ALLEGATO E: *Verifiche di stabilità globale FASE 3: completamento finale*

LISTATO DI CALCOLO – FASE 3

RICERCA SUPERFICIE CRITICA CIRCOLARE

Analisi di stabilità dei pendii con: JANBU (1956)

Lat./Long.	44.417087/9.129564
Normativa	NTC 2008
Numero di strati	4.0
Numero dei conci	25.0
Grado di sicurezza ritenuto accettabile	1.1
Coefficiente parziale resistenza	1.1
Analisi	Condizione drenata
Superficie di forma circolare	

Maglia dei Centri

Ascissa vertice sinistro inferiore xi	0.0 m
Ordinata vertice sinistro inferiore yi	80.0 m
Ascissa vertice destro superiore xs	160.0 m
Ordinata vertice destro superiore ys	350.0 m
Passo di ricerca	10.0
Numero di celle lungo x	20.0
Numero di celle lungo y	20.0

Coefficienti sismici [N.T.C.]

Dati generali

Tipo opera:	2 - Opere ordinarie
Classe d'uso:	Classe II
Vita nominale:	50.0 [anni]
Vita di riferimento:	50.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T3

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s²]	F0 [-]	TC* [sec]
S.L.O.	30.0	0.28	2.5	0.2
S.L.D.	50.0	0.35	2.55	0.22
S.L.V.	475.0	0.85	2.51	0.28
S.L.C.	975.0	1.13	2.48	0.29

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii e Fondazioni

S.L. Stato limite	amax [m/s²]	beta [-]	kh [-]	kv [sec]
S.L.O.	0.504	0.2	0.0103	0.0051
S.L.D.	0.63	0.2	0.0128	0.0064
S.L.V.	1.53	0.2	0.0312	0.0156
S.L.C.	2.034	0.24	0.0498	0.0249

Coefficiente azione sismica orizzontale	0.0312
Coefficiente azione sismica verticale	0.0156

Vertici profilo

N	X m	y m
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	21.06	7.15
8	22.59	7.61
9	26.5	8.1
10	32.75	9.52
11	40.67	11.99
12	40.78	12.47
13	44.4	12.47
14	44.4	18.47
15	61.26	24.82
16	67.63	24.82
17	67.63	28.82
18	71.75	31.66
19	75.51	31.66
20	75.89	32.65
21	79.52	32.65
22	79.52	36.65
23	83.49	38.64
24	88.14	38.73
25	88.15	38.76
26	91.8	38.76
27	91.8	42.76
28	95.64	44.36
29	104.22	44.36
30	104.22	48.36
31	115.54	50.26
32	121.1	50.26
33	121.74	51.53
34	125.19	51.53
35	125.19	55.53
36	132.31	58.76
37	137.8	58.76
38	137.88	58.93
39	141.61	58.93
40	141.61	62.93
41	145.87	64.54
42	157.55	64.54
43	157.72	65.0
44	161.24	65.0
45	161.24	69.0
46	168.1	70.49
47	173.12	70.52
48	173.29	71.0
49	176.97	71.0
50	176.97	75.0
51	184.02	76.51
52	189.04	76.57
53	189.24	77.09
54	193.25	77.09
55	193.25	81.09
56	199.73	82.47
57	204.74	82.5
58	204.89	82.89
59	208.12	82.89

60	208.12	86.89
61	215.56	88.51
62	220.57	88.54
63	220.77	89.05
64	224.58	89.05
65	224.58	93.05
66	231.36	94.51
67	236.37	94.54
68	236.54	95.01
69	240.15	95.01
70	240.15	99.01
71	247.18	100.51
72	257.19	100.54
73	257.37	101.02
74	260.98	101.02
75	260.98	105.02
76	268.02	106.57
77	273.03	106.6
78	273.15	106.92
79	276.21	106.92
80	276.21	110.92
81	283.9	112.51
82	288.91	112.54
83	289.11	113.08
84	293.01	113.08
85	293.01	117.08
86	299.66	118.51
87	304.67	118.6
88	304.82	118.99
89	308.41	118.99
90	308.41	122.99
91	315.6	124.51
92	320.61	124.54
93	320.77	124.95
94	324.17	124.95
95	324.17	128.95
96	324.74	129.07
97	340.09	129.07
98	340.09	133.07
99	433.51	133.0 2

Falda

Nr.	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	20.45	6.09
8	102.78	22.6
9	102.8	22.6
10	159.6	45.8
11	159.6	45.8
12	294.28	96.5
13	294.29	96.5
14	330.58	115.8
15	330.6	115.8
16	363.07	120.8
17	363.1	120.8
18	414.33	131.5

19	433.8	136.4 5

Vertici strato 1

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	21.06	7.15
9	22.59	7.61
10	26.5	8.1
11	32.75	9.52
12	42.61	12.6
13	48.71	13.21
14	53.26	14.02
15	58.12	15.53
16	64.29	17.64
17	70.5	18.02
18	81.13	21.02
19	93.9	23.5
20	101.03	24.85
21	109.98	30.03
22	118.88	31.91
23	128.0	36.58
24	139.9	40.13
25	142.92	40.79
26	159.6	43.29
27	172.1	48.29
28	184.1	53.29
29	192.1	58.29
30	200.1	63.29
31	216.6	68.29
32	239.1	73.29
33	264.1	78.29
34	274.1	83.29
35	284.1	88.29
36	292.6	93.29
37	300.6	98.29
38	308.1	103.29
39	318.1	108.29
40	330.6	113.29
41	363.1	118.29
42	370.6	123.29
43	375.1	128.29
44	375.1	128.29
45	375.1	128.29
46	433.51	133. 0

Vertici strato 2

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	19.56	4.52
9	22.25	5.7

10	66.68	13.34
11	100.36	19.1
12	118.09	19.1
13	161.53	39.47
14	200.09	51.87
15	224.02	63.38
16	261.26	69.58
17	289.18	80.21
18	310.9	95.71
19	344.58	107.22
20	376.94	110.76
21	433.51	116.0 2

Vertici strato 3

N	X (m)	y (m)
1	0.0	-10.56
2	13.59	-7.3
3	29.81	-2.65
4	33.05	-1.72
5	39.85	0.02
6	54.66	2.02
7	70.5	4.15
8	87.26	6.45
9	90.23	7.38
10	93.4	8.38
11	96.57	9.37
12	100.79	10.7
13	108.18	13.01
14	111.13	14.19
15	115.57	15.33
16	117.58	15.96
17	119.26	16.49
18	124.31	18.08
19	127.17	18.98
20	131.46	20.67
21	138.89	23.6
22	144.47	25.8
23	150.88	28.32
24	155.61	30.19
25	163.73	33.38
26	171.63	36.49
27	179.77	39.7
28	185.34	41.9
29	192.38	44.67
30	194.63	45.56
31	202.06	48.48
32	207.37	50.36
33	212.01	51.32
34	216.59	52.5
35	222.0	53.88
36	224.95	55.07
37	226.44	55.02
38	230.89	56.16
39	236.44	57.58
40	243.1	59.29
41	251.98	61.57
42	265.52	65.03
43	273.41	67.06
44	277.44	68.18
45	285.22	71.4
46	299.4	77.28
47	308.54	81.07

48	314.66	83.6
49	327.98	89.12
50	334.95	91.81
51	377.91	98.27
52	396.1	101.0
53	414.03	103.62
54	433.51	106.06

Coefficienti parziali per i parametri geotecnici del terreno

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Tangente angolo di resistenza al taglio	1.25
Coesione efficace	1.25
Coesione non drenata	1.4
Riduzione parametri geotecnici terreno	Si

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Stratigrafia

c: coesione; cu: coesione non drenata; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo; K: Modulo di Winkler

