0	0
42	120.19	45.8702	191.284	0	0
43	120.695	46.3936	159.32	0	0
44	121.201	46.9656	126.679	0	0
45	121.706	47.594	93.9903	0	0
46	122.211	48.2902	62.1103	0	0
47	122.717	49.0701	32.2516	0	0
48	123.222	49.9585	6.23355	0	0
49	123.727	50.9973	-12.9743	0	0
50	124.232	52.2697	-19.8191	0	0
51	124.738	54	0	0	0

## Discharge Sections

---

### Entity Information

---

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
	75.8307, 41.3725
	75.492, 41.3654
	75, 41.3283
	73.8203, 41.1375
	73.2685, 40.9291
	72.5131, 40.2601
	72.2596, 40.1793
	72.1464, 40.131
	71.8271, 40.0469
	71.7236, 40.0078
	68.7677, 38
	68.4195, 37.8777
	68.3178, 37.7956
	68.1664, 37.7261
	63.3632, 36.0652
	60.4722, 35.9308
	60.3268, 35.8382
	60.2434, 35.7142
	59.8927, 35.6386
	59.7639, 35.6325
	59.1164, 35.6659
	54.1274, 37.0029
	50.5394, 38
	50.2829, 38.176
	47.7289, 40
	47.2434, 40.3928
	46.7973, 40.7383
	46.4927, 40.9476
	46.2528, 41.0868
	46.1763, 41.1231
	45.8698, 41.32
	44.7746, 42.0512
	32.4406, 42.5861
	31.757, 42.3387
	22.2389, 43.2511
	13.6721, 44
	10.1653, 44
	9.45321, 43.9359
	9.2804, 43.959
	8.9946, 43.9712
	8.63167, 43.864
	8.22634, 43.9982
	7.59379, 43.9916
	7.50894, 44.0087


External Boundary

7.01952, 44.0358  
6.90772, 44.0531  
6.27405, 44.1057  
5.02345, 44.2192  
4.47653, 44.3019  
3.96063, 44.3437  
3.49715, 44.3704  
2.96629, 44.4536  
2.19792, 44.521  
1.25195, 44.6798  
1.07831, 44.7025  
0.273425, 44.8434  
0, 44.882  
0, 39.0402  
0, 34.942  
0, 0  
184.033, 0  
184.033, 57.0138  
184.033, 58.7814  
184.033, 67.3978  
183.553, 67.3197  
182.412, 67.0572  
181.546, 66.897  
178.324, 66.0876  
177.982, 66  
168.946, 64  
166.783, 64  
162.684, 63.0179  
161.296, 62.6642  
160, 62.3876  
158.236, 62  
157.263, 62  
151.341, 60.5201  
147.146, 59.6041  
140.595, 58  
140.57, 58  
136.459, 56  
133.521, 56  
128.89, 54.9608  
128.146, 54.886  
127.335, 54.6957  
127.24, 54.6825  
125.015, 54  
124.3, 54  
124.056, 53.941  
118.215, 52.6661  
111.16, 47.9533  
109.157, 47.9496  
101.731, 42.9894  
98.2594, 43.1936  
89.7386, 43.6946  
87.3391, 43.5443  
75.8307, 43.9816  
75.8307, 41.3708

	2.19792, 44.521 7.62157, 43.1311 11.057, 42.3609 20.6808, 41.0948 32.8917, 39.6207 35.451, 39.2837 42.7849, 38.8162 47.5118, 37.8074 50.3677, 36.0605 55.4394, 34.8303 58.7039, 34.479 60.8212, 34.233 68.1579, 34.9957 71.4076, 36.2259 75.2237, 37.2592 76.7255, 38.2434 85.9134, 38.7628 91.8663, 40.0135 95.7433, 41.3708 98.2594, 43.1936
Material Boundary	
Material Boundary	68.1664, 37.7261 76.7255, 38.2434
Material Boundary	0, 34.942 18.1595, 33.4518 33.9424, 32.1729 41.0874, 31.6401 45.1398, 30.7875 49.1922, 29.0823 53.1379, 28.1232 56.977, 27.4837 61.136, 27.4837 68.6009, 28.4429 73.2931, 29.402 80.8647, 29.8283 87.5831, 30.4678 92.5952, 31.3204 97.3941, 32.3861 111.257, 40.6988 152.472, 51.1008 174.851, 56.0102 184.033, 57.0138
Material Boundary	31.757, 42.3387 32.1835, 42.0541 45.8698, 41.32
Material Boundary	75.8307, 41.3708 95.7433, 41.3708

### Scenario-based Entities



Type	Coordinates (x,y)	Master Scenario
Water Table	0, 39.0402 27.4391, 37.4188 40, 37.2582 50.3677, 36.0605 59.2604, 35.4166 64.1277, 35.4089 70, 35.693 90.4393, 37.2582 100.081, 39.3746 115.903, 44.3676 126.373, 46.2146 139.632, 50.3076 149.474, 52.0458 155.707, 53.5523 184.033, 58.7814	Assigned to: 
Distributed Load	99.9371, 43.0949 98.2594, 43.1936 89.7386, 43.6946 87.3391, 43.5443 77.0914, 43.9337	Constant DistributionOrientation: Normal to boundaryMagnitude: 20 kN/m2Creates Excess Pore Pressure: No



SCAVI PROVVISORIALI (H=5m)  
Slide2 - An Interactive Slope Stability Program  
Date Created: 01/09/2023, 14:20:17  
Software Version: 9.027

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# Slide2 Analysis Information

## 5

### Project Summary

---

File Name:	5.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.347s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	01/09/2023, 14:20:17

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
<b>Analysis Methods Used</b>	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
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

---

**AC**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

**AC alt**

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m3]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## Global Minimums

---

### Method: bishop simplified

---

	<b>FS</b>	<b>1.526370</b>
Center:		28.153, 43.661
Radius:		21.023
Left Slip Surface Endpoint:		8.542, 36.087
Right Slip Surface Endpoint:		38.554, 25.391
Resisting Moment:		31820.1 kN-m
Driving Moment:		20846.9 kN-m
Total Slice Area:		160.68 m <sup>2</sup>
Surface Horizontal Width:		30.0124 m
Surface Average Height:		5.35378 m

### Method: janbu simplified

---

	<b>FS</b>	<b>1.410420</b>
Center:		27.210, 40.778
Radius:		19.249
Left Slip Surface Endpoint:		8.542, 36.087
Right Slip Surface Endpoint:		38.777, 25.391
Resisting Horizontal Force:		1431.69 kN
Driving Horizontal Force:		1015.09 kN
Total Slice Area:		191.999 m <sup>2</sup>
Surface Horizontal Width:		30.2352 m
Surface Average Height:		6.35018 m

## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 11363

Number of Invalid Surfaces: 7

#### Error Codes

Error Code -112 reported for 7 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 11257

Number of Invalid Surfaces: 113

#### Error Codes

Error Code -108 reported for 86 surfaces

Error Code -111 reported for 27 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi))/F < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.52637

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.581422	7.16524	-66.8674	AC alt	16	24.7913	7.56828	11.552	-7.12925	0	-7.12925	10.5864	10.5864
2	0.581422	20.277	-63.0988	AC alt	16	24.7913	11.9866	18.2961	8.93222	0	8.93222	32.558	32.558
3	0.581422	31.3305	-59.7734	AC alt	16	24.7913	16.0381	24.4801	23.6598	0	23.6598	51.1866	51.1866
4	0.581422	40.9156	-56.754	AC alt	16	24.7913	19.7755	30.1848	37.2461	0	37.2461	67.4133	67.4133
5	0.581422	49.3739	-53.9618	AC alt	16	24.7913	23.2409	35.4742	49.8431	0	49.8431	81.7866	81.7866
6	0.581422	56.9166	-51.3463	AC alt	16	24.7913	26.4641	40.394	61.56	0	61.56	94.6474	94.6474
7	0.61141	66.3901	-48.8124	AC alt	16	24.7913	28.7212	43.8392	72.544	2.77901	69.765	105.366	102.587
8	0.61141	71.8844	-46.3402	AC alt	16	24.7913	30.1222	45.9776	82.9106	8.05272	74.8579	114.476	106.423
9	0.61141	76.7301	-43.9754	AC alt	16	24.7913	31.3928	47.9171	92.2369	12.7601	79.4768	122.527	109.766
10	0.61141	81.038	-41.7016	AC alt	16	24.7913	32.5586	49.6965	100.688	16.973	83.7146	129.698	112.725
11	0.61141	84.9921	-39.5056	AC alt	16	24.7913	33.6715	51.3952	108.525	20.765	87.7602	136.287	115.522
12	0.61141	88.5028	-37.3772	AC alt	16	24.7913	34.6932	52.9546	115.65	24.1758	91.474	142.153	117.977
13	0.61141	91.5209	-35.3076	AC alt	16	24.7913	35.5986	54.3366	122.003	27.238	94.7653	147.216	119.978
14	0.61141	93.9652	-33.2898	AC alt	16	24.7913	36.3977	55.5563	127.443	29.7726	97.6701	151.342	121.57
15	0.61141	96.036	-31.3177	AC alt	16	24.7913	37.1211	56.6605	132.272	31.9727	100.3	154.858	122.885
16	0.61141	97.7532	-29.3862	AC alt	16	24.7913	37.7639	57.6417	136.529	33.8924	102.637	157.796	123.904
17	0.61141	98.9436	-27.4906	AC alt	16	24.7913	38.255	58.3913	139.97	35.5481	104.422	159.876	124.328
18	0.61141	99.877	-25.6272	AC alt	16	24.7913	38.6945	59.0622	142.973	36.9535	106.02	161.535	124.581
19	0.61141	100.841	-23.7925	AC alt	16	24.7913	39.1944	59.8251	145.957	38.1205	107.836	163.238	125.117
20	0.61141	101.123	-21.9834	AC alt	16	24.7913	39.4697	60.2453	147.897	39.0596	108.837	163.83	124.771
21	0.61141	100.656	-20.197	AC alt	16	24.7913	39.4756	60.2544	148.683	39.8237	108.859	163.204	123.381
22	0.61141	99.9348	-18.431	AC alt	16	24.7913	39.4143	60.1608	149.026	40.3905	108.636	162.162	121.771
23	0.61141	99.0149	-16.6829	AC alt	16	24.7913	39.3099	60.0014	149.009	40.7528	108.256	160.79	120.037
24	0.61141	97.8689	-14.9507	AC alt	16	24.7913	39.1499	59.7572	148.591	40.9165	107.675	159.045	118.129
25	0.61141	96.2918	-13.2324	AC alt	16	24.7913	38.8464	59.294	147.461	40.8894	106.572	156.595	115.706
26	0.61141	94.0019	-11.5261	AC alt	16	24.7913	38.2567	58.3939	145.179	40.7514	104.428	152.981	112.23
27	0.61141	91.4641	-9.83011	AC alt	16	24.7913	37.5929	57.3807	142.443	40.4279	102.015	148.957	108.529
28	0.61141	89.9623	-8.1428	AC alt	16	24.7913	37.4072	57.0972	141.262	39.9219	101.34	146.614	106.692
29	0.61141	90.8198	-6.46257	AC alt	16	24.7913	38.2882	58.4419	143.779	39.2367	104.542	148.116	108.879
30	0.61141	91.5379	-4.78792	AC alt	16	24.7913	39.1584	59.7702	146.114	38.4087	107.706	149.394	110.986
31	0.61141	91.0153	-3.11736	AC alt	16	24.7913	39.5398	60.3524	146.497	37.4044	109.092	148.65	111.246
32	0.61141	84.8193	-1.44945	AC alt	16	24.7913	37.4409	57.1486	137.687	36.2248	101.462	138.635	102.41
33	0.61141	77.6082	0.217231	AC alt	16	24.7913	34.8866	53.2498	127.078	34.9012	92.1772	126.946	92.0449
34	0.61141	70.185	1.8841	AC alt	16	24.7913	32.236	49.204	115.956	33.4147	82.5416	114.896	81.4811
35	0.61141	62.5492	3.55256	AC alt	16	24.7913	29.4866	45.0074	104.313	31.7662	72.5472	102.483	70.7166
36	0.61141	54.7002	5.22405	AC alt	16	24.7913	26.6068	40.6118	92.1369	30.0582	62.0787	89.7042	59.646
37	0.61141	46.6363	6.90001	AC alt	16	24.7913	23.6259	36.0618	79.416	28.1734	51.2426	76.557	48.3836
38	0.61141	38.3557	8.58193	AC alt	16	24.7913	20.5405	31.3524	66.137	26.1102	40.0268	63.0371	36.9269
39	0.61141	30.3094	10.2713	AC alt	16	24.7913	17.5625	26.8068	53.0676	23.8665	29.2011	49.885	26.0185
40	0.61141	27.3498	11.9698	AC alt	16	24.7913	16.8253	25.6817	48.6491	22.1275	26.5216	45.0821	22.9546
41	0.61141	25.69	13.6791	AC alt	16	24.7913	16.7289	25.5345	46.4885	20.3174	26.1711	42.4169	22.0995
42	0.61141	23.7989	15.4009	AC alt	16	24.7913	16.5831	25.312	43.9405	18.2993	25.6412	39.3724	21.0731
43	0.61141	21.671	17.137	AC alt	16	24.7913	16.2404	24.7888	40.943	16.5478	24.3952	35.9353	19.3875
44	0.61141	19.3	18.8896	AC alt	16	24.7913	15.8342	24.1689	37.5158	14.5969	22.9189	32.0978	17.5009
45	0.61141	16.6785	20.6607	AC alt	16	24.7913	15.3612	23.4469	33.6393	12.4399	21.1994	27.8468	15.4069
46	0.61141	13.7979	22.4527	AC alt	16	24.7913	14.817	22.6163	29.2909	10.0697	19.2212	23.1678	13.0981
47	0.61141	10.6485	24.2682	AC alt	16	24.7913	14.1967	21.6695	24.4445	7.47833	16.9662	18.0439	10.5656
48	0.61141	7.21888	26.1101	AC alt	16	24.7913	13.4943	20.5973	19.0693	4.6564	14.4129	12.4555	7.79913
49	0.61141	3.49607	27.9815	AC alt	16	24.7913	12.7028	19.3892	13.1288	1.59323	11.5356	6.37988	4.78665
50	0.233207	0.297438	29.2894	AC alt	16	24.7913	11.896	18.1577	8.6026	0	8.6026	1.92978	1.92978

