

**ALLEGATO 16**  
**VERIFICHE DI STABILITÀ INTERFERENZA 27**  
**SEZIONE A-A' - RELAZIONI DI CALCOLO**

**VERIFICA DI STABILITÀ PRE-OPERAM IN ASSENZA DI FALDA ACQUIFERA**

**Analisi di stabilità dei pendii con BISHOP**

Numero di strati	3.0
Numero dei conci	50.0
Coefficiente di sicurezza [R2]	1.1
<b>Superficie di forma circolare</b>	

**Maglia dei Centri**

Ascissa vertice sinistro inferiore xi	3.51 m
Ordinata vertice sinistro inferiore yi	207.66 m
Ascissa vertice destro superiore xs	52.7 m
Ordinata vertice destro superiore ys	237.35 m
Passo di ricerca	10.0
Numero di celle lungo x	10.0
Numero di celle lungo y	10.0

**Coefficienti sismici [N.T.C.] 2018**

**Dati generali**

Descrizione:	
Latitudine:	41.77
Longitudine:	15.03
Tipo di costruzione:	2 - Opere ordinarie
Classe d'uso:	Classe IV
Vita nominale:	50.0 [anni]
Vita di riferimento:	100.0 [anni]

**Parametri sismici su sito di riferimento**

Categoria sottosuolo:	C
Categoria topografica:	T1

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s <sup>2</sup> ]	F0 [-]	TC* [sec]
S.L.O.	60.0	0.8	2.47	0.3
S.L.D.	101.0	1.03	2.5	0.32
S.L.V.	949.0	2.63	2.44	0.35
S.L.C.	1950.0	3.4	2.43	0.36

**Coefficienti sismici orizzontali e verticali**

Opera: Stabilità dei pendii

S.L. Stato limite	amax [m/s <sup>2</sup> ]	beta [-]	kh [-]	kv [sec]
S.L.O.	1.2	0.2	0.0245	0.0122
S.L.D.	1.545	0.24	0.0378	0.0189
S.L.V.	3.4383	0.28	0.0982	0.0491

S.L.C.	4.0612	0.28	0.116	0.058
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Coefficiente azione sismica orizzontale 0.0982  
 Coefficiente azione sismica verticale 0.0491

#### Vertici profilo

N	X m	y m
1	0.0	186.0
2	11.33	185.0
3	30.81	190.0
4	43.59	195.0
5	65.11	200.0
6	89.58	205.0
7	112.54	210.0
8	144.74	213.0
9	150.73	213.3
10	167.8	213.2

#### Vertici strato .....1

N	X m	y m
1	0.0	184.0
2	11.75	183.97
3	30.16	188.28
4	45.25	192.89
5	65.52	197.92
6	91.69	203.24
7	113.97	208.12
8	126.05	209.99
9	135.7	211.06
10	144.74	213.0
11	150.73	213.3
12	167.8	213.2

#### Vertici strato .....2

N	X m	y m
1	0.0	184.0
2	11.75	183.97
3	30.16	188.28
4	45.25	192.89
5	65.52	197.82
6	91.69	203.24
7	113.97	208.12
8	126.05	209.99
9	135.7	211.06
10	135.7	211.06
11	144.85	210.72
12	155.84	210.89
13	167.8	211.0

#### Stratigrafia

c: coesione; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo

Strato	c (kg/cm <sup>2</sup> )	Fi (°)	G (Kg/m <sup>3</sup> )	Gs (Kg/m <sup>3</sup> )	Litologia
1	0.1	21	1980	2000	
2	0	32	1900	1930	
3	0.45	21.5	2100	2110	