Strato	c (kg/cm²)	cu (kg/cm²)	Fi (°)	G (Kg/m³)	Gs (Kg/m³)	K (Kg/cm³)	Litologia	
1	0.0383		29.60	1837	2063	0.00		
2	0		26.51	1695	1905	0.00		
3	0.3305		30.52	2402	2698	0.00		
4	0.4352		33.31	2402	2698	0.00		

Muri di sostegno - Caratteristiche geometriche

N°	x (m)	y (m)	Base mensola a valle (m)	Base mensola a monte (m)	Altezza muro (m)	Spessore testa (m)	Spessore base (m)	Peso specifico (Kg/m³)
1	44.4	12.47	0	0.1	6	2	4	2800
2	67.63	24.82	0	0.1	4	3	4	2800
3	79.52	32.65	0	0.1	4	3	4	2800
4	91.8	38.76	0	0.1	4	3	4	2800
5	104.22	44.35	0	0.1	4	3	4	2800
6	125.19	51.53	0	0.1	4	3	4	2800
7	141.61	58.93	0	0.1	4	3	4	2800
8	161.24	65	0	0.1	4	3	4	2800
9	176.97	71	0	0.1	4	3	4	2800
10	193.25	77.09	0	0.1	4	3	4	2800
11	208.12	82.89	0	0.1	4	3	4	2800
12	224.58	89.05	0	0.1	4	3	4	2800
13	240.15	95.01	0	0.1	4	3	4	2800
14	260.98	101.02	0	0.1	4	3	4	2800
15	276.21	106.92	0	0.1	4	3	4	2800
16	293.01	113.08	0	0.1	4	3	4	2800
17	308.41	118.99	0	0.1	4	3	4	2800
18	324.17	124.95	0	0.1	4	3	4	2800
19	340.09	129.07	0	0.1	4	3	4	280 0

Pali...

N°	x (m)	y (m)	Diametro (m)	Lunghezza (m)	Inclinazione (°)	Interasse (m)
1	41.34258	10.96566	0.2	6	90	3.6
2	43.73619	10.96566	0.2	6	90	3.6

Risultati analisi pendio [NTC 2008: [A2+M2+R2]]

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Fs minimo individuato	1.17
Ascissa centro superficie	28.0 m
Ordinata centro superficie	113.75 m
Raggio superficie	105.44 m

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Numero di superfici esaminate....(253)

N°	Xo	Yo	Ro	Fs
1	40.0	80.0	75.8	1.25
2	44.0	86.8	81.7	1.28
3	48.0	80.0	75.8	1.29
4	56.0	80.0	75.7	1.30
5	60.0	86.8	81.8	1.30
6	64.0	80.0	75.7	1.32
7	68.0	86.8	63.6	1.67
8	72.0	80.0	51.1	1.86
9	76.0	86.8	72.8	1.34
10	80.0	80.0	67.2	1.38
11	84.0	86.8	72.8	1.38
12	88.0	80.0	67.6	1.42
13	92.0	86.8	81.7	1.75
14	96.0	80.0	67.6	1.56
15	100.0	86.8	81.8	1.77
16	104.0	80.0	75.7	1.87
17	108.0	86.8	81.8	1.90
18	112.0	80.0	42.1	1.84
19	116.0	86.8	72.8	1.91
20	120.0	80.0	59.0	1.62
21	124.0	86.8	63.9	1.64
22	128.0	80.0	50.4	1.63
23	132.0	86.8	55.0	1.63
24	136.0	80.0	67.2	2.15
25	140.0	86.8	45.5	1.90
26	144.0	80.0	42.5	1.78
27	148.0	86.8	54.5	1.68
28	152.0	80.0	50.4	2.01
29	156.0	86.8	54.6	1.90
30	160.0	80.0	42.1	1.95
31	28.0	100.3	83.3	1.96
32	40.0	93.5	87.8	1.27
33	52.0	100.3	93.9	1.29
34	60.0	100.3	93.9	1.28
35	64.0	93.5	87.8	1.30
36	76.0	100.3	83.4	1.24
37	80.0	93.5	78.0	1.34
38	84.0	100.3	73.0	1.59
39	92.0	100.3	83.4	1.37
40	96.0	93.5	78.0	1.51
41	104.0	93.5	58.6	1.87
42	108.0	100.3	93.8	1.79
43	112.0	93.5	78.1	1.79
44	116.0	100.3	73.0	1.48
45	120.0	93.5	68.4	1.57
46	124.0	100.3	62.6	1.76
47	128.0	93.5	58.7	1.68
48	132.0	100.3	41.7	21.91
49	136.0	93.5	49.0	1.87
50	140.0	100.3	62.6	1.56
51	144.0	93.5	58.7	1.63
52	152.0	93.5	58.7	1.63
53	156.0	100.3	62.6	1.66
54	160.0	93.5	58.6	1.93
55	28.0	113.8	105.4	1.17
56	32.0	107.0	99.9	1.27
57	44.0	113.8	94.2	1.57
58	48.0	107.0	99.9	1.29

59	56.0	107.0	99.9	1.29
60	60.0	113.8	106.0	1.28
61	64.0	107.0	99.9	1.29
62	68.0	113.8	94.3	1.35
63	72.0	107.0	88.8	1.30
64	76.0	113.8	94.3	1.33
65	84.0	113.8	94.3	1.29
66	88.0	107.0	88.8	1.30
67	100.0	113.8	106.0	1.72
68	104.0	107.0	99.9	1.79
69	108.0	113.8	106.0	1.76
70	112.0	107.0	88.8	1.60
71	116.0	113.8	106.0	1.83
72	136.0	107.0	77.7	1.52
73	140.0	113.8	82.6	1.53
74	144.0	107.0	77.7	1.76
75	148.0	113.8	70.9	1.56
76	152.0	107.0	66.6	1.52
77	156.0	113.8	94.3	1.85
78	160.0	107.0	55.5	1.81
79	48.0	120.5	99.9	1.59
80	56.0	120.5	99.9	1.50
81	60.0	127.3	92.4	3.29
82	68.0	127.3	105.0	1.49
83	72.0	120.5	99.9	1.37
84	80.0	120.5	99.7	1.37
85	92.0	127.3	118.2	1.62
86	100.0	127.3	92.4	1.77
87	104.0	120.5	112.2	1.73
88	108.0	127.3	105.4	1.40
89	112.0	120.5	87.6	1.64
90	116.0	127.3	105.4	1.48
91	120.0	120.5	99.9	1.65
92	124.0	127.3	79.5	1.93
93	132.0	127.3	92.4	1.39
94	136.0	120.5	87.6	1.49
95	144.0	120.5	75.3	1.76
96	156.0	127.3	92.4	1.64
97	160.0	120.5	87.6	1.80
98	48.0	134.0	124.3	1.30
99	76.0	140.8	102.7	13.95
100	88.0	134.0	96.8	1.99
101	96.0	134.0	124.3	1.65
102	100.0	140.8	116.3	1.32
103	104.0	134.0	110.6	1.33
104	108.0	140.8	130.5	1.70
105	112.0	134.0	110.6	1.41
106	128.0	134.0	96.8	1.53
107	140.0	140.8	116.3	1.70
108	144.0	134.0	124.3	1.82
109	156.0	140.8	103.2	1.56
110	160.0	134.0	96.9	1.62
111	32.0	147.5	137.2	1.23
112	36.0	154.3	128.5	2.89
113	40.0	147.5	136.9	1.25
114	72.0	147.5	106.3	4.62
115	92.0	154.3	142.5	1.58
116	96.0	147.5	121.8	1.41
117	100.0	154.3	142.8	1.60
118	104.0	147.5	136.5	1.66
119	112.0	147.5	122.5	1.37
120	116.0	154.3	143.0	1.68
121	132.0	154.3	127.7	1.61