### Global Minimum Query (janbu simplified) - Safety Factor: 1.41042

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.615651	11.3193	-72.7969	AC alt	16	24.7913	7.67198	10.8207	-8.87082	0	-8.87082	15.9086	15.9086
2	0.615651	30.8652	-67.3204	AC alt	16	24.7913	14.1499	19.9573	12.8886	0	12.8886	46.7489	46.7489
3	0.615651	45.706	-62.9296	AC alt	16	24.7913	19.756	27.8642	31.7195	0	31.7195	70.3753	70.3753
4	0.615651	57.8856	-59.1298	AC alt	16	24.7913	24.7474	34.9042	48.4857	0	48.4857	89.8844	89.8844
5	0.613256	67.9723	-55.723	AC alt	16	24.7913	28.4976	40.1936	64.846	3.76325	61.0828	106.658	102.895
6	0.613256	76.7995	-52.5994	AC alt	16	24.7913	31.0697	43.8213	80.5331	10.8108	69.7223	121.17	110.359
7	0.613256	83.6115	-49.6857	AC alt	16	24.7913	33.0779	46.6538	93.4582	16.9902	76.468	132.443	115.452
8	0.613256	89.3513	-46.938	AC alt	16	24.7913	34.8072	49.0928	104.731	22.454	82.2768	141.976	119.522
9	0.613256	94.351	-44.3253	AC alt	16	24.7913	36.3683	51.2946	114.779	27.2589	87.5205	150.301	123.042
10	0.613256	98.7954	-41.8245	AC alt	16	24.7913	37.807	53.3238	123.885	31.5318	92.3529	157.717	126.185
11	0.613256	102.797	-39.4181	AC alt	16	24.7913	39.1561	55.2265	132.223	35.3391	96.8841	164.407	129.068
12	0.613256	106.29	-37.0923	AC alt	16	24.7913	40.3832	56.9573	139.736	38.7289	101.007	170.269	131.54
13	0.613256	109.172	-34.836	AC alt	16	24.7913	41.452	58.4648	146.287	41.6912	104.596	175.136	133.445
14	0.613256	111.517	-32.64	AC alt	16	24.7913	42.4193	59.829	151.958	44.1127	107.845	179.128	135.015
15	0.613256	113.47	-30.4968	AC alt	16	24.7913	43.2902	61.0573	156.984	46.2124	110.771	182.48	136.268
16	0.613256	114.995	-28.3999	AC alt	16	24.7913	44.045	62.122	161.319	48.0119	113.307	185.134	137.122
17	0.613256	115.965	-26.3438	AC alt	16	24.7913	44.6265	62.9421	164.789	49.5293	115.26	186.887	137.358
18	0.613256	116.856	-24.3236	AC alt	16	24.7913	45.2287	63.7915	168.062	50.7798	117.282	188.506	137.726
19	0.613256	117.582	-22.3352	AC alt	16	24.7913	45.8151	64.6186	171.03	51.7768	119.253	189.853	138.076
20	0.613256	117.354	-20.3748	AC alt	16	24.7913	46.0418	64.9383	172.552	52.5386	120.014	189.652	137.113
21	0.613256	116.638	-18.439	AC alt	16	24.7913	46.0894	65.0054	173.293	53.1182	120.175	188.66	135.541
22	0.613256	115.666	-16.5248	AC alt	16	24.7913	46.0683	64.9756	173.575	53.473	120.102	187.243	133.77
23	0.613256	114.477	-14.6294	AC alt	16	24.7913	45.9945	64.8715	173.465	53.6101	119.855	185.471	131.861
24	0.613256	113.027	-12.7503	AC alt	16	24.7913	45.847	64.6635	172.896	53.5355	119.36	183.27	129.735
25	0.613256	110.893	-10.8851	AC alt	16	24.7913	45.4217	64.0637	171.219	53.288	117.931	179.954	126.666
26	0.613256	108.245	-9.03142	AC alt	16	24.7913	44.7852	63.1659	168.678	52.8854	115.792	175.796	122.911
27	0.613256	105.427	-7.18727	AC alt	16	24.7913	44.106	62.208	165.795	52.2837	113.511	171.357	119.073
28	0.613256	104.95	-5.35059	AC alt	16	24.7913	44.5666	62.8576	166.544	51.4857	115.058	170.718	119.232
29	0.613256	105.519	-3.51941	AC alt	16	24.7913	45.5826	64.2906	168.979	50.5082	118.471	171.782	121.274
30	0.613256	105.853	-1.69182	AC alt	16	24.7913	46.5546	65.6615	171.095	49.3589	121.737	172.471	123.112
31	0.613256	102.772	0.134038	AC alt	16	24.7913	45.9436	64.7998	167.701	48.0176	119.684	167.594	119.576
32	0.613256	95.3211	1.96004	AC alt	16	24.7913	43.2309	60.9737	157.062	46.4901	110.572	155.582	109.092
33	0.613256	87.6193	3.78803	AC alt	16	24.7913	40.3841	56.9585	145.817	44.8073	101.009	143.143	98.3356
34	0.613256	79.6821	5.6199	AC alt	16	24.7913	37.4196	52.7773	133.983	42.9314	91.0518	130.301	87.3697
35	0.613256	71.5077	7.45755	AC alt	16	24.7913	34.313	48.3957	121.544	40.9273	80.6167	117.052	76.1252
36	0.613256	63.0934	9.30297	AC alt	16	24.7913	31.06	43.8077	108.479	38.7894	69.6899	103.391	64.602
37	0.613256	54.4359	11.1582	AC alt	16	24.7913	27.6745	39.0327	94.77	36.4519	58.3181	89.3112	52.8593
38	0.613256	45.5308	13.0253	AC alt	16	24.7913	24.1498	34.0613	80.3896	33.9112	46.4784	74.8029	40.8917
39	0.613256	38.5932	14.9067	AC alt	16	24.7913	21.5852	30.4442	69.2521	31.3883	37.8638	63.5061	32.1178
40	0.613256	36.3292	16.8047	AC alt	16	24.7913	21.3573	30.1227	66.3348	29.2367	37.0981	59.8848	30.6481
41	0.613256	33.9791	18.7218	AC alt	16	24.7913	21.1621	29.8475	63.2967	26.854	36.4427	56.1247	29.2707
42	0.613256	31.3537	20.661	AC alt	16	24.7913	20.8308	29.3802	59.7671	24.4372	35.3299	51.912	27.4748
43	0.613256	28.4427	22.6254	AC alt	16	24.7913	20.3311	28.6754	55.7007	22.0492	33.6515	47.2271	25.1779
44	0.613256	25.2343	24.6182	AC alt	16	24.7913	19.7451	27.8489	51.1001	19.4172	31.6829	42.0525	22.6353
45	0.613256	21.7144	26.6434	AC alt	16	24.7913	19.0655	26.8904	45.9301	16.5298	29.4003	36.3647	19.8349
46	0.613256	17.8668	28.7052	AC alt	16	24.7913	18.2837	25.7877	40.1474	13.3734	26.774	30.1352	16.7618
47	0.613256	13.6722	30.8085	AC alt	16	24.7913	17.3888	24.5255	33.7006	9.93247	23.7681	23.3313	13.3988
48	0.613256	9.10812	32.959	AC alt	16	24.7913	16.3674	23.0849	26.5255	6.18835	20.3372	15.913	9.72469
49	0.613256	4.14746	35.1633	AC alt	16	24.7913	15.2026	21.442	18.5434	2.11893	16.4245	7.83375	5.71482
50	0.176099	0.224601	36.6063	AC alt	16	24.7913	14.1298	19.9289	12.8209	0	12.8209	2.32483	2.32483



# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.52637

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	8.5416	36.0874	0	0	0
2	9.12302	34.7264	-14.0954	0	0
3	9.70444	33.5804	-10.8162	0	0
4	10.2859	32.5825	3.48584	0	0
5	10.8673	31.6956	25.0435	0	0
6	11.4487	30.8964	51.386	0	0
7	12.0301	30.1695	80.7766	0	0
8	12.6415	29.4708	113.935	0	0
9	13.253	28.8301	148.671	0	0
10	13.8644	28.2401	183.924	0	0
11	14.4758	27.6954	218.904	0	0
12	15.0872	27.1913	253.062	0	0
13	15.6986	26.7242	285.904	0	0
14	16.31	26.2912	317.008	0	0
15	16.9214	25.8897	345.957	0	0
16	17.5328	25.5177	372.506	0	0
17	18.1442	25.1734	396.467	0	0
18	18.7556	24.8552	417.651	0	0
19	19.3671	24.5619	435.967	0	0
20	19.9785	24.2924	451.391	0	0
21	20.5899	24.0455	463.805	0	0
22	21.2013	23.8206	473.154	0	0
23	21.8127	23.6169	479.463	0	0
24	22.4241	23.4336	482.774	0	0
25	23.0355	23.2704	483.139	0	0
26	23.6469	23.1266	480.63	0	0
27	24.2583	23.0019	475.382	0	0
28	24.8697	22.896	467.528	0	0
29	25.4812	22.8085	457.055	0	0
30	26.0926	22.7392	443.644	0	0
31	26.704	22.688	427.227	0	0
32	27.3154	22.6547	407.973	0	0
33	27.9268	22.6393	387.252	0	0
34	28.5382	22.6416	365.665	0	0
35	29.1496	22.6617	343.658	0	0
36	29.761	22.6996	321.701	0	0
37	30.3724	22.7555	300.312	0	0
38	30.9839	22.8295	280.016	0	0
39	31.5953	22.9218	261.377	0	0
40	32.2067	23.0326	244.779	0	0
41	32.8181	23.1622	228.203	0	0
42	33.4295	23.311	211.075	0	0
43	34.0409	23.4795	193.554	0	0
44	34.6523	23.668	175.923	0	0
45	35.2637	23.8772	158.41	0	0
46	35.8751	24.1077	141.279	0	0
47	36.4865	24.3604	124.835	0	0
48	37.098	24.6361	109.432	0	0
49	37.7094	24.9357	95.4813	0	0
50	38.3208	25.2606	83.4635	0	0
51	38.554	25.3914	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.41042**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	8.5416	36.0874	0	0	0
2	9.15725	34.0989	-22.3625	0	0
3	9.7729	32.6257	-12.0858	0	0
4	10.3886	31.4211	13.9617	0	0
5	11.0042	30.3912	48.6612	0	0
6	11.6175	29.4914	89.532	0	0
7	12.2307	28.6893	135.073	0	0
8	12.844	27.9666	182.336	0	0
9	13.4572	27.3104	229.716	0	0
10	14.0705	26.7114	276.164	0	0
11	14.6837	26.1626	320.966	0	0
12	15.297	25.6585	363.602	0	0
13	15.9102	25.1949	403.629	0	0
14	16.5235	24.7681	440.643	0	0
15	17.1368	24.3753	474.319	0	0
16	17.75	24.0141	504.472	0	0
17	18.3633	23.6825	530.953	0	0
18	18.9765	23.3788	553.628	0	0
19	19.5898	23.1016	572.479	0	0
20	20.203	22.8497	587.474	0	0
21	20.8163	22.6219	598.54	0	0
22	21.4295	22.4174	605.708	0	0
23	22.0428	22.2355	609.038	0	0
24	22.6561	22.0754	608.6	0	0
25	23.2693	21.9366	604.477	0	0
26	23.8826	21.8187	596.814	0	0
27	24.4958	21.7212	585.792	0	0
28	25.1091	21.6439	571.566	0	0
29	25.7223	21.5865	553.801	0	0
30	26.3356	21.5488	532.221	0	0
31	26.9488	21.5306	506.771	0	0
32	27.5621	21.5321	478.356	0	0
33	28.1754	21.5531	448.548	0	0
34	28.7886	21.5937	417.862	0	0
35	29.4019	21.654	386.83	0	0
36	30.0151	21.7343	356.031	0	0
37	30.6284	21.8347	326.086	0	0
38	31.2416	21.9557	297.651	0	0
39	31.8549	22.0976	271.437	0	0
40	32.4681	22.2608	246.894	0	0
41	33.0814	22.446	221.511	0	0
42	33.6947	22.6539	195.378	0	0
43	34.3079	22.8851	168.782	0	0
44	34.9212	23.1407	142.078	0	0
45	35.5344	23.4217	115.61	0	0
46	36.1477	23.7294	89.7864	0	0
47	36.7609	24.0652	65.0917	0	0
48	37.3742	24.4309	42.104	0	0
49	37.9874	24.8285	21.5194	0	0
50	38.6007	25.2606	4.18542	0	0
51	38.7768	25.3914	0	0	0