## Risultati analisi pendio [A2+M2+R2]

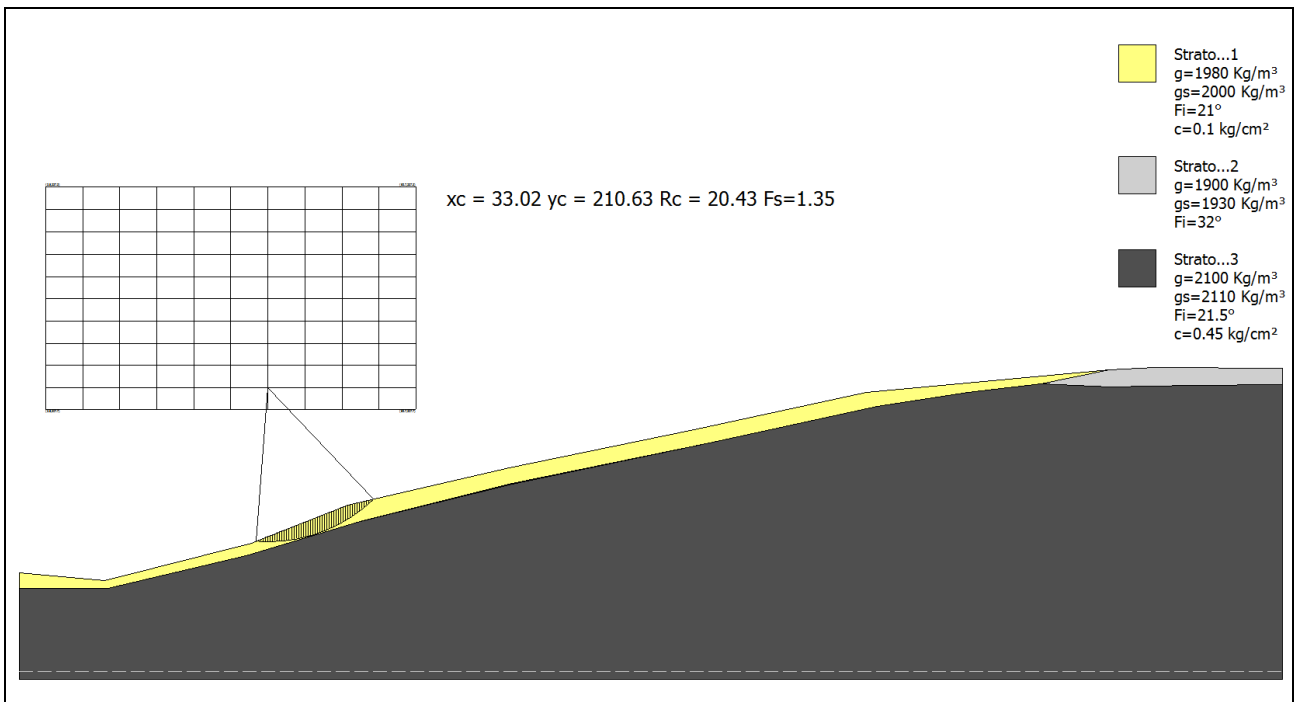
Fs minimo individuato	1.35
Ascissa centro superficie	33.02 m
Ordinata centro superficie	210.63 m
Raggio superficie	20.43 m

B: Larghezza del concio; Alfa: Angolo di inclinazione della base del concio; Li: Lunghezza della base del concio; Wi: Peso del concio ; Ui: Forze derivanti dalle pressioni neutre; Ni: forze agenti normalmente alla direzione di scivolamento; Ti: forze agenti parallelamente alla superficie di scivolamento; Fi: Angolo di attrito; c: coesione.