122	136.0	147.5	121.4	1.67
123	140.0	154.3	110.8	1.49
124	148.0	154.3	112.3	1.38
125	152.0	147.5	108.8	1.42
126	156.0	154.3	112.7	1.49
127	160.0	147.5	106.7	1.48
128	4.0	167.8	154.5	2.56
129	84.0	167.8	138.0	1.64
130	92.0	167.8	137.7	1.55
131	96.0	161.0	132.5	1.48
132	108.0	167.8	154.8	1.65
133	112.0	161.0	148.8	1.66
134	116.0	167.8	154.9	1.69
135	128.0	161.0	132.3	1.49
136	132.0	167.8	138.4	1.61
137	136.0	161.0	133.3	1.61
138	140.0	167.8	154.9	1.78
139	144.0	161.0	148.6	1.76
140	148.0	167.8	120.7	1.51
141	152.0	161.0	117.9	1.39
142	156.0	167.8	138.7	1.69
143	160.0	161.0	132.5	1.74
144	44.0	181.3	148.6	3.63
145	92.0	181.3	166.9	1.55
146	96.0	174.5	160.9	1.62
147	100.0	181.3	167.3	1.63
148	104.0	174.5	160.8	1.63
149	112.0	174.5	161.0	1.67
150	116.0	181.3	167.1	1.68
151	124.0	181.3	148.8	1.40
152	128.0	174.5	143.0	1.39
153	136.0	174.5	126.8	1.68
154	148.0	181.3	167.1	1.74
155	152.0	174.5	143.3	1.66
156	4.0	194.8	179.5	6.51
157	48.0	188.0	154.0	4.47
158	84.0	194.8	178.9	1.30
159	88.0	188.0	173.3	1.47
160	96.0	188.0	135.1	2.97
161	100.0	194.8	179.5	1.58
162	108.0	194.8	159.4	1.53
163	112.0	188.0	173.4	1.64
164	116.0	194.8	161.0	1.32
165	120.0	188.0	154.2	1.34
166	140.0	194.8	179.2	1.73
167	144.0	188.0	172.9	1.74
168	148.0	194.8	159.9	1.56
169	152.0	188.0	154.2	1.65
170	160.0	188.0	135.2	1.57
171	60.0	208.3	171.8	6.43
172	76.0	208.3	191.6	1.25
173	80.0	201.5	164.7	1.88
174	88.0	201.5	164.8	1.77
175	96.0	201.5	185.2	1.53
176	108.0	208.3	149.1	4.28
177	136.0	201.5	144.8	2.00
178	28.0	221.8	203.0	1.55
179	36.0	221.8	203.2	1.49
180	76.0	221.8	203.8	1.25
181	88.0	215.0	197.2	1.37
182	100.0	221.8	203.8	1.54
183	104.0	215.0	197.3	1.58
184	140.0	221.8	203.4	1.63

185	144.0	215.0	197.1	1.70
186	0.0	228.5	210.3	2.49
187	60.0	235.3	216.4	1.28
188	64.0	228.5	209.9	1.24
189	84.0	235.3	215.5	1.23
190	88.0	228.5	209.7	1.34
191	116.0	235.3	193.3	1.58
192	136.0	228.5	165.1	8.48
193	148.0	235.3	191.8	1.40
194	160.0	228.5	186.7	1.50
195	4.0	248.8	228.1	2.91
196	48.0	242.0	221.6	1.42
197	56.0	242.0	222.4	1.32
198	68.0	248.8	227.7	1.24
199	88.0	242.0	198.0	31.52
200	96.0	242.0	221.5	1.53
201	140.0	248.8	227.9	1.63
202	148.0	248.8	203.0	1.38
203	156.0	248.8	202.4	1.38
204	160.0	242.0	197.5	1.36
205	52.0	262.3	240.2	1.45
206	60.0	262.3	240.7	1.36
207	64.0	255.5	208.9	2.85
208	72.0	255.5	233.7	1.22
209	76.0	262.3	240.2	1.28
210	80.0	255.5	233.8	1.28
211	88.0	255.5	234.1	1.30
212	92.0	262.3	213.5	14.55
213	124.0	262.3	213.8	1.60
214	132.0	262.3	213.8	1.54
215	136.0	255.5	209.2	1.41
216	144.0	255.5	207.6	1.41
217	152.0	255.5	209.1	1.38
218	156.0	262.3	188.2	8.83
219	72.0	269.0	245.8	1.22
220	76.0	275.8	224.8	3.58
221	112.0	269.0	219.4	1.77
222	124.0	275.8	252.2	1.54
223	76.0	289.3	235.6	5.14
224	124.0	289.3	264.3	1.55
225	128.0	282.5	257.9	1.55
226	0.0	296.0	271.1	3.43
227	32.0	296.0	269.4	1.80
228	108.0	302.8	276.1	1.47
229	112.0	296.0	240.7	2.02
230	132.0	302.8	246.1	1.75
231	140.0	302.8	246.3	1.69
232	148.0	302.8	246.1	1.59
233	156.0	302.8	247.0	1.44
234	160.0	296.0	240.8	1.38
235	116.0	316.3	288.5	1.49
236	128.0	309.5	250.9	66.79
237	156.0	316.3	289.1	1.75
238	160.0	309.5	282.6	1.77
239	12.0	329.8	300.5	3.60
240	100.0	329.8	300.8	1.39
241	104.0	323.0	262.3	6.14
242	108.0	329.8	300.4	1.43
243	112.0	323.0	294.6	1.47
244	148.0	329.8	300.7	1.69
245	152.0	323.0	295.0	1.73
246	156.0	329.8	301.2	1.74
247	160.0	323.0	294.7	1.77

248	56.0	336.5	307.3	1.57
249	76.0	343.3	313.0	1.35
250	148.0	343.3	312.8	1.71
251	152.0	336.5	307.1	1.73
252	64.0	350.0	319.4	1.52
253	144.0	350.0	318.7	1.71

==========

CARICO LIMITE PALI ESISTENTI

xc = 60.00 yc = 86.75 Rc = 81.758 Fs=1.3012
pali alla base x=41.34258 Y=10.96566 Plim=368.1 Kg Sbalzo del palo 5.59 m
pali alla base x=43.73619 Y=10.96566 Plim=368.1 Kg Sbalzo del palo 5.59 m

xc = 64.00 yc = 80.00 Rc = 75.739 Fs=1.3156
pali alla base x=41.34258 Y=10.96566 Plim=1766.5 Kg Sbalzo del palo 5.11 m
pali alla base x=43.73619 Y=10.96566 Plim=1766.5 Kg Sbalzo del palo 5.11 m

xc = 76.00 yc = 86.75 Rc = 72.786 Fs=1.3419
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 80.00 yc = 80.00 Rc = 67.222 Fs=1.3794
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 84.00 yc = 86.75 Rc = 72.795 Fs=1.3778
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 80.00 yc = 93.50 Rc = 78.022 Fs=1.3384
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 92.00 yc = 100.25 Rc = 83.44 Fs=1.3718
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 68.00 yc = 113.75 Rc = 94.323 Fs=1.3451
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 76.00 yc = 113.75 Rc = 94.334 Fs=1.3315
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 72.00 yc = 120.50 Rc = 99.902 Fs=1.3684
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 80.00 yc = 120.50 Rc = 99.723 Fs=1.3701
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 132.00 yc = 127.25 Rc = 92.422 Fs=1.3896
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 100.00 yc = 140.75 Rc = 116.341 Fs=1.3179
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 104.00 yc = 134.00 Rc = 110.561 Fs=1.3349
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 112.00 yc = 147.50 Rc = 122.498 Fs=1.3728
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 148.00 yc = 154.25 Rc = 112.334 Fs=1.3825
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 152.00 yc = 161.00 Rc = 117.942 Fs=1.3894
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 124.00 yc = 181.25 Rc = 148.762 Fs=1.3967
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 128.00 yc = 174.50 Rc = 143.045 Fs=1.3908
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 116.00 yc = 194.75 Rc = 160.98 Fs=1.3166
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 120.00 yc = 188.00 Rc = 154.245 Fs=1.3381
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 88.00 yc = 215.00 Rc = 197.202 Fs=1.3719
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 88.00 yc = 228.50 Rc = 209.665 Fs=1.3353
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 148.00 yc = 235.25 Rc = 191.839 Fs=1.3959
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 56.00 yc = 242.00 Rc = 222.369 Fs=1.315
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 148.00 yc = 248.75 Rc = 203.003 Fs=1.3817
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 156.00 yc = 248.75 Rc = 202.439 Fs=1.3774
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 160.00 yc = 242.00 Rc = 197.491 Fs=1.358
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 60.00 yc = 262.25 Rc = 240.685 Fs=1.3593
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

