

## **Slide Analysis Information**

### **Estabilidad UD-FJC Sede Vivero**

#### **Project Summary**

---

File Name: PerfilS3S4TaludAncladoSIN  
Slide Modeler Version: 6.005  
Project Title: Estabilidad UD-FJC Sede Vivero  
Author: Ing. Paola Murcia para <SODICO>  
Date Created: 5/03/2019, 3:05:39 p. m.  
Comments:

Dapcil, perforaciones y laboratorio de suelos.

#### **General Settings**

---

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

#### **Analysis Options**

---

##### **Analysis Methods Used**

Bishop simplified  
Janbu simplified

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

#### **Groundwater Analysis**

---

Groundwater Method: Ru Coefficient  
Pore Fluid Unit Weight: 9.81 kN/m3  
Advanced Groundwater Method: None

#### **Random Numbers**

---

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

### Surface Options

Surface Type: Circular  
 Search Method: Slope Search  
 Number of Surfaces: 5000  
 Upper Angle: Not Defined  
 Lower Angle: Not Defined  
 Composite Surfaces: Disabled  
 Reverse Curvature: Create Tension Crack  
 Minimum Elevation: Not Defined  
 Minimum Depth: Not Defined



### Loading

Seismic Load Coefficient (Horizontal): 0.144  
 1 Distributed Load present

#### Distributed Load 1

Distribution: Constant  
 Magnitude [kN/m<sup>2</sup>]: 20  
 Orientation: Normal to boundary

### Material Properties

Property	Arcilla Dura	Arenisca
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m <sup>3</sup> ]	21	22
Cohesion [kPa]	50	290
Friction Angle [deg]	0	30
Ru Value	0.1	0.1

### Support Properties

#### Support 1

Support Type: Grouted Tieback  
 Force Application: Active  
 Out-of-Plane Spacing: 2 m  
 Tensile Capacity: 148 kN

Plate Capacity: 500 kN  
Bond length: 10.000 m  
Bond Strength: 31 kN/m

## **Global Minimums**

---

### **Method: bishop simplified**

FS: 1.203280  
Center: 101588.666, 100277.605  
Radius: 25.532  
Left Slip Surface Endpoint: 101584.980, 100252.340  
Right Slip Surface Endpoint: 101611.750, 100266.695  
Resisting Moment=41524.7 kN-m  
Driving Moment=34509.7 kN-m

### **Method: janbu simplified**

FS: 1.074700  
Center: 101581.606, 100251.167  
Radius: 0.790  
Left Slip Surface Endpoint: 101581.849, 100250.416  
Right Slip Surface Endpoint: 101582.357, 100250.924  
Resisting Horizontal Force=25.4222 kN  
Driving Horizontal Force=23.6551 kN

## **Valid / Invalid Surfaces**

---

### **Method: bishop simplified**

Number of Valid Surfaces: 2281  
Number of Invalid Surfaces: 2719

#### **Error Codes:**

Error Code -101 reported for 1 surface  
Error Code -105 reported for 11 surfaces  
Error Code -107 reported for 106 surfaces  
Error Code -108 reported for 29 surfaces  
Error Code -112 reported for 2560 surfaces  
Error Code -113 reported for 12 surfaces

### **Method: janbu simplified**

Number of Valid Surfaces: 1893  
Number of Invalid Surfaces: 3107

#### **Error Codes:**

Error Code -101 reported for 1 surface  
Error Code -105 reported for 11 surfaces

Error Code -107 reported for 106 surfaces  
 Error Code -108 reported for 417 surfaces  
 Error Code -112 reported for 2560 surfaces  
 Error Code -113 reported for 12 surfaces

**Error Codes**

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 105 = More than two surface / slope intersections with no valid slip surface.
- 107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
- 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.
- 113 = Surface intersects outside slope limits.

**Slice Data**

Global Minimum Query (bishop simplified) - Safety Factor: 1.20328

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	1.0708	2.30555	Arcilla Dura	50	0	41.5531	50	7.32204	0.215312	7.10672
2	1.0708	22.2566	Arcilla Dura	50	0	41.5531	50	24.1827	2.07851	22.1042
3	1.0708	47.7961	Arcilla Dura	50	0	41.5531	50	46.2805	4.4636	41.8169
4	1.0708	69.8034	Arcilla Dura	50	0	41.5531	50	116.052	6.51884	109.533
5	1.0708	72.7845	Arcilla Dura	50	0	41.5531	50	66.1274	6.79724	59.3302
6	1.0708	75.3927	Arcilla Dura	50	0	41.5531	50	66.8084	7.04081	59.7676
7	1.0708	94.844	Arcilla Dura	50	0	41.5531	50	83.1997	8.85734	74.3423
8	1.0708	115.286	Arcilla Dura	50	0	41.5531	50	100.487	10.7664	89.7203
9	1.0708	133.601	Arcilla Dura	50	0	41.5531	50	115.747	12.4768	103.27
10	1.0708	137.59	Arcilla Dura	50	0	41.5531	50	117.576	12.8493	104.727
11	1.0708	140.013	Arcilla Dura	50	0	41.5531	50	168.841	13.0756	155.765
12	1.0708	146.047	Arcilla Dura	50	0	41.5531	50	121.468	13.6392	107.828
13	1.0708	150.305	Arcilla Dura	50	0	41.5531	50	123.299	14.0368	109.263
14	1.0708	152.746	Arcilla Dura	50	0	41.5531	50	123.31	14.2647	109.045
15	1.0708	153.828	Arcilla Dura	50	0	41.5531	50	121.9	14.3658	107.535
16	1.0708	153.454	Arcilla Dura	50	0	41.5531	50	118.942	14.3308	104.611
17	1.0708	151.5	Arcilla Dura	50	0	41.5531	50	114.276	14.1484	100.128
18	1.0708	147.943	Arcilla Dura	50	0	41.5531	50	107.816	13.8162	93.9997
19	1.0708	143.642	Arcilla Dura	50	0	41.5531	50	100.281	13.4145	86.867
20	1.0708	137.444	Arcilla Dura	50	0	41.5531	50	90.4744	12.8357	77.6387
21	1.0708	128.72	Arcilla Dura	50	0	41.5531	50	77.6274	12.021	65.6064
22	1.0708	114.31	Arcilla Dura	50	0	41.5531	50	58.5052	10.6752	47.83