### Analisi dei conc. Superficie...xc = 33.024 yc = 210.63 Rc = 20.426 Fs=1.3492

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm <sup>2</sup> )	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	0.31	-3.9	0.31	44.69	4.39	2.19	0.08	17.1	0.0	58.3	198.8
2	0.31	-3.0	0.31	131.8	12.94	6.47	0.08	17.1	0.0	143.5	218.0
3	0.31	-2.1	0.31	215.94	21.21	10.6	0.08	17.1	0.0	224.9	236.4
4	0.31	-1.3	0.31	297.13	29.18	14.59	0.08	17.1	0.0	302.9	254.0
5	0.31	-0.4	0.31	375.39	36.86	18.43	0.08	17.1	0.0	377.3	270.9
6	0.31	0.5	0.31	450.69	44.26	22.13	0.08	17.1	0.0	448.3	287.1
7	0.31	1.4	0.31	523.04	51.36	25.68	0.08	17.1	0.0	516.0	302.6
8	0.31	2.2	0.31	592.45	58.18	29.09	0.08	17.1	0.0	580.6	317.4
9	0.31	3.1	0.31	658.89	64.7	32.35	0.08	17.1	0.0	641.9	331.4
10	0.31	4.0	0.31	722.38	70.94	35.47	0.08	17.1	0.0	700.1	344.9
11	0.31	4.9	0.31	782.91	76.88	38.44	0.08	17.1	0.0	755.4	357.7
12	0.31	5.7	0.31	840.44	82.53	41.27	0.08	17.1	0.0	807.5	369.8
13	0.31	6.6	0.31	894.99	87.89	43.94	0.08	17.1	0.0	856.8	381.3
14	0.31	7.5	0.31	946.52	92.95	46.47	0.08	17.1	0.0	903.1	392.2
15	0.31	8.4	0.32	995.06	97.71	48.86	0.08	17.1	0.0	946.5	402.5
16	0.31	9.3	0.32	1040.53	102.18	51.09	0.08	17.1	0.0	987.0	412.2
17	0.31	10.2	0.32	1082.93	106.34	53.17	0.08	17.1	0.0	1024.7	421.2
18	0.31	11.0	0.32	1122.26	110.21	55.1	0.08	17.1	0.0	1059.6	429.7
19	0.31	12.0	0.32	1158.45	113.76	56.88	0.08	17.1	0.0	1091.5	437.6
20	0.31	12.8	0.32	1191.5	117.01	58.5	0.08	17.1	0.0	1120.7	444.9
21	0.31	13.7	0.32	1221.39	119.94	59.97	0.08	17.1	0.0	1147.0	451.6
22	0.31	14.6	0.32	1248.05	122.56	61.28	0.08	17.1	0.0	1170.4	457.7
23	0.31	15.6	0.32	1271.45	124.86	62.43	0.08	17.1	0.0	1190.9	463.1
24	0.31	16.5	0.33	1291.56	126.83	63.42	0.08	17.1	0.0	1208.5	468.0
25	0.31	17.4	0.33	1308.33	128.48	64.24	0.08	17.1	0.0	1223.1	472.3
26	0.31	18.3	0.33	1321.69	129.79	64.89	0.08	17.1	0.0	1234.7	475.9
27	0.31	19.2	0.33	1331.63	130.77	65.38	0.08	17.1	0.0	1243.2	479.0
28	0.31	20.1	0.33	1338.07	131.4	65.7	0.08	17.1	0.0	1248.7	481.3
29	0.31	21.1	0.33	1340.93	131.68	65.84	0.08	17.1	0.0	1250.9	483.1
30	0.31	22.0	0.34	1340.18	131.61	65.8	0.08	17.1	0.0	1249.8	484.1
31	0.31	23.0	0.34	1335.71	131.17	65.58	0.08	17.1	0.0	1245.4	484.5
32	0.31	23.9	0.34	1327.49	130.36	65.18	0.08	17.1	0.0	1237.5	484.1
33	0.31	24.9	0.34	1315.39	129.17	64.59	0.08	17.1	0.0	1225.9	483.0
34	0.31	25.9	0.35	1299.35	127.6	63.8	0.08	17.1	0.0	1210.7	481.2
35	0.31	26.8	0.35	1279.26	125.62	62.81	0.08	17.1	0.0	1191.5	478.6
36	0.31	27.8	0.35	1255.02	123.24	61.62	0.08	17.1	0.0	1168.3	475.2
37	0.31	28.8	0.36	1226.51	120.44	60.22	0.08	17.1	0.0	1140.8	470.9
38	0.31	29.8	0.36	1193.65	117.22	58.61	0.08	17.1	0.0	1108.9	465.7
39	0.25	30.7	0.3	946.15	92.91	46.46	0.08	17.1	0.0	877.6	375.4

40	0.37	31.8	0.43	1302.89	127.94	63.97	0.08	17.1	0.0	1203.2	531.7
41	0.31	32.9	0.37	1015.79	99.75	49.88	0.08	17.1	0.0	930.2	432.1
42	0.31	34.0	0.38	933.34	91.65	45.83	0.08	17.1	0.0	845.4	415.5
43	0.31	35.0	0.38	845.74	83.05	41.53	0.08	17.1	0.0	754.1	397.6
44	0.31	36.1	0.39	752.77	73.92	36.96	0.08	17.1	0.0	655.8	378.3
45	0.31	37.2	0.39	654.21	64.24	32.12	0.08	17.1	0.0	550.0	357.4
46	0.31	38.3	0.4	549.83	53.99	27.0	0.08	17.1	0.0	436.0	335.0
47	0.31	39.4	0.4	439.35	43.14	21.57	0.08	17.1	0.0	313.3	310.8
48	0.31	40.6	0.41	322.47	31.67	15.83	0.08	17.1	0.0	180.8	284.7
49	0.31	41.7	0.42	198.89	19.53	9.77	0.08	17.1	0.0	37.8	256.5
50	0.31	42.9	0.43	68.21	6.7	3.35	0.08	17.1	0.0	-116.9	226.0



## VERIFICA DI STABILITÀ PRE-OPERAM IN PRESENZA DI FALDA ACQUIFERA

### Analisi di stabilità dei pendii con BISHOP

Numero di strati	3.0
Numero dei conci	50.0
Coefficiente di sicurezza [R2]	1.1

### Superficie di forma circolare

### Maglia dei Centri

Ascissa vertice sinistro inferiore xi	3.51 m
Ordinata vertice sinistro inferiore yi	207.66 m
Ascissa vertice destro superiore xs	52.7 m
Ordinata vertice destro superiore ys	237.35 m
Passo di ricerca	10.0
Numero di celle lungo x	10.0
Numero di celle lungo y	10.0