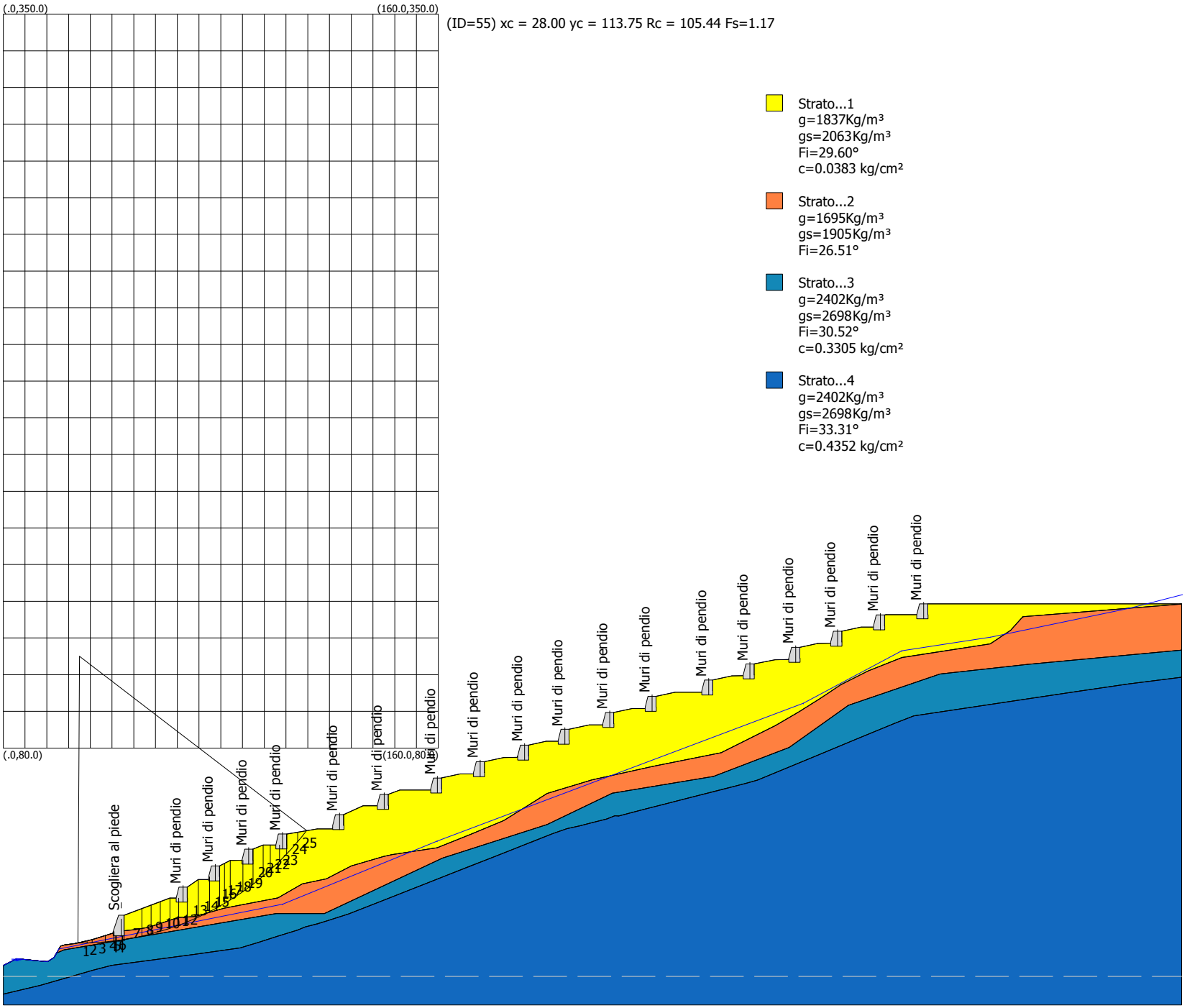
xc = 88.00 yc = 255.50 Rc = 234.12 Fs=1.3043
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 152.00 yc = 255.50 Rc = 209.063 Fs=1.3795
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

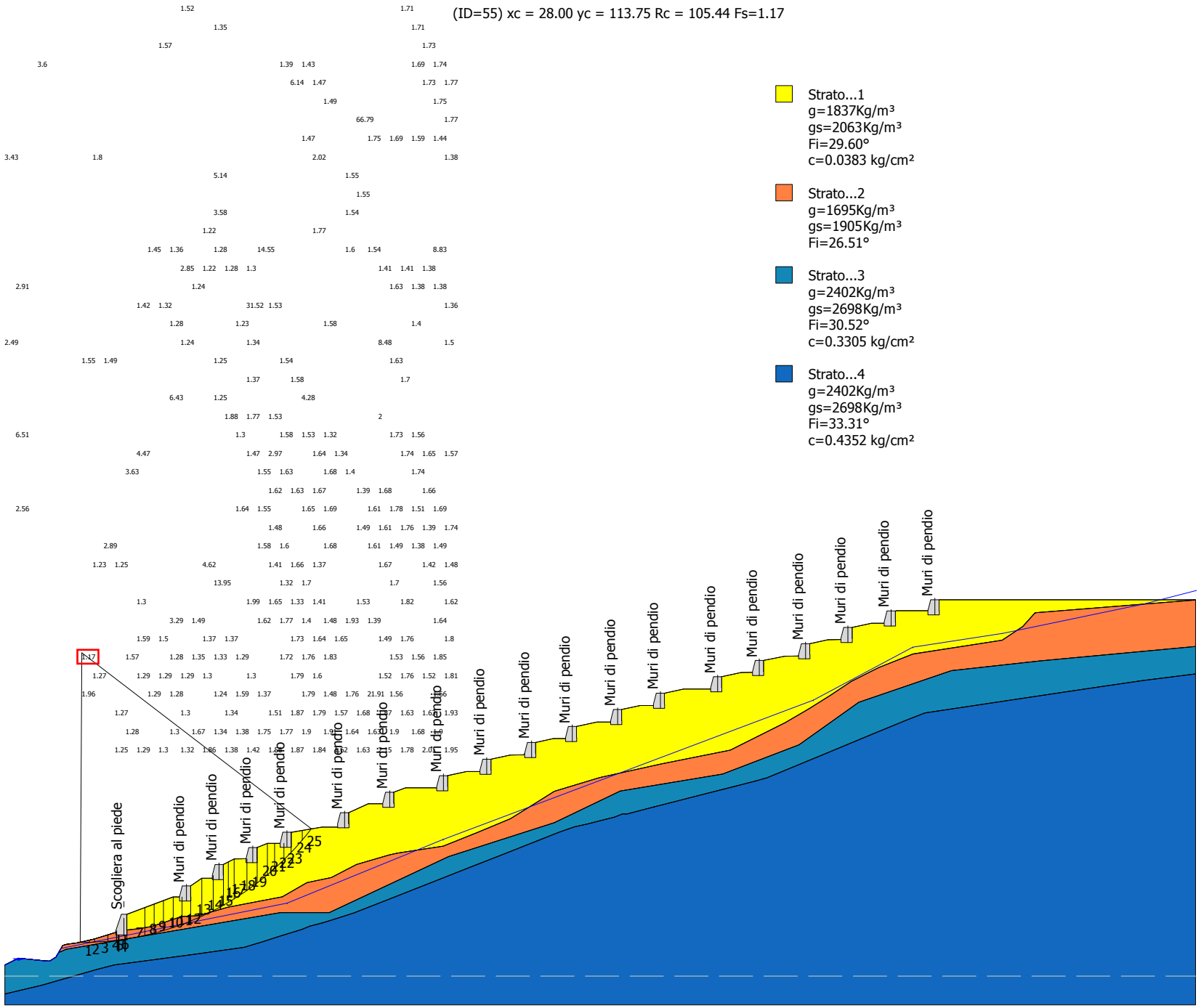
xc = 160.00 yc = 296.00 Rc = 240.826 Fs=1.3775
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

xc = 100.00 yc = 329.75 Rc = 300.831 Fs=1.3947
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m