## Discharge Sections



### Entity Information

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
External Boundary	31.9909, 25.3914
	26.9909, 30.3914
	24.9909, 30.3914
	23.19, 31.358
	21.608, 32.055
	19.999, 32.779
	18.927, 33.128
	17.961, 33.503
	15.866, 34.233
	14.129, 34.776
	11.96, 35.517
	7.669, 36.233
	3.349, 37.007
	0, 37.424
	0, 10
0, 0	
76.9909, 0	
76.9909, 10	
76.9909, 25.3914	
Material Boundary	0, 10
	76.9909, 10

##### Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario
Water Table	1.06581e-14, 31.7896	Assigned to:  AC  AC alt
	2.60647, 31.6416	
	4.98412, 31.4288	
	7.37359, 31.1096	
	10.5793, 30.483	
	13.2053, 29.9155	
	16.0937, 29.2641	
	20.4315, 28.1114	
	23.3209, 27.3715	
	25.7758, 26.7762	
	27.7872, 26.3004	
	29.3939, 25.9316	
	31.9909, 25.3914	
	33.0262, 25.3152	
	33.7361, 25.2606	
	76.9909, 25.2606	



SCAVI PROVVISORIALI (H=5+5m)  
Slide2 - An Interactive Slope Stability Program  
Date Created: 01/09/2023, 14:20:17  
Software Version: 9.027

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# Slide2 Analysis Information

## 5+5

### Project Summary

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File Name:	5+5.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.253s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	01/09/2023, 14:20:17

## General Settings

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Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	



## Analysis Options

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Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

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Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	9.81
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [kPa]:	0
Advanced Groundwater Method:	None

# Random Numbers

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Pseudo-random Seed:

10116

Random Number Generation Method:

Park and Miller v.3

## Surface Options

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Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading


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Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Materials

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## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	20
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

# Global Minimums

## Method: bishop simplified

	<b>FS</b>	<b>1.265830</b>
Center:		30.276, 47.079
Radius:		21.780
Left Slip Surface Endpoint:		10.351, 38.285
Right Slip Surface Endpoint:		32.274, 25.391
Resisting Moment:		23613.3 kN-m
Driving Moment:		18654.4 kN-m
Total Slice Area:		98.8975 m <sup>2</sup>
Surface Horizontal Width:		21.9229 m
Surface Average Height:		4.51116 m

## Method: janbu simplified

	<b>FS</b>	<b>1.190220</b>
Center:		28.497, 42.802
Radius:		19.587
Left Slip Surface Endpoint:		9.414, 38.386
Right Slip Surface Endpoint:		37.471, 25.391
Resisting Horizontal Force:		1285.67 kN
Driving Horizontal Force:		1080.2 kN
Total Slice Area:		162.118 m <sup>2</sup>
Surface Horizontal Width:		28.0567 m
Surface Average Height:		5.77822 m

## Global Minimum Support Data

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No Supports Present

## Valid and Invalid Surfaces

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### Method: bishop simplified

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Number of Valid Surfaces: 10704

Number of Invalid Surfaces: 6

#### Error Codes

Error Code -112 reported for 6 surfaces

### Method: janbu simplified

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Number of Valid Surfaces: 10577

Number of Invalid Surfaces: 133

#### Error Codes

Error Code -108 reported for 95 surfaces

Error Code -111 reported for 37 surfaces

Error Code -112 reported for 1 surface

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.



# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.26583

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.448169	3.94886	-64.7996	AC alt	16	24.7913	8.12383	10.2834	-10.1505	0	-10.1505	7.11318	7.11318
2	0.448169	11.3919	-62.1528	AC alt	16	24.7913	11.791	14.9253	0.904638	0	0.904638	23.2236	23.2236
3	0.448169	18.0308	-59.7215	AC alt	16	24.7913	15.2931	19.3585	11.4624	0	11.4624	37.6559	37.6559
4	0.448169	24.0411	-57.4563	AC alt	16	24.7913	18.6417	23.5973	21.5574	0	21.5574	50.7698	50.7698
5	0.448169	28.9595	-55.3242	AC alt	16	24.7913	21.567	27.3002	30.3763	0	30.3763	61.5511	61.5511
6	0.448169	32.0971	-53.3015	AC alt	16	24.7913	23.6747	29.9682	36.7303	0	36.7303	68.4941	68.4941
7	0.448169	34.7984	-51.3707	AC alt	16	24.7913	25.5831	32.3839	42.4833	0	42.4833	74.4971	74.4971
8	0.448169	37.7488	-49.5182	AC alt	16	24.7913	27.6345	34.9806	48.6677	0	48.6677	81.0445	81.0445
9	0.448169	41.2352	-47.7337	AC alt	16	24.7913	29.9892	37.9612	55.7661	0	55.7661	88.7627	88.7627
10	0.448169	44.4622	-46.0084	AC alt	16	24.7913	32.2344	40.8033	62.5349	0	62.5349	95.9244	95.9244
11	0.448169	47.2999	-44.3354	AC alt	16	24.7913	34.2924	43.4084	68.7389	0	68.7389	102.245	102.245
12	0.448169	48.7547	-42.7089	AC alt	16	24.7913	35.6031	45.0675	72.6901	0	72.6901	105.554	105.554
13	0.448169	49.7577	-41.124	AC alt	16	24.7913	36.658	46.4028	75.8705	0	75.8705	107.876	107.876
14	0.448169	50.8052	-39.5766	AC alt	16	24.7913	37.7314	47.7615	79.1061	0	79.1061	110.294	110.294
15	0.448169	52.1822	-38.063	AC alt	16	24.7913	38.9898	49.3544	82.8999	0	82.8999	113.431	113.431
16	0.448169	53.4111	-36.5801	AC alt	16	24.7913	40.1635	50.8401	86.4382	0	86.4382	116.245	116.245
17	0.448169	54.4841	-35.1252	AC alt	16	24.7913	41.2459	52.2103	89.7014	0	89.7014	118.717	118.717
18	0.448169	56.2073	-33.6959	AC alt	16	24.7913	42.7152	54.0702	94.1309	0	94.1309	122.614	122.614
19	0.448169	58.7487	-32.29	AC alt	16	24.7913	44.6855	56.5643	100.071	0	100.071	128.309	128.309
20	0.442662	60.3932	-30.9139	AC alt	16	24.7913	46.3868	58.7178	105.923	0.723124	105.199	133.7	132.977
21	0.442662	62.6211	-29.5658	AC alt	16	24.7913	47.833	60.5485	111.661	2.10114	109.559	138.796	136.695
22	0.442662	64.3287	-28.2355	AC alt	16	24.7913	48.9999	62.0255	116.422	3.34493	113.077	142.734	139.389
23	0.442662	63.0634	-26.9215	AC alt	16	24.7913	48.3275	61.1744	115.509	4.45954	111.05	140.05	135.591
24	0.442662	61.1288	-25.6227	AC alt	16	24.7913	47.2251	59.7789	113.216	5.48997	107.726	135.866	130.376
25	0.442662	59.0882	-24.3379	AC alt	16	24.7913	46.0559	58.2989	110.603	6.40145	104.202	131.435	125.033
26	0.442662	56.9449	-23.0659	AC alt	16	24.7913	44.822	56.737	107.678	7.19617	100.482	126.765	119.569
27	0.442662	54.7018	-21.8059	AC alt	16	24.7913	43.5246	55.0947	104.448	7.8775	96.5708	121.862	113.985
28	0.442662	52.3617	-20.5569	AC alt	16	24.7913	42.1649	53.3736	100.92	8.4485	92.4719	116.733	108.284
29	0.442662	49.9269	-19.318	AC alt	16	24.7913	40.744	51.575	97.1002	8.91193	88.1883	111.383	102.471
30	0.442662	47.3996	-18.0885	AC alt	16	24.7913	39.2551	49.6903	92.9957	9.29591	83.6998	105.818	96.5216
31	0.442662	44.7819	-16.8675	AC alt	16	24.7913	37.6965	47.7173	88.611	9.61022	79.0008	100.041	90.4305
32	0.442662	42.0755	-15.6544	AC alt	16	24.7913	36.0783	45.669	83.9465	9.82379	74.1227	94.0567	84.2329
33	0.442662	39.3332	-14.4484	AC alt	16	24.7913	34.4361	43.5903	79.1107	9.93846	69.1722	87.9833	78.0449
34	0.442662	38.9383	-13.2489	AC alt	16	24.7913	34.4149	43.5634	79.0642	9.95591	69.1083	87.1671	77.2112
35	0.442662	39.7962	-12.0553	AC alt	16	24.7913	35.29	44.6712	81.6239	9.87762	71.7463	89.1607	79.283
36	0.442662	40.571	-10.867	AC alt	16	24.7913	36.1385	45.7452	84.0322	9.72805	74.3042	90.9698	81.2418
37	0.442662	41.2637	-9.68343	AC alt	16	24.7913	36.9667	46.7935	86.2891	9.48812	76.801	92.597	83.1088
38	0.442662	41.0797	-8.504	AC alt	16	24.7913	37.2101	47.1016	86.6906	9.15602	77.5345	92.2543	83.0983
39	0.442662	38.0303	-7.3282	AC alt	16	24.7913	35.4323	44.8513	80.9079	8.73265	72.1753	85.4646	76.732
40	0.442662	34.6611	-6.15549	AC alt	16	24.7913	33.4214	42.3058	74.3425	8.22941	66.113	77.9469	69.7175
41	0.442662	31.2128	-4.98537	AC alt	16	24.7913	31.3445	39.6768	67.5085	7.65636	59.8521	70.2427	62.5863
42	0.442662	27.6859	-3.81733	AC alt	16	24.7913	29.2075	36.9717	60.4035	6.99402	53.4095	62.3524	55.3584
43	0.442662	24.0808	-2.65087	AC alt	16	24.7913	27.0096	34.1895	53.0264	6.2428	46.7836	54.2769	48.0341
44	0.442662	20.3978	-1.48552	AC alt	16	24.7913	24.728	31.3015	45.3754	5.4699	39.9055	46.0166	40.5467
45	0.442662	16.637	-0.320779	AC alt	16	24.7913	22.3748	28.3227	37.4465	4.63505	32.8115	37.5718	32.9367
46	0.442662	12.7985	0.843829	AC alt	16	24.7913	19.9573	25.2626	29.2356	3.7119	25.5237	28.9417	25.2298
47	0.442662	8.88238	2.00878	AC alt	16	24.7913	17.4745	22.1197	20.739	2.70045	18.0386	20.1261	17.4257
48	0.442662	4.88839	3.17457	AC alt	16	24.7913	14.9247	18.8921	11.9523	1.60055	10.3518	11.1246	9.52402
49	0.442662	1.05047	4.34168	AC alt	16	24.7913	12.4868	15.8062	3.41432	0.41196	3.00236	2.4663	2.05434
50	0.127808	0.0141984	5.0944	AC alt	16	24.7913	11.9147	15.082	1.27774	0	1.27774	0.215557	0.215557