### Coefficienti sismici [N.T.C.] 2018

#### Dati generali

Descrizione:	
Latitudine:	41.77
Longitudine:	15.03
Tipo di costruzione:	2 - Opere ordinarie
Classe d'uso:	Classe IV
Vita nominale:	50.0 [anni]
Vita di riferimento:	100.0 [anni]

#### Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T1

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s <sup>2</sup> ]	F0 [-]	TC* [sec]
S.L.O.	60.0	0.8	2.47	0.3
S.L.D.	101.0	1.03	2.5	0.32
S.L.V.	949.0	2.63	2.44	0.35
S.L.C.	1950.0	3.4	2.43	0.36

#### Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii

S.L. Stato limite	amax [m/s <sup>2</sup> ]	beta [-]	kh [-]	kv [sec]
S.L.O.	1.2	0.2	0.0245	0.0122
S.L.D.	1.545	0.24	0.0378	0.0189
S.L.V.	3.4383	0.28	0.0982	0.0491
S.L.C.	4.0612	0.28	0.116	0.058

Coefficiente azione sismica orizzontale	0.0982
Coefficiente azione sismica verticale	0.0491

**Vertici profilo**

N	X m	y m
1	0.0	186.0
2	11.33	185.0
3	30.81	190.0
4	43.59	195.0
5	65.11	200.0
6	89.58	205.0
7	112.54	210.0
8	144.74	213.0
9	150.73	213.3
10	167.8	213.2

**Falda**

Nr.	X m	y m
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2	11.33	185.0
3	30.81	190.0
4	43.59	195.0
5	65.11	200.0
6	89.58	205.0
7	112.54	210.0
8	144.74	213.0
9	150.73	213.3
10	167.8	213.2

**Vertici strato .....1**

N	X m	y m
1	0.0	184.0
2	11.75	183.97
3	30.16	188.28
4	45.25	192.89
5	65.52	197.92
6	91.69	203.24
7	113.97	208.12
8	126.05	209.99
9	135.7	211.06
10	144.74	213.0
11	150.73	213.3
12	167.8	213.2

**Vertici strato .....2**

N	X m	y m
1	0.0	184.0
2	11.75	183.97
3	30.16	188.28
4	45.25	192.89
5	65.52	197.82
6	91.69	203.24
7	113.97	208.12
8	126.05	209.99
9	135.7	211.06
10	135.7	211.06
11	144.85	210.72
12	155.84	210.89
13	167.8	211.0

## Stratigrafia

c: coesione; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo

Strato	c (kg/cm <sup>2</sup> )	Fi (°)	G (Kg/m <sup>3</sup> )	Gs (Kg/m <sup>3</sup> )	Litologia
1	0.1	21	1980	2000	
2	0	32	1900	1930	
3	0.45	21.5	2100	2110	

## Risultati analisi pendio [A2+M2+R2]

Fs minimo individuato	0.96
Ascissa centro superficie	33.02 m
Ordinata centro superficie	210.63 m
Raggio superficie	20.43 m