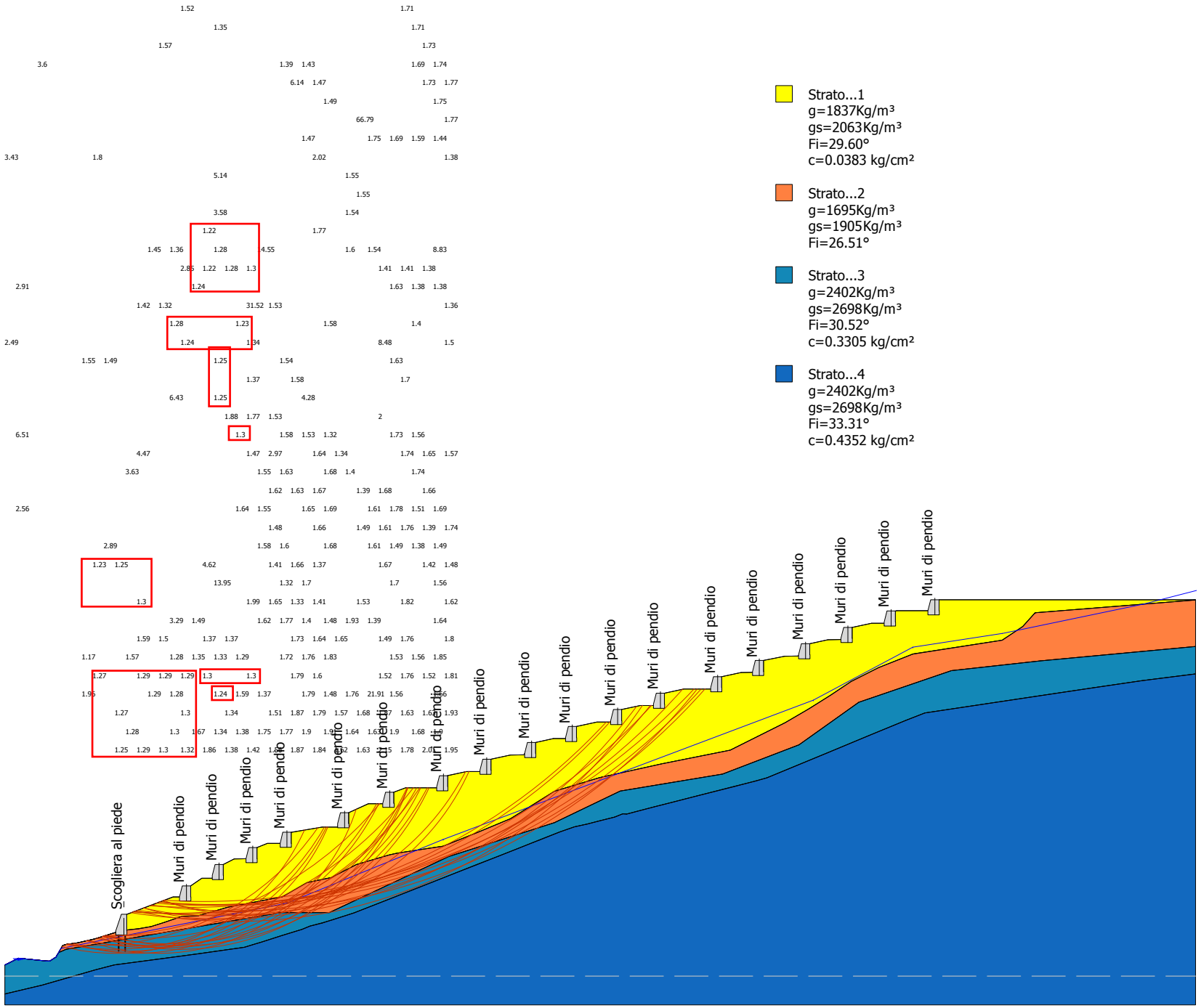
xc = 76.00 yc = 343.25 Rc = 312.964 Fs=1.3512
pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m


(.0,350.0)
(160.0,350.0)
(ID=55) xc = 28.00 yc = 113.75 Rc = 105.44 Fs=1.17
Strato...1
g=1837Kg/m³
gs=2063Kg/m³
Fi=29.60°
c=0.0383 kg/cm²
Strato...2
g=1695Kg/m³
gs=1905Kg/m³
Fi=26.51°
Strato...3
g=2402Kg/m³
gs=2698Kg/m³
Fi=30.52°
c=0.3305 kg/cm²
Strato...4
g=2402Kg/m³
gs=2698Kg/m³
Fi=33.31°
c=0.4352 kg/cm²
(.0,80.0)
(160.0,80.0)
Scogliera al piede
Muri di pendio