## Global Minimum Query (janbu simplified) - Safety Factor: 1.19022

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.558304	10.2724	-74.0057	AC alt	16	24.7913	7.96288	9.47758	-12.0696	0	-12.0696	15.7106	15.7106
2	0.558304	28.0434	-68.7839	AC alt	16	24.7913	14.995	17.8474	7.86369	0	7.86369	46.4911	46.4911
3	0.558304	41.6184	-64.6214	AC alt	16	24.7913	21.2148	25.2503	25.4943	0	25.4943	70.2158	70.2158
4	0.558304	52.8564	-61.0298	AC alt	16	24.7913	26.8528	31.9607	41.4755	0	41.4755	89.9787	89.9787
5	0.558304	62.5315	-57.8107	AC alt	16	24.7913	32.0394	38.1339	56.1775	0	56.1775	107.076	107.076
6	0.558304	69.7491	-54.8589	AC alt	16	24.7913	36.3257	43.2356	68.3276	0	68.3276	119.935	119.935
7	0.558304	74.2937	-52.1105	AC alt	16	24.7913	39.5172	47.0342	77.374	0	77.374	128.155	128.155
8	0.558304	78.5051	-49.5228	AC alt	16	24.7913	42.5396	50.6315	85.9412	0	85.9412	135.789	135.789
9	0.569068	85.3559	-47.0433	AC alt	16	24.7913	45.424	54.0645	96.4854	2.36815	94.1173	145.271	142.902
10	0.569068	90.3244	-44.6518	AC alt	16	24.7913	47.5993	56.6536	107.148	6.8644	100.283	154.172	147.307
11	0.569068	93.8021	-42.3554	AC alt	16	24.7913	49.1763	58.5306	115.661	10.9076	104.754	160.495	149.588
12	0.569068	95.3066	-40.1403	AC alt	16	24.7913	49.893	59.3836	121.332	14.5472	106.785	163.406	148.859
13	0.569068	96.7675	-37.9953	AC alt	16	24.7913	50.6593	60.2957	126.643	17.6853	108.957	166.215	148.53
14	0.569068	98.6607	-35.9114	AC alt	16	24.7913	51.6993	61.5335	132.309	20.4037	111.905	169.749	149.345
15	0.569068	100.233	-33.8812	AC alt	16	24.7913	52.6341	62.6462	137.371	22.816	114.555	172.715	149.899
16	0.569068	102.339	-31.8982	AC alt	16	24.7913	53.8871	64.1375	143.051	24.9443	118.107	176.591	151.646
17	0.569068	106.054	-29.9571	AC alt	16	24.7913	56.0177	66.6734	150.953	26.8069	124.146	183.239	156.432
18	0.569068	109.556	-28.0533	AC alt	16	24.7913	58.1268	69.1837	158.544	28.4197	130.125	189.52	161.101
19	0.569068	112.574	-26.1827	AC alt	16	24.7913	60.0696	71.496	165.428	29.7962	135.632	194.964	165.168
20	0.569068	110.958	-24.3416	AC alt	16	24.7913	59.6486	70.9949	165.386	30.948	134.438	192.371	161.423
21	0.569068	107.382	-22.527	AC alt	16	24.7913	58.185	69.253	162.228	31.9384	130.29	186.361	154.423
22	0.569068	103.572	-20.7359	AC alt	16	24.7913	56.5939	67.3592	158.503	32.7233	125.78	179.928	147.205
23	0.569068	99.5372	-18.9658	AC alt	16	24.7913	54.8788	65.3178	154.228	33.3098	120.918	173.087	139.778
24	0.569068	95.2857	-17.2144	AC alt	16	24.7913	53.0425	63.1322	149.417	33.7044	115.713	165.851	132.147
25	0.569068	90.8235	-15.4793	AC alt	16	24.7913	51.0873	60.8051	144.083	33.9127	110.17	158.231	124.318
26	0.569068	86.1562	-13.7588	AC alt	16	24.7913	48.9925	58.3119	138.241	34.0085	104.233	150.238	116.229
27	0.569068	81.2885	-12.0508	AC alt	16	24.7913	46.7789	55.6772	131.892	33.9339	97.958	141.878	107.944
28	0.569068	76.9399	-10.3536	AC alt	16	24.7913	44.8633	53.3972	126.214	33.6858	92.5279	134.41	100.724
29	0.569068	77.131	-8.66554	AC alt	16	24.7913	45.6111	54.2873	127.915	33.2672	94.6477	134.866	101.599
30	0.569068	77.9991	-6.98505	AC alt	16	24.7913	46.8193	55.7253	130.773	32.7005	98.0725	136.509	103.809
31	0.569068	78.6794	-5.31059	AC alt	16	24.7913	47.9884	57.1167	133.368	31.9814	101.386	137.828	105.847
32	0.569068	76.255	-3.64066	AC alt	16	24.7913	47.3571	56.3654	130.695	31.0979	99.597	133.708	102.61
33	0.569068	70.2546	-1.97383	AC alt	16	24.7913	44.5771	53.0566	121.77	30.0535	91.7169	123.307	93.2532
34	0.569068	64.0655	-0.308676	AC alt	16	24.7913	41.6607	49.5854	112.334	28.8835	83.4501	112.558	83.6746
35	0.569068	57.693	1.35622	AC alt	16	24.7913	38.6208	45.9672	102.384	27.5513	74.8331	101.47	73.9187
36	0.569068	51.1367	3.02227	AC alt	16	24.7913	35.4438	42.1859	91.9128	26.0852	65.8276	90.0415	63.9563
37	0.569068	44.396	4.69088	AC alt	16	24.7913	32.1027	38.2093	80.9045	24.5476	56.3569	78.2703	53.7227
38	0.569068	37.47	6.36349	AC alt	16	24.7913	28.6253	34.0704	69.3458	22.846	46.4998	66.1534	43.3074
39	0.569068	30.3569	8.04156	AC alt	16	24.7913	25.006	29.7627	57.2198	20.9791	36.2407	53.6869	32.7078
40	0.569068	23.1516	9.72662	AC alt	16	24.7913	21.3027	25.3549	44.6883	18.945	25.7433	41.0368	22.0918
41	0.569068	19.8245	11.4202	AC alt	16	24.7913	19.9881	23.7902	39.2652	17.2483	22.0169	35.2276	17.9793
42	0.569068	18.4505	13.124	AC alt	16	24.7913	19.9468	23.7411	37.5231	15.6232	21.8999	32.8726	17.2494
43	0.569068	16.8778	14.8397	AC alt	16	24.7913	19.8484	23.624	35.4267	13.8056	21.6211	30.1678	16.3622
44	0.569068	15.1018	16.5691	AC alt	16	24.7913	19.58	23.3045	32.9272	12.0672	20.86	27.1017	15.0345
45	0.569068	13.1173	18.3143	AC alt	16	24.7913	19.1696	22.8161	30.0096	10.3128	19.6968	23.6646	13.3518
46	0.569068	10.9182	20.0772	AC alt	16	24.7913	18.6786	22.2317	26.6738	8.3687	18.3051	19.8468	11.4781
47	0.569068	8.49744	21.8602	AC alt	16	24.7913	18.1012	21.5444	22.8971	6.22866	16.6684	15.635	9.40637
48	0.569068	5.84695	23.6658	AC alt	16	24.7913	17.4306	20.7463	18.653	3.88553	14.7675	11.014	7.12844
49	0.569068	2.9574	25.4967	AC alt	16	24.7913	16.6587	19.8275	13.9104	1.33106	12.5794	5.96585	4.63479
50	0.258489	0.329683	26.8425	AC alt	16	24.7913	15.756	18.7532	10.0208	0	10.0208	2.04718	2.04718

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.26583

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	10.3508	38.2846	0	0	0
2	10.799	37.3322	-13.3026	0	0
3	11.2472	36.4839	-17.8116	0	0
4	11.6953	35.7163	-15.8566	0	0
5	12.1435	35.014	-9.05896	0	0
6	12.5917	34.3661	0.968235	0	0
7	13.0398	33.7648	12.4596	0	0
8	13.488	33.204	24.8368	0	0
9	13.9362	32.6789	38.0247	0	0
10	14.3843	32.1858	52.1036	0	0
11	14.8325	31.7216	66.7091	0	0
12	15.2807	31.2837	81.4635	0	0
13	15.7288	30.87	95.6021	0	0
14	16.177	30.4787	108.885	0	0
15	16.6252	30.1083	121.305	0	0
16	17.0734	29.7573	132.951	0	0
17	17.5215	29.4247	143.727	0	0
18	17.9697	29.1095	153.55	0	0
19	18.4179	28.8106	162.565	0	0
20	18.866	28.5274	170.91	0	0
21	19.3087	28.2623	178.484	0	0
22	19.7514	28.0112	185.382	0	0
23	20.194	27.7735	191.398	0	0
24	20.6367	27.5487	196.002	0	0
25	21.0793	27.3364	199.165	0	0
26	21.522	27.1362	200.953	0	0
27	21.9647	26.9477	201.439	0	0
28	22.4073	26.7706	200.7	0	0
29	22.85	26.6046	198.816	0	0
30	23.2927	26.4494	195.875	0	0
31	23.7353	26.3048	191.97	0	0
32	24.178	26.1706	187.201	0	0
33	24.6206	26.0466	181.668	0	0
34	25.0633	25.9325	175.47	0	0
35	25.506	25.8283	168.499	0	0
36	25.9486	25.7337	160.617	0	0
37	26.3913	25.6488	151.785	0	0
38	26.8339	25.5732	141.963	0	0
39	27.2766	25.507	131.254	0	0
40	27.7193	25.4501	120.199	0	0
41	28.1619	25.4024	108.976	0	0
42	28.6046	25.3638	97.7286	0	0
43	29.0473	25.3342	86.603	0	0
44	29.4899	25.3137	75.7515	0	0
45	29.9326	25.3023	65.3426	0	0
46	30.3752	25.2998	55.5458	0	0
47	30.8179	25.3063	46.534	0	0
48	31.2606	25.3218	38.4883	0	0
49	31.7032	25.3464	31.5982	0	0
50	32.1459	25.38	25.9643	0	0
51	32.2737	25.3914	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.19022**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	9.41401	38.3864	0	0	0
2	9.97232	36.4386	-27.9414	0	0
3	10.5306	35.0004	-24.9793	0	0
4	11.0889	33.8235	-6.78423	0	0
5	11.6472	32.815	20.0932	0	0
6	12.2055	31.9281	52.0837	0	0
7	12.7638	31.1349	86.058	0	0
8	13.3221	30.4175	119.571	0	0
9	13.8804	29.7633	152.115	0	0
10	14.4495	29.1521	185.31	0	0
11	15.0186	28.5899	218.54	0	0
12	15.5876	28.0711	250.644	0	0
13	16.1567	27.5912	280.56	0	0
14	16.7258	27.1467	308.112	0	0
15	17.2949	26.7346	333.303	0	0
16	17.8639	26.3524	355.931	0	0
17	18.433	25.9982	376.022	0	0
18	19.0021	25.6703	393.748	0	0
19	19.5711	25.367	408.846	0	0
20	20.1402	25.0872	421.049	0	0
21	20.7093	24.8298	429.781	0	0
22	21.2783	24.5937	435.057	0	0
23	21.8474	24.3783	437.094	0	0
24	22.4165	24.1827	436.117	0	0
25	22.9855	24.0064	432.364	0	0
26	23.5546	23.8488	426.084	0	0
27	24.1237	23.7095	417.548	0	0
28	24.6927	23.588	407.028	0	0
29	25.2618	23.484	394.694	0	0
30	25.8309	23.3973	379.908	0	0
31	26.3999	23.3276	362.46	0	0
32	26.969	23.2747	342.286	0	0
33	27.5381	23.2385	320.148	0	0
34	28.1071	23.2188	297.242	0	0
35	28.6762	23.2158	273.948	0	0
36	29.2453	23.2292	250.655	0	0
37	29.8143	23.2593	227.782	0	0
38	30.3834	23.306	205.789	0	0
39	30.9525	23.3695	185.146	0	0
40	31.5216	23.4499	166.357	0	0
41	32.0906	23.5474	149.911	0	0
42	32.6597	23.6623	134.056	0	0
43	33.2288	23.795	117.759	0	0
44	33.7978	23.9458	101.156	0	0
45	34.3669	24.1151	84.4709	0	0
46	34.936	24.3035	67.9413	0	0
47	35.505	24.5115	51.795	0	0
48	36.0741	24.7398	36.2967	0	0
49	36.6432	24.9892	21.7544	0	0
50	37.2122	25.2606	8.52701	0	0
51	37.4707	25.3914	0	0	0