## Analisi dei conci. Superficie...xc = 33.024 yc = 210.63 Rc = 20.426 Fs=0.9608

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm <sup>2</sup> )	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	0.31	-3.9	0.31	45.14	4.43	2.22	0.08	17.1	72.3	41.3	273.7
2	0.31	-3.0	0.31	133.13	13.07	6.54	0.08	17.1	213.3	81.9	286.4
3	0.31	-2.1	0.31	218.12	21.42	10.71	0.08	17.1	349.4	120.3	298.5
4	0.31	-1.3	0.31	300.13	29.47	14.74	0.08	17.1	480.8	157.0	310.1
5	0.31	-0.4	0.31	379.18	37.24	18.62	0.08	17.1	607.4	191.9	321.2
6	0.31	0.5	0.31	455.25	44.71	22.35	0.08	17.1	729.3	224.8	331.7
7	0.31	1.4	0.31	528.32	51.88	25.94	0.08	17.1	846.4	256.2	341.8
8	0.31	2.2	0.31	598.43	58.77	29.38	0.08	17.1	958.7	285.9	351.4
9	0.31	3.1	0.31	665.54	65.36	32.68	0.08	17.1	1066.2	313.7	360.5
10	0.31	4.0	0.31	729.68	71.65	35.83	0.08	17.1	1169.0	340.0	369.2
11	0.31	4.9	0.31	790.82	77.66	38.83	0.08	17.1	1266.9	364.8	377.4
12	0.31	5.7	0.31	848.93	83.37	41.68	0.08	17.1	1360.0	387.8	385.1
13	0.31	6.6	0.31	904.03	88.78	44.39	0.08	17.1	1448.3	409.5	392.5
14	0.31	7.5	0.31	956.08	93.89	46.94	0.08	17.1	1531.7	429.6	399.4
15	0.31	8.4	0.32	1005.11	98.7	49.35	0.08	17.1	1610.2	448.2	405.9
16	0.31	9.3	0.32	1051.04	103.21	51.61	0.08	17.1	1683.8	465.2	412.0
17	0.31	10.2	0.32	1093.87	107.42	53.71	0.08	17.1	1752.4	480.8	417.7
18	0.31	11.0	0.32	1133.6	111.32	55.66	0.08	17.1	1816.0	495.0	423.0
19	0.31	12.0	0.32	1170.15	114.91	57.45	0.08	17.1	1874.6	507.5	427.8
20	0.31	12.8	0.32	1203.53	118.19	59.09	0.08	17.1	1928.1	518.7	432.3
21	0.31	13.7	0.32	1233.72	121.15	60.58	0.08	17.1	1976.4	528.3	436.4
22	0.31	14.6	0.32	1260.66	123.8	61.9	0.08	17.1	2019.6	536.5	440.1
23	0.31	15.6	0.32	1284.29	126.12	63.06	0.08	17.1	2057.4	543.2	443.3
24	0.31	16.5	0.33	1304.61	128.11	64.06	0.08	17.1	2090.0	548.3	446.2
25	0.31	17.4	0.33	1321.54	129.78	64.89	0.08	17.1	2117.1	551.9	448.7
26	0.31	18.3	0.33	1335.04	131.1	65.55	0.08	17.1	2138.8	554.1	450.8
27	0.31	19.2	0.33	1345.08	132.09	66.04	0.08	17.1	2154.8	554.5	452.4
28	0.31	20.1	0.33	1351.58	132.73	66.36	0.08	17.1	2165.2	553.4	453.7
29	0.31	21.1	0.33	1354.48	133.01	66.5	0.08	17.1	2169.9	550.5	454.5
30	0.31	22.0	0.34	1353.72	132.93	66.47	0.08	17.1	2168.7	546.1	454.9
31	0.31	23.0	0.34	1349.2	132.49	66.25	0.08	17.1	2161.5	539.9	454.8
32	0.31	23.9	0.34	1340.9	131.68	65.84	0.08	17.1	2148.1	531.9	454.3
33	0.31	24.9	0.34	1328.67	130.48	65.24	0.08	17.1	2128.6	522.1	453.3
34	0.31	25.9	0.35	1312.47	128.88	64.44	0.08	17.1	2102.6	510.2	451.9
35	0.31	26.8	0.35	1292.19	126.89	63.45	0.08	17.1	2070.1	496.5	449.9
36	0.31	27.8	0.35	1267.7	124.49	62.24	0.08	17.1	2030.9	480.5	447.4
37	0.31	28.8	0.36	1238.9	121.66	60.83	0.08	17.1	1984.8	462.5	444.4

38	0.31	29.8	0.36	1205.71	118.4	59.2	0.08	17.1	1931.5	442.2	440.9
39	0.25	30.7	0.3	955.71	93.85	46.93	0.08	17.1	1876.9	343.9	356.6
40	0.37	31.8	0.43	1316.05	129.24	64.62	0.08	17.1	1780.3	459.0	508.7
41	0.31	32.9	0.37	1026.05	100.76	50.38	0.08	17.1	1643.8	340.5	418.3
42	0.31	34.0	0.38	942.77	92.58	46.29	0.08	17.1	1510.3	294.1	407.3
43	0.31	35.0	0.38	854.28	83.89	41.95	0.08	17.1	1368.6	244.6	395.4
44	0.31	36.1	0.39	760.37	74.67	37.33	0.08	17.1	1218.1	191.4	382.8
45	0.31	37.2	0.39	660.82	64.89	32.45	0.08	17.1	1058.6	134.7	369.2
46	0.31	38.3	0.4	555.38	54.54	27.27	0.08	17.1	889.7	73.9	354.7
47	0.31	39.4	0.4	443.79	43.58	21.79	0.08	17.1	710.9	8.6	339.1
48	0.31	40.6	0.41	325.72	31.99	15.99	0.08	17.1	521.8	-61.5	322.4
49	0.31	41.7	0.42	200.9	19.73	9.86	0.08	17.1	321.8	-136.8	304.4
50	0.31	42.9	0.43	68.9	6.77	3.38	0.08	17.1	110.4	-217.9	285.1