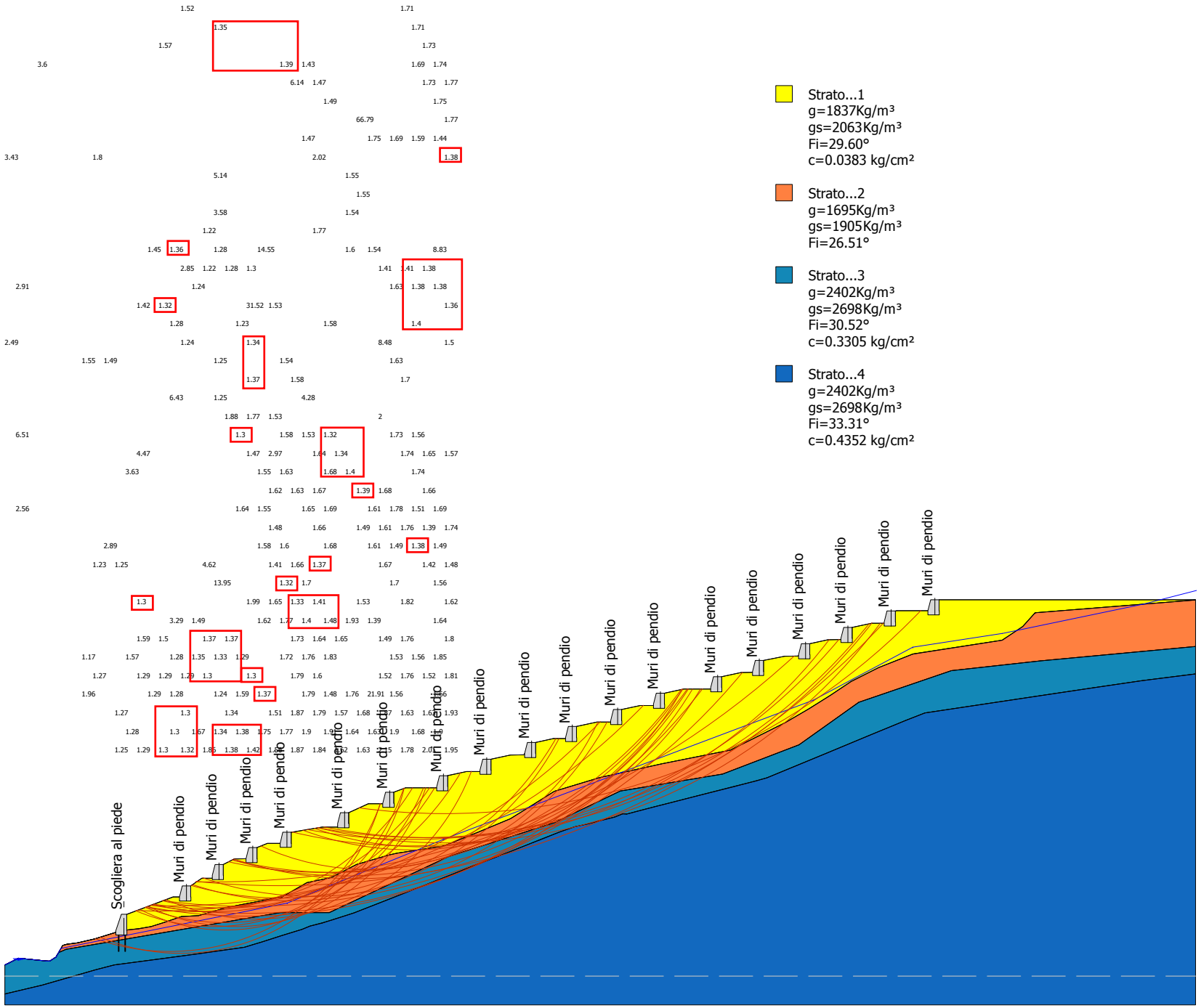
SUPERFICIE A FATTORE MINIMO FS=1.17



SUPERFICI FATTORE FS>1.1 - FS (1.2-1.3)



SUPERFICI FATTORE FS>1.1 - FS (1.3-1.4)



ANALISI SUPERFICIE GENERICA 1
Linea separatrice strato PREESISTENTE e strato nuovo materiale oggetto di deposito

Analisi di stabilità dei pendii con: JANBU (1956)

Lat./Long.	44.417087/9.129564
Normativa	NTC 2008
Numero di strati	4.0
Numero dei conci	15.0
Grado di sicurezza ritenuto accettabile	1.1
Coefficiente parziale resistenza	1.1
Analisi	Condizione drenata
Superficie di forma generica	

Coefficienti sismici [N.T.C.]

Dati generali

Tipo opera:	2 - Opere ordinarie
Classe d'uso:	Classe II
Vita nominale:	50.0 [anni]
Vita di riferimento:	50.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T3

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s²]	F0 [-]	TC* [sec]
S.L.O.	30.0	0.28	2.5	0.2
S.L.D.	50.0	0.35	2.55	0.22
S.L.V.	475.0	0.85	2.51	0.28
S.L.C.	975.0	1.13	2.48	0.29

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii e Fondazioni

S.L. Stato limite	amax [m/s²]	beta [-]	kh [-]	kv [sec]
S.L.O.	0.504	0.2	0.0103	0.0051
S.L.D.	0.63	0.2	0.0128	0.0064
S.L.V.	1.53	0.2	0.0312	0.0156
S.L.C.	2.034	0.24	0.0498	0.0249

Coefficiente azione sismica orizzontale	0.031
Coefficiente azione sismica verticale	0.016

Vertici profilo

N	X m	y m
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	21.06	7.15
8	22.59	7.61
9	26.5	8.1
10	32.75	9.52
11	40.67	11.99

12	40.78	12.47
13	44.41	12.47
14	44.41	18.47
15	63.11	25.52
16	68.65	25.52
17	68.65	29.52
18	71.75	31.66
19	75.51	31.66
20	75.86	32.59
21	79.4	32.59
22	79.4	36.59
23	83.49	38.64
24	88.14	38.73
25	88.19	38.85
26	92.03	38.85
27	92.03	42.85
28	95.67	44.37
29	104.28	44.37
30	104.28	48.37
31	115.54	50.26
32	121.1	50.26
33	121.76	51.58
34	125.29	51.58
35	125.29	55.58
36	132.31	58.76
37	137.8	58.76
38	137.9	58.96
39	141.69	58.96
40	141.69	62.96
41	145.87	64.54
42	157.55	64.54
43	157.74	65.05
44	161.48	65.05
45	161.48	69.05
46	168.1	70.49
47	173.12	70.52
48	173.32	71.07
49	177.3	71.07
50	177.3	75.07
51	184.02	76.51
52	189.03	76.54
53	189.23	77.06
54	193.1	77.06
55	193.1	81.06
56	199.73	82.47
57	204.74	82.5
58	204.92	82.98
59	208.56	82.98
60	208.56	86.98
61	215.56	88.51
62	220.57	88.54
63	220.76	89.04
64	224.49	89.04
65	224.49	93.04
66	231.36	94.51
67	236.37	94.54
68	236.56	95.05
69	240.34	95.05
70	240.34	99.05
71	246.76	100.42
72	267.01	100.47

73	272.02	102.54
74	276.14	102.54
75	276.14	105.14
76	277.14	105.14
77	282.79	107.56
78	287.09	107.56
79	287.09	110.16
80	288.09	110.16
81	296.09	112.54
82	299.97	112.54
83	299.97	115.14
84	300.97	115.14
85	307.85	117.6
86	315.6	117.6
87	315.6	120.2
88	316.6	120.2
89	324.51	122.58
90	329.47	122.58
91	329.47	125.18
92	330.47	125.18
93	339.18	127.6
94	344.88	127.6
95	344.88	130.2
96	345.88	130.2
97	355.93	132.19
98	355.93	132.19
99	433.8	133.0 2

Falda

Nr.	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	20.45	6.09
8	102.78	22.6
9	102.8	22.6
10	159.6	45.8
11	159.6	45.8
12	294.28	96.5
13	294.29	96.5
14	330.58	115.8
15	330.6	115.8
16	363.07	120.8
17	363.1	120.8
18	414.33	131.5
19	433.8	136.4 5

Vertici strato 1

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	21.06	7.15

9	22.59	7.61
10	26.5	8.1
11	32.75	9.52
12	42.61	12.6
13	48.71	13.21
14	53.26	14.02
15	58.12	15.53
16	64.29	17.64
17	70.5	18.02
18	81.13	21.02
19	93.9	23.5
20	101.03	24.85
21	109.98	30.03
22	118.88	31.91
23	128.0	36.58
24	139.9	40.13
25	142.92	40.79
26	159.6	43.29
27	172.1	48.29
28	184.1	53.29
29	192.1	58.29
30	200.1	63.29
31	216.6	68.29
32	239.1	73.29
33	264.1	78.29
34	274.1	83.29
35	284.1	88.29
36	292.6	93.29
37	300.6	98.29
38	308.1	103.29
39	318.1	108.29
40	330.6	113.29
41	363.1	118.29
42	370.6	123.29
43	375.1	128.29
44	375.1	128.29
45	375.1	128.29
46	433.8	133.02
47	433.8	133.0 2

Vertici strato 2

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	19.56	4.52
9	22.25	5.7
10	66.68	13.34
11	100.36	19.1
12	118.09	19.1
13	161.53	39.47
14	200.09	51.87
15	224.02	63.38
16	261.26	69.58
17	289.18	80.21
18	310.9	95.71
19	344.58	107.22