## Discharge Sections



### Entity Information

#### ◆ Group 1

##### Shared Entities

Type	Coordinates (x,y)
External Boundary	31.9909, 25.3914
	26.9909, 30.3914
	24.9909, 30.3914
	19.9909, 35.3914
	17.9909, 35.3914
	16.2731, 36.1624
	15.0854, 36.9249
	13.5304, 37.3045
	12.2505, 38.0812
	11.382, 38.1726
	9.27932, 38.401
	7.17661, 39.0863
	5.75957, 39.9086
	2.14841, 40.5025
	1.06581e-14, 40
	0, 10
	0, 0
76.9909, 0	
76.9909, 10	
76.9909, 25.3914	
Material Boundary	0, 10
	76.9909, 10

##### Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario
Water Table	1.06581e-14, 31.7896	Assigned to:  AC  AC alt
	2.60647, 31.6416	
	4.98412, 31.4288	
	7.37359, 31.1096	
	10.5793, 30.483	
	13.2053, 29.9155	
	16.0937, 29.2641	
	20.4315, 28.1114	
	23.3209, 27.3715	
	25.7758, 26.7762	
	27.7872, 26.3004	
	29.3939, 25.9316	
	31.9909, 25.3914	
	33.0262, 25.3152	
	33.7361, 25.2606	
	76.9909, 25.2606	



2su1

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027

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# Slide2 Analysis Information

## 2su1

### Project Summary

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File Name:	2su1.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.121s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31



## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	1
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Materials

---

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	27
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## FN

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	5
Friction Angle [deg]	23
Water Surface	Water Table
Hu Value	1



# Global Minimums

---

## Method: bishop simplified

---

	<b>FS</b>	<b>1.083840</b>
Center:		42.451, 48.754
Radius:		23.039
Left Slip Surface Endpoint:		24.975, 33.741
Right Slip Surface Endpoint:		44.412, 25.799
Resisting Moment:		7595.11 kN-m
Driving Moment:		7007.6 kN-m
Total Slice Area:		44.0333 m <sup>2</sup>
Surface Horizontal Width:		19.4376 m
Surface Average Height:		2.26537 m

## Method: janbu simplified

---

	<b>FS</b>	<b>1.045330</b>
Center:		40.758, 44.151
Radius:		18.721
Left Slip Surface Endpoint:		25.200, 33.739
Right Slip Surface Endpoint:		44.452, 25.798
Resisting Horizontal Force:		340.259 kN
Driving Horizontal Force:		325.505 kN
Total Slice Area:		51.8744 m <sup>2</sup>
Surface Horizontal Width:		19.2519 m
Surface Average Height:		2.6945 m

## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 8925

Number of Invalid Surfaces: 24

#### Error Codes

Error Code -112 reported for 24 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 8887

Number of Invalid Surfaces: 62

#### Error Codes

Error Code -108 reported for 29 surfaces

Error Code -111 reported for 33 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.08384

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.388752	1.65507	-48.6045	FN	4	18.7565	3.36997	3.6525	0.0522984	0	0.0522984	3.87538	3.87538
2	0.388752	4.88274	-47.1625	FN	4	18.7565	5.18173	5.61617	6.4132	0	6.4132	12.0016	12.0016
3	0.388752	7.95184	-45.7587	FN	4	18.7565	6.94651	7.5289	12.6091	0	12.6091	19.742	19.742
4	0.388752	10.8742	-44.3894	FN	4	18.7565	8.66494	9.39141	18.6422	0	18.6422	27.1244	27.1244
5	0.388752	13.0572	-43.0514	FN	4	18.7565	9.99612	10.8342	23.3159	0	23.3159	32.6542	32.6542
6	0.388752	14.2802	-41.742	FN	4	18.7565	10.799	11.7044	26.1348	0	26.1348	35.7705	35.7705
7	0.388752	15.3781	-40.4588	FN	4	18.7565	11.5391	12.5066	28.7333	0	28.7333	38.5743	38.5743
8	0.388752	16.363	-39.1997	FN	4	18.7565	12.2212	13.2458	31.1279	0	31.1279	41.0952	41.0952
9	0.388752	17.241	-37.9628	FN	4	18.7565	12.8468	13.9239	33.3243	0	33.3243	43.3479	43.3479
10	0.388752	18.0173	-36.7464	FN	4	18.7565	13.4173	14.5423	35.3275	0	35.3275	45.3454	45.3454
11	0.388752	18.6969	-35.549	FN	4	18.7565	13.9343	15.1026	37.1426	0	37.1426	47.0999	47.0999
12	0.388752	19.2841	-34.3692	FN	4	18.7565	14.3989	15.6061	38.7734	0	38.7734	48.6212	48.6212
13	0.388752	19.7829	-33.2059	FN	4	18.7565	14.8121	16.054	40.2244	0	40.2244	49.9193	49.9193
14	0.388752	20.1966	-32.0577	FN	4	18.7565	15.1752	16.4475	41.499	0	41.499	51.0028	51.0028
15	0.388752	20.5286	-30.9239	FN	4	18.7565	15.489	16.7876	42.6005	0	42.6005	51.8793	51.8793
16	0.388752	20.7818	-29.8033	FN	4	18.7565	15.7543	17.0752	43.5323	0	43.5323	52.5561	52.5561
17	0.388752	20.9589	-28.6952	FN	4	18.7565	15.9721	17.3112	44.2968	0	44.2968	53.0395	53.0395
18	0.388752	21.0622	-27.5986	FN	4	18.7565	16.143	17.4965	44.897	0	44.897	53.3359	53.3359
19	0.388752	21.0941	-26.5129	FN	4	18.7565	16.2677	17.6316	45.3348	0	45.3348	53.4502	53.4502
20	0.388752	21.6087	-25.4375	FN	4	18.7565	16.6989	18.099	46.8484	0	46.8484	54.7911	54.7911
21	0.388752	22.9638	-24.3715	FN	4	18.7565	17.6719	19.1536	50.2648	0	50.2648	58.2706	58.2706
22	0.388752	24.2664	-23.3144	FN	4	18.7565	18.6203	20.1815	53.5945	0	53.5945	61.6192	61.6192
23	0.388752	25.5047	-22.2657	FN	4	18.7565	19.5359	21.1738	56.8087	0	56.8087	64.8073	64.8073
24	0.388752	26.6803	-21.2248	FN	4	18.7565	20.4187	22.1306	59.9079	0	59.9079	67.838	67.838
25	0.388752	27.4113	-20.1912	FN	4	18.7565	21.0172	22.7793	62.0096	0	62.0096	69.7387	69.7387
26	0.388752	27.0491	-19.1644	FN	4	18.7565	20.8979	22.65	61.5907	0	61.5907	68.8535	68.8535
27	0.388752	26.5706	-18.1439	FN	4	18.7565	20.6978	22.4331	60.888	0	60.888	67.6706	67.6706
28	0.388752	26.0341	-17.1294	FN	4	18.7565	20.4546	22.1695	60.0343	0	60.0343	66.3385	66.3385
29	0.388752	25.4406	-16.1204	FN	4	18.7565	20.1685	21.8595	59.03	0	59.03	64.8591	64.8591
30	0.388752	24.791	-15.1165	FN	4	18.7565	19.8398	21.5032	57.8758	0	57.8758	63.2351	63.2351
31	0.388752	24.0861	-14.1173	FN	4	18.7565	19.4683	21.1006	56.5718	0	56.5718	61.4681	61.4681
32	0.388752	23.3267	-13.1225	FN	4	18.7565	19.0543	20.6519	55.1183	0	55.1183	59.5602	59.5602
33	0.388752	22.5135	-12.1317	FN	4	18.7565	18.5976	20.1569	53.515	0	53.515	57.5127	57.5127
34	0.388752	21.647	-11.1446	FN	4	18.7565	18.0983	19.6157	51.7616	0	51.7616	55.327	55.327
35	0.388752	20.7279	-10.1608	FN	4	18.7565	17.5561	19.028	49.8581	0	49.8581	53.0046	53.0046
36	0.388752	19.7566	-9.18005	FN	4	18.7565	16.9709	18.3938	47.8037	0	47.8037	50.5463	50.5463
37	0.388752	18.7336	-8.202	FN	4	18.7565	16.3427	17.7129	45.5979	0	45.5979	47.9535	47.9535
38	0.388752	17.6593	-7.22634	FN	4	18.7565	15.6711	16.985	43.2399	0	43.2399	45.2269	45.2269
39	0.388752	16.5341	-6.25279	FN	4	18.7565	14.9558	16.2097	40.7289	0	40.7289	42.3675	42.3675
40	0.388752	15.3582	-5.28105	FN	4	18.7565	14.1965	15.3868	38.0631	0	38.0631	39.3753	39.3753
41	0.388752	14.132	-4.31083	FN	4	18.7565	13.3929	14.5158	35.2418	0	35.2418	36.2514	36.2514
42	0.388752	12.8556	-3.34184	FN	4	18.7565	12.5446	13.5963	32.2633	0	32.2633	32.9958	32.9958
43	0.388752	11.5292	-2.37382	FN	4	18.7565	11.6509	12.6278	29.1257	0	29.1257	29.6087	29.6087
44	0.388752	10.153	-1.40647	FN	4	18.7565	10.7115	11.6096	25.8277	0	25.8277	26.0907	26.0907
45	0.388752	8.72698	-0.439517	FN	4	18.7565	9.72573	10.5411	22.3666	0	22.3666	22.4412	22.4412
46	0.388752	7.25121	0.527306	FN	4	18.7565	8.69292	9.42173	18.7405	0	18.7405	18.6605	18.6605
47	0.388752	5.72571	1.49428	FN	4	18.7565	7.61237	8.25059	14.9468	0	14.9468	14.7483	14.7483
48	0.388752	4.15043	2.46168	FN	4	18.7565	6.4833	7.02686	10.9828	0	10.9828	10.7041	10.7041
49	0.388752	2.52527	3.42978	FN	4	18.7565	5.30487	5.74963	6.84553	0	6.84553	6.52759	6.52759
50	0.388752	0.850102	4.39887	FN	4	18.7565	4.07615	4.4179	2.53164	0	2.53164	2.21808	2.21808