23	1.0708	92.4328	Arcilla Dura	50	0	41.5531	50	30.9653	8.63216	22.3332
24	1.0708	64.8085	Arcilla Dura	50	0	41.5531	50	-4.28838	6.05237	-10.3408
25	1.0708	24.0651	Arcilla Dura	50	0	41.5531	50	-56.1144	2.24741	-58.3619

**Global Minimum Query (janbu simplified) - Safety Factor: 1.0747**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.0203377	0.00288391	Arcilla Dura	50	0	46.5246	50	-15.5991	0.0141801	-15.6133
2	0.0203377	0.00849152	Arcilla Dura	50	0	46.5246	50	-16.7455	0.0417525	-16.7873
3	0.0203377	0.0138187	Arcilla Dura	50	0	46.5246	50	-17.9574	0.0679463	-18.0253
4	0.0203377	0.0188656	Arcilla Dura	50	0	46.5246	50	-19.2331	0.0927615	-19.3259
5	0.0203377	0.0236721	Arcilla Dura	50	0	46.5246	50	-20.5774	0.116395	-20.6938
6	0.0203377	0.0281582	Arcilla Dura	50	0	46.5246	50	-22.0019	0.138453	-22.1403
7	0.0203377	0.0322838	Arcilla Dura	50	0	46.5246	50	-23.5173	0.158738	-23.676
8	0.0203377	0.036129	Arcilla Dura	50	0	46.5246	50	-25.13	0.177645	-25.3077
9	0.0203377	0.0395937	Arcilla Dura	50	0	46.5246	50	-26.8572	0.194681	-27.0518
10	0.0203377	0.0426979	Arcilla Dura	50	0	46.5246	50	-28.7121	0.209944	-28.922
11	0.0203377	0.0454416	Arcilla Dura	50	0	46.5246	50	-30.7121	0.223435	-30.9356
12	0.0203377	0.0477848	Arcilla Dura	50	0	46.5246	50	-32.8804	0.234956	-33.1153
13	0.0203377	0.0496273	Arcilla Dura	50	0	46.5246	50	-35.2476	0.244016	-35.4917
14	0.0203377	0.0510693	Arcilla Dura	50	0	46.5246	50	-37.8415	0.251106	-38.0926
15	0.0203377	0.0519104	Arcilla Dura	50	0	46.5246	50	-40.7131	0.255242	-40.9684
16	0.0203377	0.0522308	Arcilla Dura	50	0	46.5246	50	-43.9119	0.256817	-44.1687
17	0.0203377	0.0519104	Arcilla Dura	50	0	46.5246	50	-47.5145	0.255242	-47.7698
18	0.0203377	0.0508289	Arcilla Dura	50	0	46.5246	50	-51.6233	0.249924	-51.8732
19	0.0203377	0.0490065	Arcilla Dura	50	0	46.5246	50	-56.3721	0.240963	-56.6131
20	0.0203377	0.0461626	Arcilla Dura	50	0	46.5246	50	-61.9716	0.22698	-62.1986

21	0.0203377	0.0422773	Arcilla Dura	50	0	46.5246	50	-68.7233	0.207876	-68.9312
22	0.0203377	0.0369501	Arcilla Dura	50	0	46.5246	50	-77.134	0.181683	-77.3157
23	0.0203377	0.0299006	Arcilla Dura	50	0	46.5246	50	2595.18	0.14702	2595.03
24	0.0203377	0.0204878	Arcilla Dura	50	0	46.5246	50	-103.297	0.100738	-103.398
25	0.0203377	0.00757027	Arcilla Dura	50	0	46.5246	50	-126.919	0.0372228	-126.957

## List Of Coordinates

### Line Load

X	Y
101623	100267
101616	100267
101616	100267

### External Boundary

X	Y
101624	100231
101624	100262
101624	100267
101616	100267
101616	100267
101613	100267
101611	100267
101611	100267
101610	100267
101608	100266
101604	100264
101598	100260
101596	100259
101595	100259
101594	100259
101593	100257
101592	100257
101591	100255
101589	100255
101587	100254
101587	100254
101586	100252

101584	100252
101582	100251
101582	100251
101581	100249
101577	100249
101576	100249
101576	100249
101575	100249
101574	100249
101574	100249
101572	100249
101569	100247
101568	100247
101567	100247
101566	100246
101566	100237
101566	100231

**Material Boundary**

X	Y
101566	100237
101567	100238
101568	100238
101569	100238
101572	100240
101574	100240
101574	100241
101575	100241
101576	100241
101576	100241
101577	100241
101579	100242
101581	100243
101583	100244
101584	100244
101584	100245
101584	100245
101587	100246
101587	100246
101590	100249
101591	100249
101592	100250
101595	100253
101600	100254

101604	100256
101607	100258
101610	100260
101612	100260
101613	100260
101615	100261
101618	100261
101624	100262