20	376.94	110.76
21	433.8	116.0 5

Vertici strato 3

N	X (m)	y (m)
1	0.0	-10.56
2	13.59	-7.3
3	29.81	-2.65
4	33.05	-1.72
5	39.85	0.02
6	54.66	2.02
7	70.5	4.15
8	87.26	6.45
9	90.23	7.38
10	93.4	8.38
11	96.57	9.37
12	100.79	10.7
13	108.18	13.01
14	111.13	14.19
15	115.57	15.33
16	117.58	15.96
17	119.26	16.49
18	124.31	18.08
19	127.17	18.98
20	131.46	20.67
21	138.89	23.6
22	144.47	25.8
23	150.88	28.32
24	155.61	30.19
25	163.73	33.38
26	171.63	36.49
27	179.77	39.7
28	185.34	41.9
29	192.38	44.67
30	194.63	45.56
31	202.06	48.48
32	207.37	50.36
33	212.01	51.32
34	216.59	52.5
35	222.0	53.88
36	224.95	55.07
37	226.44	55.02
38	230.89	56.16
39	236.44	57.58
40	243.1	59.29
41	251.98	61.57
42	265.52	65.03
43	273.41	67.06
44	277.44	68.18
45	285.22	71.4
46	299.4	77.28
47	308.54	81.07
48	314.66	83.6
49	327.98	89.12
50	334.95	91.81
51	377.91	98.27
52	396.1	101.0
53	414.03	103.62
54	433.8	106. 1

Vertici superficie Nr...1

N	X m	y m
1	38.21	11.33
2	48.71	13.21
3	53.26	14.02
4	58.12	15.53
5	64.29	17.64
6	70.5	18.02
7	81.13	21.02
8	93.9	23.5
9	101.03	24.85
10	109.98	30.03
11	118.88	31.91
12	128.0	36.58
13	139.9	41.65
14	145.6	43.29
15	148.4	47.14
16	151.7	47.14
17	158.59	49.54
18	162.04	52.14
19	169.53	54.54
20	173.09	57.14
21	180.73	59.58
22	184.32	62.18
23	193.09	65.24
24	200.34	67.49
25	203.83	70.09
26	211.16	72.53
27	214.58	75.13
28	221.76	77.58
29	225.19	80.18
30	232.35	82.54
31	235.79	85.14
32	242.59	87.91
33	246.38	90.51
34	252.88	92.62
35	254.7	95.22
36	261.93	97.54
37	267.28	100.59

Coefficienti parziali per i parametri geotecnici del terreno

Tangente angolo di resistenza al taglio	1.25
Coesione efficace	1.25
Coesione non drenata	1.4
Riduzione parametri geotecnici terreno	Si

Stratigrafia

c: coesione; cu: coesione non drenata; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo; K: Modulo di Winkler

Strato	c (kg/cm²)	cu (kg/cm²)	Fi (°)	G (Kg/m³)	Gs (Kg/m³)	K (Kg/cm³)	Litologia	
1	0.0383		29.6	1837	2063	0.00		
2	0		26.51	1695	1905	0.00		
3	0.3305		30.52	2402	2698	0.00		
4	0.4352		33.31	2402	2698	0.00		

Muri di sostegno - Caratteristiche geometriche

N°	x (m)	y (m)	Base mensola a valle (m)	Base mensola a monte (m)	Altezza muro (m)	Spessore testa (m)	Spessore base (m)	Peso specifico (Kg/m³)
1	44.41	12.47	0	0.1	6	2	4	2800
2	68.65	25.52	0	0.1	4	3	4	2800
3	79.4	32.59	0	0.1	4	3	4	2800
4	92.03	38.85	0	0.1	4	3	4	2800
5	104.28	44.37	0	0.1	4	3	4	2800
6	125.29	51.58	0	0.1	4	3	4	2800
7	141.69	58.96	0	0.1	4	3	4	2800
8	161.48	65.05	0	0.1	4	3	4	2800
9	177.3	71.07	0	0.1	4	3	4	2800
10	193.1	77.06	0	0.1	4	3	4	2800
11	208.56	82.98	0	0.1	4	3	4	2800
12	224.49	89.04	0	0.1	4	3	4	2800
13	240.34	95.05	0	0.1	4	3	4	280 0

Pali...

N°	x (m)	y (m)	Diametro (m)	Lunghezza (m)	Inclinazione (°)	Interasse (m)
1	41.22313	10.96872	0.2	6	90	3.6
2	43.81049	10.96872	0.2	6	90	3.6

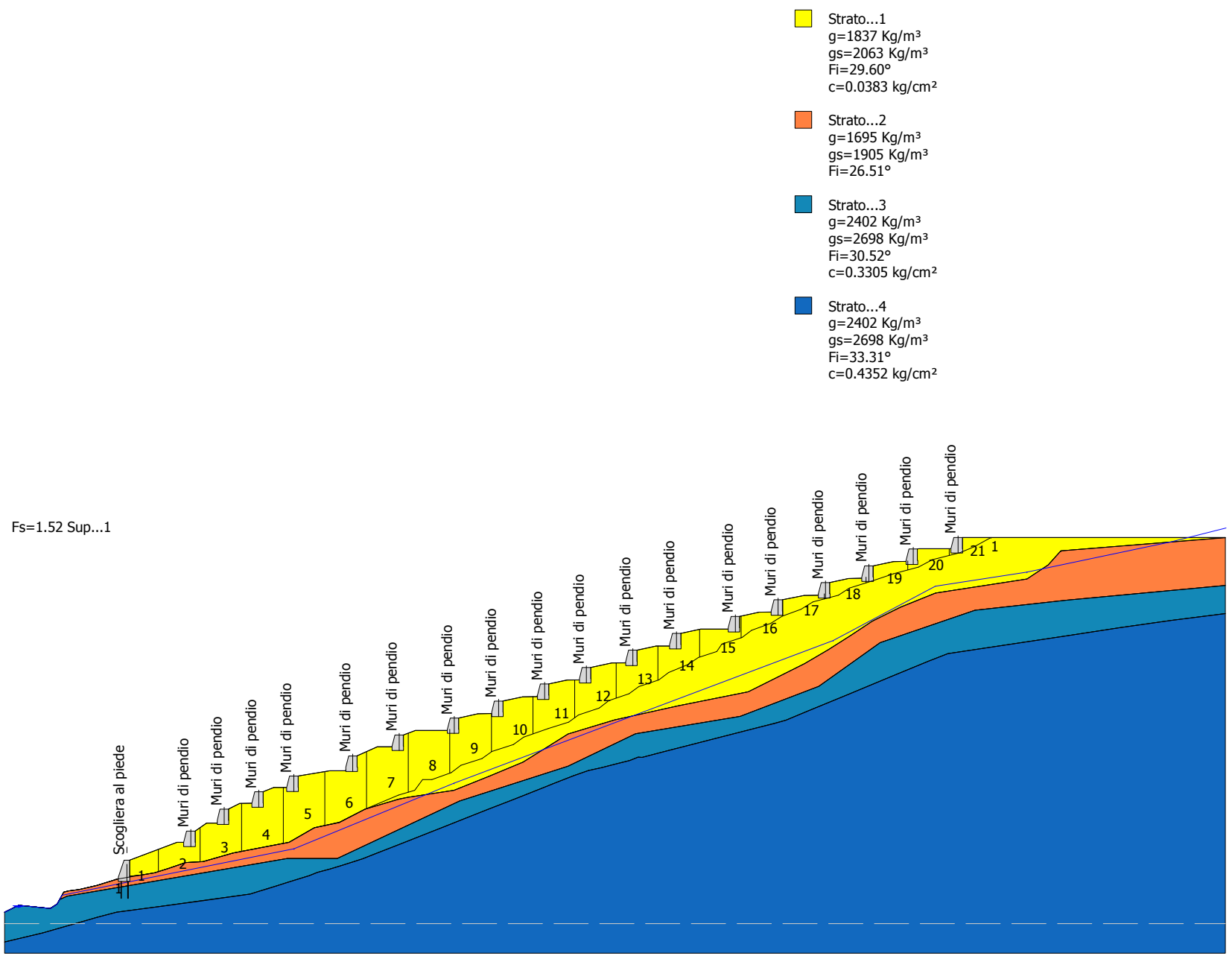
Superficie Nr...1 Fattore di sicurezza=1.41