**Global Minimum Query (janbu simplified) - Safety Factor: 1.04533**

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.385039	2.06161	-55.1751	FN	4	18.7565	3.44926	3.60561	-0.0995943	0	-0.0995943	4.85864	4.85864
2	0.385039	6.03643	-53.1606	FN	4	18.7565	5.65607	5.91246	7.37297	0	7.37297	14.9228	14.9228
3	0.385039	9.73358	-51.2367	FN	4	18.7565	7.79198	8.14519	14.6054	0	14.6054	24.3094	24.3094
4	0.385039	13.037	-49.3903	FN	4	18.7565	9.77462	10.2177	21.3189	0	21.3189	32.7192	32.7192
5	0.385039	15.0662	-47.6111	FN	4	18.7565	11.0882	11.5908	25.7669	0	25.7669	37.9148	37.9148
6	0.385039	16.6955	-45.8905	FN	4	18.7565	12.1968	12.7497	29.5209	0	29.5209	42.1029	42.1029
7	0.385039	18.1479	-44.2218	FN	4	18.7565	13.2189	13.8182	32.9819	0	32.9819	45.8466	45.8466
8	0.385039	19.4383	-42.5991	FN	4	18.7565	14.1586	14.8004	36.1635	0	36.1635	49.1826	49.1826
9	0.385039	20.5793	-41.0177	FN	4	18.7565	15.019	15.6999	39.0774	0	39.0774	52.1414	52.1414
10	0.385039	21.5816	-39.4735	FN	4	18.7565	15.8037	16.5201	41.734	0	41.734	54.7492	54.7492
11	0.385039	22.4543	-37.9628	FN	4	18.7565	16.5151	17.2638	44.1433	0	44.1433	57.0291	57.0291
12	0.385039	23.2056	-36.4826	FN	4	18.7565	17.156	17.9337	46.3133	0	46.3133	59	59
13	0.385039	23.8423	-35.0302	FN	4	18.7565	17.7285	18.5322	48.252	0	48.252	60.6796	60.6796
14	0.385039	24.3706	-33.6032	FN	4	18.7565	18.2348	19.0614	49.966	0	49.966	62.0827	62.0827
15	0.385039	24.7959	-32.1995	FN	4	18.7565	18.6765	19.5231	51.4617	0	51.4617	63.2227	63.2227
16	0.385039	25.1229	-30.8171	FN	4	18.7565	19.0553	19.9191	52.7444	0	52.7444	64.1114	64.1114
17	0.385039	25.356	-29.4543	FN	4	18.7565	19.3727	20.2509	53.8193	0	53.8193	64.7594	64.7594
18	0.385039	25.4989	-28.1096	FN	4	18.7565	19.6299	20.5198	54.6904	0	54.6904	65.1761	65.1761
19	0.385039	25.6066	-26.7816	FN	4	18.7565	19.8621	20.7625	55.4766	0	55.4766	65.5017	65.5017
20	0.385039	26.636	-25.4689	FN	4	18.7565	20.7047	21.6433	58.3298	0	58.3298	68.1917	68.1917
21	0.385039	27.9732	-24.1705	FN	4	18.7565	21.7614	22.7479	61.9077	0	61.9077	71.6742	71.6742
22	0.385039	29.2321	-22.8851	FN	4	18.7565	22.7764	23.8089	65.3448	0	65.3448	74.9589	74.9589
23	0.385039	30.4149	-21.6117	FN	4	18.7565	23.7503	24.8269	68.6423	0	68.6423	78.0513	78.0513
24	0.385039	31.5199	-20.3495	FN	4	18.7565	24.6806	25.7994	71.7926	0	71.7926	80.9465	80.9465
25	0.385039	31.7329	-19.0976	FN	4	18.7565	25.0052	26.1387	72.8916	0	72.8916	81.5492	81.5492
26	0.385039	31.2535	-17.855	FN	4	18.7565	24.8496	25.9761	72.3649	0	72.3649	80.3696	80.3696
27	0.385039	30.7051	-16.6211	FN	4	18.7565	24.6399	25.7569	71.655	0	71.655	79.0104	79.0104
28	0.385039	30.0891	-15.395	FN	4	18.7565	24.3765	25.4815	70.7627	0	70.7627	77.4748	77.4748
29	0.385039	29.4068	-14.1762	FN	4	18.7565	24.0593	25.15	69.6889	0	69.6889	75.7662	75.7662
30	0.385039	28.6592	-12.9638	FN	4	18.7565	23.6887	24.7625	68.4338	0	68.4338	73.887	73.887
31	0.385039	27.8473	-11.7573	FN	4	18.7565	23.2645	24.3191	66.9974	0	66.9974	71.8395	71.8395
32	0.385039	26.9721	-10.5561	FN	4	18.7565	22.7866	23.8196	65.3795	0	65.3795	69.6258	69.6258
33	0.385039	26.0342	-9.35962	FN	4	18.7565	22.2551	23.264	63.5796	0	63.5796	67.2478	67.2478
34	0.385039	25.0344	-8.16721	FN	4	18.7565	21.6697	22.652	61.5972	0	61.5972	64.7072	64.7072
35	0.385039	23.9733	-6.97834	FN	4	18.7565	21.0299	21.9832	59.4307	0	59.4307	62.0048	62.0048
36	0.385039	22.8514	-5.79249	FN	4	18.7565	20.3355	21.2573	57.0792	0	57.0792	59.1421	59.1421
37	0.385039	21.6691	-4.60913	FN	4	18.7565	19.5858	20.4737	54.5409	0	54.5409	56.1199	56.1199
38	0.385039	20.4267	-3.42774	FN	4	18.7565	18.7804	19.6318	51.8139	0	51.8139	52.9388	52.9388
39	0.385039	19.1246	-2.2478	FN	4	18.7565	17.9186	18.7309	48.8956	0	48.8956	49.599	49.599
40	0.385039	17.7628	-1.06882	FN	4	18.7565	16.9996	17.7702	45.7836	0	45.7836	46.1007	46.1007
41	0.385039	16.3415	0.109715	FN	4	18.7565	16.0225	16.7488	42.4749	0	42.4749	42.4442	42.4442
42	0.385039	14.8607	1.28829	FN	4	18.7565	14.9862	15.6656	38.9662	0	38.9662	38.6292	38.6292
43	0.385039	13.3205	2.46742	FN	4	18.7565	13.8898	14.5195	35.2534	0	35.2534	34.6548	34.6548
44	0.385039	11.7205	3.64759	FN	4	18.7565	12.7319	13.309	31.3327	0	31.3327	30.5211	30.5211
45	0.385039	10.0608	4.82931	FN	4	18.7565	11.5111	12.0329	27.1991	0	27.1991	26.2265	26.2265
46	0.385039	8.34091	6.01309	FN	4	18.7565	10.226	10.6896	22.8474	0	22.8474	21.7702	21.7702
47	0.385039	6.56058	7.19946	FN	4	18.7565	8.87476	9.27705	18.2719	0	18.2719	17.1508	17.1508
48	0.385039	4.71933	8.38895	FN	4	18.7565	7.45552	7.79348	13.4662	0	13.4662	12.3667	12.3667
49	0.385039	2.81667	9.58208	FN	4	18.7565	5.96621	6.23666	8.42316	0	8.42316	7.41597	7.41597
50	0.385039	0.859331	10.7794	FN	4	18.7565	4.41055	4.61048	3.15547	0	3.15547	2.31575	2.31575

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.08384

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	24.9748	33.7414	0	0	0
2	25.3635	33.3004	-1.28693	0	0
3	25.7523	32.8811	-0.612372	0	0
4	26.141	32.4819	1.72073	0	0
5	26.5298	32.1013	5.44684	0	0
6	26.9185	31.7382	10.0288	0	0
7	27.3073	31.3913	14.8965	0	0
8	27.696	31.0598	19.9372	0	0
9	28.0848	30.7427	25.0559	0	0
10	28.4735	30.4394	30.1699	0	0
11	28.8623	30.1491	35.2084	0	0
12	29.251	29.8713	40.1098	0	0
13	29.6398	29.6055	44.8216	0	0
14	30.0285	29.351	49.2988	0	0
15	30.4173	29.1075	53.5034	0	0
16	30.806	28.8747	57.4034	0	0
17	31.1948	28.652	60.9727	0	0
18	31.5835	28.4392	64.19	0	0
19	31.9723	28.236	67.0389	0	0
20	32.3611	28.042	69.5072	0	0
21	32.7498	27.8571	71.6784	0	0
22	33.1386	27.681	73.6612	0	0
23	33.5273	27.5135	75.4022	0	0
24	33.9161	27.3543	76.8502	0	0
25	34.3048	27.2033	77.9579	0	0
26	34.6936	27.0604	78.6532	0	0
27	35.0823	26.9253	78.851	0	0
28	35.4711	26.7979	78.5621	0	0
29	35.8598	26.678	77.8038	0	0
30	36.2486	26.5657	76.5963	0	0
31	36.6373	26.4607	74.9618	0	0
32	37.0261	26.3629	72.9252	0	0
33	37.4148	26.2723	70.5135	0	0
34	37.8036	26.1887	67.7561	0	0
35	38.1923	26.1121	64.685	0	0
36	38.5811	26.0425	61.3343	0	0
37	38.9698	25.9796	57.7406	0	0
38	39.3586	25.9236	53.9428	0	0
39	39.7473	25.8743	49.9825	0	0
40	40.1361	25.8317	45.9036	0	0
41	40.5249	25.7958	41.7528	0	0
42	40.9136	25.7665	37.5794	0	0
43	41.3024	25.7438	33.4354	0	0
44	41.6911	25.7277	29.3757	0	0
45	42.0799	25.7181	25.4584	0	0
46	42.4686	25.7151	21.7445	0	0
47	42.8574	25.7187	18.2983	0	0
48	43.2461	25.7288	15.1876	0	0
49	43.6349	25.7456	12.4838	0	0
50	44.0236	25.7689	10.2622	0	0
51	44.4124	25.7988	0	0	0

**Global Minimum Query (janbu simplified) - Safety Factor: 1.04533**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	25.2002	33.7388	0	0	0
2	25.5852	33.1854	-1.38318	0	0
3	25.9703	32.6714	0.228443	0	0
4	26.3553	32.1919	4.23192	0	0
5	26.7404	31.7428	10.0423	0	0
6	27.1254	31.321	16.6424	0	0
7	27.5104	30.9238	23.6719	0	0
8	27.8955	30.5491	30.9412	0	0
9	28.2805	30.195	38.2935	0	0
10	28.6656	29.8601	45.5985	0	0
11	29.0506	29.543	52.7476	0	0
12	29.4356	29.2426	59.6505	0	0
13	29.8207	28.9578	66.2319	0	0
14	30.2057	28.6879	72.4296	0	0
15	30.5907	28.4321	78.1925	0	0
16	30.9758	28.1896	83.4794	0	0
17	31.3608	27.9599	88.2572	0	0
18	31.7459	27.7425	92.5006	0	0
19	32.1309	27.5368	96.191	0	0
20	32.5159	27.3425	99.3249	0	0
21	32.901	27.1591	102.051	0	0
22	33.286	26.9863	104.37	0	0
23	33.6711	26.8237	106.221	0	0
24	34.0561	26.6712	107.547	0	0
25	34.4411	26.5284	108.297	0	0
26	34.8262	26.3951	108.387	0	0
27	35.2112	26.271	107.794	0	0
28	35.5962	26.1561	106.543	0	0
29	35.9813	26.0501	104.66	0	0
30	36.3663	25.9528	102.174	0	0
31	36.7514	25.8642	99.1193	0	0
32	37.1364	25.784	95.531	0	0
33	37.5214	25.7123	91.4487	0	0
34	37.9065	25.6488	86.9149	0	0
35	38.2915	25.5936	81.9753	0	0
36	38.6766	25.5464	76.6792	0	0
37	39.0616	25.5074	71.079	0	0
38	39.4466	25.4763	65.231	0	0
39	39.8317	25.4533	59.195	0	0
40	40.2167	25.4382	53.0348	0	0
41	40.6017	25.431	46.8184	0	0
42	40.9868	25.4317	40.618	0	0
43	41.3718	25.4404	34.5105	0	0
44	41.7569	25.457	28.5776	0	0
45	42.1419	25.4815	22.9064	0	0
46	42.5269	25.514	17.5895	0	0
47	42.912	25.5546	12.7256	0	0
48	43.297	25.6032	8.41986	0	0
49	43.6821	25.66	4.78466	0	0
50	44.0671	25.725	1.93999	0	0
51	44.4521	25.7983	0	0	0

# Discharge Sections

## Entity Information

◆ **Group 1**

**Shared Entities**

Type	Coordinates (x,y)
External Boundary	18.8617, 33.81
	18.0007, 33.81
	0, 33.81
	0, 18.6757
	0, 0
	72.3393, 0
	72.3393, 18.8014
	72.3393, 24.9896
	72.3393, 25.7983
	44.4132, 25.7983
	34.4132, 30.7983
32.4132, 30.7983	
26.5628, 33.7235	
Material Boundary	0, 18.6757
	72.3393, 18.8014
Material Boundary	18.0007, 33.81
	19.743, 32.1531
	22.4954, 29.8533
	27.6843, 27.283
	32.6026, 25.9301
	37.1148, 25.2537
	43.6139, 24.9906
72.3393, 24.9896	

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 21.9213	Assigned to: <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 15px; background-color: #cccccc; border: 1px solid black; margin-right: 5px;"></span> AC</div> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 15px; background-color: #ff9966; border: 1px solid black; margin-right: 5px;"></span> AC alt</div> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 15px; background-color: #cc3300; border: 1px solid black; margin-right: 5px;"></span> FN</div> </div>
	72.3393, 21.9213	



3su2

Slide2 - An Interactive Slope Stability Program

Date Created: 19/07/2023, 15:19:31

Software Version: 9.027



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# Slide2 Analysis Information

## 3su2

### Project Summary

---

File Name:	3su2.slmd
Slide2 Modeler Version:	9.027
Compute Time:	00h:00m:01.42s
Project Title:	Slide2 - An Interactive Slope Stability Program
Date Created:	19/07/2023, 15:19:31

## General Settings

---

Units of Measurement:

Time Units:

Permeability Units:

Data Output:

Failure Direction:

Metric Units

days

meters/second

Standard

Left to Right

## Design Standard

Selected Type:	Eurocode 7 (User Defined)	
Name:	A2+M2+R2	
	<b>Type</b>	<b>Partial Factor</b>
Permanent Actions: Unfavourable	1	
Permanent Actions: Favourable	1	
Variable Actions: Unfavourable	1.3	
Variable Actions: Favourable	1	
Effective cohesion	1.25	
Coefficient of shearing resistance	1.25	
Undrained strength	1.4	
Weight density	1	
Shear strength (other models)	1.25	
Earth resistance	1.1	
Tensile and plate strength	1.1	
Shear strength	1.1	
Compressive strength	1.1	
Bond strength	1.1	
Seismic Coefficient	1	

## Analysis Options

---

Slices Type:	Vertical
	<b>Analysis Methods Used</b>
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

## Groundwater Analysis

---

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [kN/m <sup>3</sup> ]:	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:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [m]:	2
Minimum Area:	Not Defined
Minimum Weight:	Not Defined



## Seismic Loading

---

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

# Materials

---

## AC

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	23
Cohesion [kPa]	100
Friction Angle [deg]	27
Water Surface	Water Table
Hu Value	1

## AC alt

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	19.5
Cohesion [kPa]	50
Friction Angle [deg]	30
Water Surface	Water Table
Hu Value	1

## R

Color	
Strength Type	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	20
Cohesion [kPa]	0
Friction Angle [deg]	35
Water Surface	Water Table
Hu Value	1

# Global Minimums

---

## Method: bishop simplified

---

	<b>FS</b>	<b>1.152860</b>
Center:		65.623, 73.847
Radius:		46.627
Left Slip Surface Endpoint:		36.509, 37.426
Right Slip Surface Endpoint:		58.852, 27.714
Resisting Moment:		13405.8 kN-m
Driving Moment:		11628.2 kN-m
Total Slice Area:		31.1271 m <sup>2</sup>
Surface Horizontal Width:		22.3433 m
Surface Average Height:		1.39313 m

## Method: janbu simplified

---

	<b>FS</b>	<b>1.151860</b>
Center:		62.885, 64.241
Radius:		36.864
Left Slip Surface Endpoint:		37.685, 37.336
Right Slip Surface Endpoint:		59.184, 27.564
Resisting Horizontal Force:		257.732 kN
Driving Horizontal Force:		223.753 kN
Total Slice Area:		30.7273 m <sup>2</sup>
Surface Horizontal Width:		21.4982 m
Surface Average Height:		1.42929 m

## Global Minimum Support Data

---

No Supports Present

## Valid and Invalid Surfaces

---

### Method: bishop simplified

---

Number of Valid Surfaces: 6613

Number of Invalid Surfaces: 16

#### Error Codes

Error Code -112 reported for 16 surfaces

### Method: janbu simplified

---

Number of Valid Surfaces: 6511

Number of Invalid Surfaces: 118

#### Error Codes

Error Code -108 reported for 34 surfaces

Error Code -111 reported for 82 surfaces

Error Code -112 reported for 2 surfaces

### Error Code Descriptions

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient  $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$  for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

# Slice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.15286

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.446865	1.57633	-38.2874	R	0	29.2561	1.1264	1.29858	2.55001	0	2.55001	3.43919	3.43919
2	0.446865	4.68998	-37.5911	R	0	29.2561	3.37445	3.89027	7.63934	0	7.63934	10.2372	10.2372
3	0.446865	7.12613	-36.9013	R	0	29.2561	5.16194	5.95099	11.686	0	11.686	15.5619	15.5619
4	0.446865	8.3042	-36.2177	R	0	29.2561	6.05514	6.98073	13.7081	0	13.7081	18.1426	18.1426
5	0.446865	9.37776	-35.5399	R	0	29.2561	6.88236	7.9344	15.5808	0	15.5808	20.4972	20.4972
6	0.446865	10.3803	-34.8679	R	0	29.2561	7.66666	8.83859	17.3564	0	17.3564	22.6983	22.6983
7	0.446865	11.3134	-34.2013	R	0	29.2561	8.4082	9.69348	19.0351	0	19.0351	24.7496	24.7496
8	0.446865	12.179	-33.5399	R	0	29.2561	9.10709	10.4992	20.6174	0	20.6174	26.6544	26.6544
9	0.446865	12.9783	-32.8836	R	0	29.2561	9.76363	11.2561	22.1035	0	22.1035	28.4159	28.4159
10	0.446865	13.7131	-32.2321	R	0	29.2561	10.3778	11.9641	23.4938	0	23.4938	30.0372	30.0372
11	0.446865	14.3846	-31.5852	R	0	29.2561	10.9497	12.6235	24.7887	0	24.7887	31.5211	31.5211
12	0.446865	14.9942	-30.9428	R	0	29.2561	11.4795	13.2343	25.9883	0	25.9883	32.8703	32.8703
13	0.446865	15.5431	-30.3047	R	0	29.2561	11.9675	13.7969	27.093	0	27.093	34.0875	34.0875
14	0.446865	16.0325	-29.6707	R	0	29.2561	12.4136	14.3111	28.1028	0	28.1028	35.175	35.175
15	0.446865	16.4635	-29.0406	R	0	29.2561	12.8179	14.7772	29.0181	0	29.0181	36.135	36.135
16	0.446865	16.8373	-28.4144	R	0	29.2561	13.1805	15.1953	29.8392	0	29.8392	36.9702	36.9702
17	0.446865	17.1547	-27.7919	R	0	29.2561	13.5016	15.5654	30.5659	0	30.5659	37.6821	37.6821
18	0.446865	17.4169	-27.1729	R	0	29.2561	13.7811	15.8877	31.1987	0	31.1987	38.273	38.273
19	0.446865	17.6248	-26.5574	R	0	29.2561	14.0191	16.1621	31.7374	0	31.7374	38.7447	38.7447
20	0.446865	17.7791	-25.9451	R	0	29.2561	14.2157	16.3887	32.1824	0	32.1824	39.099	39.099
21	0.446865	17.8808	-25.336	R	0	29.2561	14.3708	16.5675	32.5338	0	32.5338	39.3379	39.3379
22	0.446865	17.9306	-24.73	R	0	29.2561	14.4846	16.6987	32.7912	0	32.7912	39.4626	39.4626
23	0.446865	17.9294	-24.1268	R	0	29.2561	14.5569	16.7821	32.9549	0	32.9549	39.4747	39.4747
24	0.446865	17.8778	-23.5266	R	0	29.2561	14.5879	16.8178	33.0251	0	33.0251	39.3761	39.3761
25	0.446865	17.7765	-22.929	R	0	29.2561	14.5774	16.8057	33.0013	0	33.0013	39.1678	39.1678
26	0.446865	17.6262	-22.3341	R	0	29.2561	14.5254	16.7458	32.8839	0	32.8839	38.8513	38.8513
27	0.446865	17.4276	-21.7417	R	0	29.2561	14.4321	16.6382	32.6724	0	32.6724	38.4278	38.4278
28	0.446865	17.1812	-21.1517	R	0	29.2561	14.2971	16.4826	32.367	0	32.367	37.8986	37.8986
29	0.446865	16.8876	-20.5641	R	0	29.2561	14.1207	16.2792	31.9674	0	31.9674	37.2649	37.2649
30	0.446865	16.5474	-19.9787	R	0	29.2561	13.9025	16.0276	31.4735	0	31.4735	36.5277	36.5277
31	0.446865	16.161	-19.3955	R	0	29.2561	13.6425	15.7279	30.885	0	30.885	35.6881	35.6881
32	0.446865	15.7291	-18.8143	R	0	29.2561	13.3407	15.38	30.2017	0	30.2017	34.747	34.747
33	0.446865	15.252	-18.2352	R	0	29.2561	12.997	14.9837	29.4236	0	29.4236	33.7056	33.7056
34	0.446865	14.7302	-17.658	R	0	29.2561	12.6111	14.5388	28.5499	0	28.5499	32.5645	32.5645
35	0.446865	14.1642	-17.0827	R	0	29.2561	12.183	14.0453	27.5809	0	27.5809	31.3249	31.3249
36	0.446865	13.5543	-16.5091	R	0	29.2561	11.7125	13.5029	26.5157	0	26.5157	29.9871	29.9871
37	0.446865	12.9011	-15.9372	R	0	29.2561	11.1995	12.9115	25.3542	0	25.3542	28.5523	28.5523
38	0.446865	12.2047	-15.3669	R	0	29.2561	10.6437	12.2707	24.096	0	24.096	27.0212	27.0212
39	0.446865	11.4657	-14.7982	R	0	29.2561	10.045	11.5805	22.7408	0	22.7408	25.3945	25.3945
40	0.446865	10.6843	-14.231	R	0	29.2561	9.40322	10.8406	21.2878	0	21.2878	23.6726	23.6726
41	0.446865	9.86092	-13.6652	R	0	29.2561	8.71806	10.0507	19.7367	0	19.7367	21.8563	21.8563
42	0.446865	8.99579	-13.1007	R	0	29.2561	7.98934	9.21059	18.0869	0	18.0869	19.9461	19.9461
43	0.446865	8.08923	-12.5376	R	0	29.2561	7.21676	8.31991	16.3378	0	16.3378	17.9427	17.9427
44	0.446865	7.14151	-11.9756	R	0	29.2561	6.40007	7.37838	14.489	0	14.489	15.8465	15.8465
45	0.446865	6.15291	-11.4149	R	0	29.2561	5.53899	6.38568	12.5396	0	12.5396	13.6579	13.6579
46	0.446865	5.12367	-10.8552	R	0	29.2561	4.63323	5.34147	10.489	0	10.489	11.3775	11.3775
47	0.446865	4.05401	-10.2966	R	0	29.2561	3.68247	4.24537	8.33666	0	8.33666	9.00565	9.00565
48	0.446865	2.94417	-9.739	R	0	29.2561	2.68637	3.09701	6.08161	0	6.08161	6.54269	6.54269
49	0.446865	1.79434	-9.18231	R	0	29.2561	1.64459	1.89598	3.72314	0	3.72314	3.98899	3.98899
50	0.446865	0.60473	-8.62649	R	0	29.2561	0.556751	0.641856	1.26042	0	1.26042	1.34488	1.34488

## Global Minimum Query (janbu simplified) - Safety Factor: 1.15186

Slice Number	Width [m]	Weight [kN]	Angle of Slice Base [deg]	Base Material	Base Cohesion [kPa]	Base Friction Angle [deg]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]	Base Vertical Stress [kPa]	Effective Vertical Stress [kPa]
1	0.429965	0.863853	-42.6706	R	0	29.2561	0.61396	0.707196	1.38872	0	1.38872	1.95469	1.95469
2	0.429965	2.53846	-41.7681	R	0	29.2561	1.82167	2.09831	4.12047	0	4.12047	5.7474	5.7474
3	0.429965	4.10907	-40.8782	R	0	29.2561	2.9765	3.42851	6.73259	0	6.73259	9.30893	9.30893
4	0.429965	5.57983	-40.0001	R	0	29.2561	4.07873	4.69813	9.22574	0	9.22574	12.6482	12.6482
5	0.429965	6.95461	-39.1331	R	0	29.2561	5.12866	5.9075	11.6006	0	11.6006	15.7735	15.7735
6	0.429965	8.23694	-38.2767	R	0	29.2561	6.12658	7.05696	13.8578	0	13.8578	18.6922	18.6922
7	0.429965	9.43008	-37.4303	R	0	29.2561	7.07279	8.14686	15.998	0	15.998	21.4115	21.4115
8	0.429965	10.5371	-36.5933	R	0	29.2561	7.96758	9.17754	18.022	0	18.022	23.9378	23.9378
9	0.429965	11.5607	-35.7653	R	0	29.2561	8.81123	10.1493	19.9302	0	19.9302	26.277	26.277
10	0.429965	12.5035	-34.9459	R	0	29.2561	9.60403	11.0625	21.7235	0	21.7235	28.4348	28.4348
11	0.429965	13.3681	-34.1346	R	0	29.2561	10.3462	11.9174	23.4024	0	23.4024	30.4164	30.4164
12	0.429965	14.1565	-33.331	R	0	29.2561	11.0381	12.7144	24.9673	0	24.9673	32.2265	32.2265
13	0.429965	14.871	-32.5347	R	0	29.2561	11.68	13.4537	26.419	0	26.419	33.8699	33.8699
14	0.429965	15.5135	-31.7454	R	0	29.2561	12.2718	14.1354	27.7578	0	27.7578	35.3504	35.3504
15	0.429965	16.0859	-30.9628	R	0	29.2561	12.8141	14.76	28.9843	0	28.9843	36.6725	36.6725
16	0.429965	16.5898	-30.1866	R	0	29.2561	13.3068	15.3276	30.0988	0	30.0988	37.8394	37.8394
17	0.429965	17.0269	-29.4165	R	0	29.2561	13.7503	15.8384	31.1019	0	31.1019	38.855	38.855
18	0.429965	17.3988	-28.6521	R	0	29.2561	14.1445	16.2925	31.9937	0	31.9937	39.7222	39.7222
19	0.429965	17.7069	-27.8933	R	0	29.2561	14.4898	16.6902	32.7745	0	32.7745	40.4443	40.4443
20	0.429965	17.9524	-27.1397	R	0	29.2561	14.7861	17.0315	33.4449	0	33.4449	41.0242	41.0242
21	0.429965	18.1368	-26.3912	R	0	29.2561	15.0336	17.3166	34.0045	0	34.0045	41.4644	41.4644
22	0.429965	18.2611	-25.6475	R	0	29.2561	15.2323	17.5455	34.454	0	34.454	41.7677	41.7677
23	0.429965	18.3266	-24.9085	R	0	29.2561	15.3823	17.7183	34.7934	0	34.7934	41.9364	41.9364
24	0.429965	18.3342	-24.1738	R	0	29.2561	15.4837	17.835	35.0225	0	35.0225	41.9727	41.9727
25	0.429965	18.2851	-23.4433	R	0	29.2561	15.5363	17.8957	35.1418	0	35.1418	41.8789	41.8789
26	0.429965	18.1801	-22.7169	R	0	29.2561	15.5403	17.9003	35.1509	0	35.1509	41.6569	41.6569
27	0.429965	18.0201	-21.9943	R	0	29.2561	15.4956	17.8488	35.0499	0	35.0499	41.3087	41.3087
28	0.429965	17.8061	-21.2753	R	0	29.2561	15.4022	17.7412	34.8386	0	34.8386	40.836	40.836
29	0.429965	17.5387	-20.5599	R	0	29.2561	15.26	17.5774	34.5168	0	34.5168	40.2405	40.2405
30	0.429965	17.2188	-19.8478	R	0	29.2561	15.0688	17.3572	34.0844	0	34.0844	39.5237	39.5237
31	0.429965	16.847	-19.1389	R	0	29.2561	14.8287	17.0806	33.5412	0	33.5412	38.6874	38.6874
32	0.429965	16.4241	-18.4433	R	0	29.2561	14.5394	16.7473	32.8869	0	32.8869	37.7328	37.7328
33	0.429965	15.9507	-17.7299	R	0	29.2561	14.2008	16.3573	32.1208	0	32.1208	36.661	36.661
34	0.429965	15.4274	-17.0297	R	0	29.2561	13.8126	15.9102	31.243	0	31.243	35.4737	35.4737
35	0.429965	14.8547	-16.332	R	0	29.2561	13.3748	15.4059	30.2526	0	30.2526	34.1718	34.1718
36	0.429965	14.2333	-15.6369	R	0	29.2561	12.8871	14.8441	29.1494	0	29.1494	32.7565	32.7565
37	0.429965	13.5635	-14.944	R	0	29.2561	12.3491	14.2244	27.9325	0	27.9325	31.2285	31.2285
38	0.429965	12.8459	-14.2535	R	0	29.2561	11.7607	13.5467	26.6018	0	26.6018	29.5893	29.5893
39	0.429965	12.081	-13.565	R	0	29.2561	11.1216	12.8105	25.1561	0	25.1561	27.8395	27.8395
40	0.429965	11.2691	-12.8785	R	0	29.2561	10.4314	12.0155	23.595	0	23.595	25.98	25.98
41	0.429965	10.4106	-12.1939	R	0	29.2561	9.68972	11.1612	21.9174	0	21.9174	24.0113	24.0113
42	0.429965	9.50596	-11.511	R	0	29.2561	8.89631	10.2473	20.1227	0	20.1227	21.9344	21.9344
43	0.429965	8.55547	-10.8298	R	0	29.2561	8.05065	9.27322	18.2098	0	18.2098	19.7499	19.7499
44	0.429965	7.55947	-10.1502	R	0	29.2561	7.15234	8.23849	16.1779	0	16.1779	17.4584	17.4584
45	0.429965	6.51824	-9.47196	R	0	29.2561	6.20089	7.14256	14.0259	0	14.0259	15.0604	15.0604
46	0.429965	5.43208	-8.79508	R	0	29.2561	5.19585	5.98489	11.7525	0	11.7525	12.5564	12.5564
47	0.429965	4.30122	-8.11945	R	0	29.2561	4.13665	4.76484	9.35673	0	9.35673	9.94689	9.94689
48	0.429965	3.12592	-7.44494	R	0	29.2561	3.02275	3.48178	6.83718	0	6.83718	7.23218	7.23218
49	0.429965	1.90637	-6.77147	R	0	29.2561	1.85353	2.13501	4.19252	0	4.19252	4.41261	4.41261
50	0.429965	0.642783	-6.09895	R	0	29.2561	0.628391	0.723818	1.42136	0	1.42136	1.48851	1.48851

# Interslice Data

## Global Minimum Query (bishop simplified) - Safety Factor: 1.15286

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	36.5092	37.4261	0	0	0
2	36.956	37.0733	0.396478	0	0
3	37.4029	36.7293	1.51754	0	0
4	37.8498	36.3938	3.13323	0	0
5	38.2966	36.0665	4.91519	0	0
6	38.7435	35.7473	6.81516	0	0
7	39.1903	35.4359	8.79538	0	0
8	39.6372	35.1322	10.8213	0	0
9	40.0841	34.836	12.8613	0	0
10	40.5309	34.5471	14.8868	0	0
11	40.9778	34.2653	16.8716	0	0
12	41.4247	33.9906	18.7923	0	0
13	41.8715	33.7227	20.6276	0	0
14	42.3184	33.4615	22.3589	0	0
15	42.7653	33.2069	23.9695	0	0
16	43.2121	32.9588	25.4449	0	0
17	43.659	32.717	26.7725	0	0
18	44.1059	32.4815	27.9416	0	0
19	44.5527	32.2521	28.9436	0	0
20	44.9996	32.0288	29.7715	0	0
21	45.4465	31.8113	30.4199	0	0
22	45.8933	31.5998	30.8852	0	0
23	46.3402	31.3939	31.1654	0	0
24	46.7871	31.1938	31.26	0	0
25	47.2339	30.9993	31.17	0	0
26	47.6808	30.8102	30.8979	0	0
27	48.1277	30.6266	30.4477	0	0
28	48.5745	30.4484	29.8248	0	0
29	49.0214	30.2755	29.0357	0	0
30	49.4682	30.1079	28.0885	0	0
31	49.9151	29.9454	26.9928	0	0
32	50.362	29.7881	25.759	0	0
33	50.8088	29.6359	24.3992	0	0
34	51.2557	29.4886	22.9266	0	0
35	51.7026	29.3464	21.3558	0	0
36	52.1494	29.2091	19.7024	0	0
37	52.5963	29.0766	17.9834	0	0
38	53.0432	28.949	16.217	0	0
39	53.49	28.8262	14.4227	0	0
40	53.9369	28.7081	12.6211	0	0
41	54.3838	28.5948	10.8342	0	0
42	54.8306	28.4862	9.08499	0	0
43	55.2775	28.3822	7.39787	0	0
44	55.7244	28.2828	5.79842	0	0
45	56.1712	28.188	4.31348	0	0
46	56.6181	28.0978	2.97113	0	0
47	57.065	28.0121	1.80073	0	0
48	57.5118	27.9309	0.83291	0	0
49	57.9587	27.8542	0.0996109	0	0
50	58.4055	27.782	-0.365927	0	0
51	58.8524	27.7142	0	0	0

### Global Minimum Query (janbu simplified) - Safety Factor: 1.15186

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [deg]
1	37.6854	37.3356	0	0	0
2	38.1153	36.9392	0.287355	0	0
3	38.5453	36.5552	1.08908	0	0
4	38.9753	36.1831	2.31932	0	0
5	39.4052	35.8223	3.90018	0	0
6	39.8352	35.4724	5.76097	0	0
7	40.2651	35.1332	7.83757	0	0
8	40.6951	34.8041	10.0719	0	0
9	41.1251	34.4848	12.4113	0	0
10	41.555	34.1751	14.8084	0	0
11	41.985	33.8747	17.2204	0	0
12	42.415	33.5832	19.6087	0	0
13	42.8449	33.3004	21.9391	0	0
14	43.2749	33.0261	24.1808	0	0
15	43.7049	32.7601	26.3068	0	0
16	44.1348	32.5021	28.2934	0	0
17	44.5648	32.252	30.1198	0	0
18	44.9948	32.0096	31.7683	0	0
19	45.4247	31.7747	33.2241	0	0
20	45.8547	31.5471	34.4747	0	0
21	46.2847	31.3267	35.5105	0	0
22	46.7146	31.1133	36.324	0	0
23	47.1446	30.9069	36.9101	0	0
24	47.5745	30.7072	37.2661	0	0
25	48.0045	30.5142	37.391	0	0
26	48.4345	30.3278	37.2862	0	0
27	48.8644	30.1478	36.9549	0	0
28	49.2944	29.9741	36.4024	0	0
29	49.7244	29.8067	35.6357	0	0
30	50.1543	29.6454	34.6637	0	0
31	50.5843	29.4902	33.497	0	0
32	51.0143	29.341	32.1482	0	0
33	51.4442	29.1977	30.6312	0	0
34	51.8742	29.0602	28.9621	0	0
35	52.3042	28.9285	27.1583	0	0
36	52.7341	28.8025	25.2391	0	0
37	53.1641	28.6822	23.2254	0	0
38	53.5941	28.5674	21.1396	0	0
39	54.024	28.4582	19.006	0	0
40	54.454	28.3544	16.8503	0	0
41	54.884	28.2561	14.7002	0	0
42	55.3139	28.1632	12.5848	0	0
43	55.7439	28.0757	10.535	0	0
44	56.1738	27.9934	8.58329	0	0
45	56.6038	27.9164	6.76402	0	0
46	57.0338	27.8447	5.11323	0	0
47	57.4637	27.7782	3.66877	0	0
48	57.8937	27.7168	2.47027	0	0
49	58.3237	27.6606	1.55925	0	0
50	58.7536	27.6096	0.9791	0	0
51	59.1836	27.5636	0	0	0



# Discharge Sections

## Entity Information

◆ **Group 1**

**Shared Entities**

Type	Coordinates (x,y)
External Boundary	59.4863, 27.4261 37.4863, 37.4261 35.4863, 37.4261 31.451, 39.4437 0, 39.4437 0, 35.3418 0, 24.9861 0, 0 92.8232, 0 92.8232, 25.1275 92.8232, 26.6174 92.8232, 27.4261
Material Boundary	0, 24.9861 92.8232, 25.1275
Material Boundary	0, 35.3418 2.09879, 34.9248 11.0146, 33.1159 17.3161, 31.709 22.2767, 31.039 31.863, 29.7661 44.9351, 27.9572 48.619, 27.3701 52.3781, 26.9738 55.6372, 26.7497 58.6869, 26.6183 92.8232, 26.6174

**Scenario-based Entities**

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 24.3819 92.8232, 24.5413	Assigned to: <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 15px; background-color: #cccccc; border: 1px solid black; margin-right: 5px;"></span> AC</div> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 15px; background-color: #ff9966; border: 1px solid black; margin-right: 5px;"></span> AC alt</div> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 15px; background-color: #9999ff; border: 1px solid black; margin-right: 5px;"></span> R</div> </div>