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	15.21	10.6	15.48	245867.6	7621.9	3933.88	0.0	21.8	0.0	236508.3	74132.0
2	15.21	13.5	15.64	303687.8	9414.32	4859.01	0.0	21.8	0.0	290821.5	92133.8
3	15.21	13.8	15.67	413104.8	12806.25	6609.68	0.0	21.8	0.0	395441.2	125482.3
4	15.21	10.9	15.49	608598.7	18866.56	9737.58	0.0	21.8	0.0	585082.8	183575.4
5	15.21	23.1	16.54	642595.1	19920.45	10281.52	0.0	21.8	0.0	617417.8	206759.2
6	15.21	23.0	16.52	538469.4	16692.55	8615.51	0.03	24.4	0.0	507673.4	197728.6
7	15.21	20.6	16.25	574264.7	17802.21	9188.24	0.03	24.4	0.0	540720.8	206764.8
8	15.21	27.4	17.13	541162.6	16776.04	8658.6	0.03	24.4	0.0	513924.5	207643.1
9	15.21	24.4	16.71	500899.6	15527.89	8014.39	0.03	24.4	0.0	472962.7	186615.4
10	15.21	23.2	16.55	422182.4	13087.65	6754.92	0.03	24.4	0.0	397806.9	156109.5
11	15.21	22.7	16.49	462116.4	14325.61	7393.86	0.03	24.4	0.0	435385.8	169864.8
12	15.21	23.4	16.58	445977.8	13825.31	7135.65	0.03	24.4	0.0	420408.5	165021.6
13	15.21	27.8	17.2	406103.3	12589.2	6497.65	0.03	24.4	0.0	385625.6	157611.0
14	15.21	24.0	16.66	363112.2	11256.48	5809.8	0.03	24.4	0.0	342270.5	135838.1
15	15.21	28.4	17.29	112123.7	3475.84	1793.98	0.03	24.4	0.0	105269.6	46629.4

CARICO LIMITE PALI ESISTENTI

Superficie Nr...1 Fattore di sicurezza=1.41

Micropali x=41.22313 Y=10.96872 Plim=329.0 Kg Sbalzo del palo 6.39 m
Micropali x=43.81049 Y=10.96872 Plim=329.0 Kg Sbalzo del palo 6.39 m


Strato...1
g=1837 Kg/m³
gs=2063 Kg/m³
Fi=29.60°
c=0.0383 kg/cm²
Strato...2
g=1695 Kg/m³
gs=1905 Kg/m³
Fi=26.51°
Strato...3
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=30.52°
c=0.3305 kg/cm²
Strato...4
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=33.31°
c=0.4352 kg/cm²
Fs=1.52 Sup...1
Scogliera al piede
Muri di pendio
1
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21

ANALISI SUPERFICIE GENERICA 2
Linea separatrice strato COLTRE NATURALE e strato materiale oggetto di deposito (preesistente e nuovo)

Analisi di stabilità dei pendii con: JANBU (1956)

Lat./Long.	44.417087/9.129564
Normativa	NTC 2008
Numero di strati	4.0
Numero dei conci	21.0
Grado di sicurezza ritenuto accettabile	1.1
Coefficiente parziale resistenza	1.1
Analisi	Condizione drenata
Superficie di forma generica	

Coefficienti sismici [N.T.C.]

Dati generali

Tipo opera:	2 - Opere ordinarie
Classe d'uso:	Classe II
Vita nominale:	50.0 [anni]
Vita di riferimento:	50.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T3

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s²]	F0 [-]	TC* [sec]
S.L.O.	30.0	0.28	2.5	0.2
S.L.D.	50.0	0.35	2.55	0.22
S.L.V.	475.0	0.85	2.51	0.28
S.L.C.	975.0	1.13	2.48	0.29

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii e Fondazioni

S.L. Stato limite	amax [m/s²]	beta [-]	kh [-]	kv [sec]
S.L.O.	0.504	0.2	0.0103	0.0051
S.L.D.	0.63	0.2	0.0128	0.0064
S.L.V.	1.53	0.2	0.0312	0.0156
S.L.C.	2.034	0.24	0.0498	0.0249

Coefficiente azione sismica orizzontale	0.031
Coefficiente azione sismica verticale	0.01 6

Vertici profilo

N	X m	y m
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	21.06	7.15
8	22.59	7.61
9	26.5	8.1
10	32.75	9.52
11	40.67	11.99

12	40.78	12.47
13	44.4	12.47
14	44.4	18.47
15	61.26	24.82
16	67.63	24.82
17	67.63	28.82
18	71.75	31.66
19	75.51	31.66
20	75.89	32.65
21	79.52	32.65
22	79.52	36.65
23	83.49	38.64
24	88.14	38.73
25	88.15	38.76
26	91.8	38.76
27	91.8	42.76
28	95.64	44.36
29	104.22	44.36
30	104.22	48.36
31	115.54	50.26
32	121.1	50.26
33	121.74	51.53
34	125.19	51.53
35	125.19	55.53
36	132.31	58.76
37	137.8	58.76
38	137.88	58.93
39	141.61	58.93
40	141.61	62.93
41	145.87	64.54
42	157.55	64.54
43	157.72	65.0
44	161.24	65.0
45	161.24	69.0
46	168.1	70.49
47	173.12	70.52
48	173.29	71.0
49	176.97	71.0
50	176.97	75.0
51	184.02	76.51
52	189.04	76.57
53	189.24	77.09
54	193.25	77.09
55	193.25	81.09
56	199.73	82.47
57	204.74	82.5
58	204.89	82.89
59	208.12	82.89
60	208.12	86.89
61	215.56	88.51
62	220.57	88.54
63	220.77	89.05
64	224.58	89.05
65	224.58	93.05
66	231.36	94.51
67	236.37	94.54
68	236.54	95.01
69	240.15	95.01
70	240.15	99.01
71	247.18	100.51
72	257.19	100.54

73	257.37	101.02
74	260.98	101.02
75	260.98	105.02
76	268.02	106.57
77	273.03	106.6
78	273.15	106.92
79	276.21	106.92
80	276.21	110.92
81	283.9	112.51
82	288.91	112.54
83	289.11	113.08
84	293.01	113.08
85	293.01	117.08
86	299.66	118.51
87	304.67	118.6
88	304.82	118.99
89	308.41	118.99
90	308.41	122.99
91	315.6	124.51
92	320.61	124.54
93	320.77	124.95
94	324.17	124.95
95	324.17	128.95
96	324.74	129.07
97	340.09	129.07
98	340.09	133.07
99	433.51	133.0 2

Falda

Nr.	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	20.45	6.09
8	102.78	22.6
9	102.8	22.6
10	159.6	45.8
11	159.6	45.8
12	294.28	96.5
13	294.29	96.5
14	330.58	115.8
15	330.6	115.8
16	363.07	120.8
17	363.1	120.8
18	414.33	131.5
19	433.8	136.4 5

Vertici strato 1

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	21.06	7.15
9	22.59	7.61

10	26.5	8.1
11	32.75	9.52
12	42.61	12.6
13	48.71	13.21
14	53.26	14.02
15	58.12	15.53
16	64.29	17.64
17	70.5	18.02
18	81.13	21.02
19	93.9	23.5
20	101.03	24.85
21	109.98	30.03
22	118.88	31.91
23	128.0	36.58
24	139.9	40.13
25	142.92	40.79
26	159.6	43.29
27	172.1	48.29
28	184.1	53.29
29	192.1	58.29
30	200.1	63.29
31	216.6	68.29
32	239.1	73.29
33	264.1	78.29
34	274.1	83.29
35	284.1	88.29
36	292.6	93.29
37	300.6	98.29
38	308.1	103.29
39	318.1	108.29
40	330.6	113.29
41	363.1	118.29
42	370.6	123.29
43	375.1	128.29
44	375.1	128.29
45	375.1	128.29
46	433.51	133. 0

Vertici strato 2

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	19.56	4.52
9	22.25	5.7
10	66.68	13.34
11	100.36	19.1
12	118.09	19.1
13	161.53	39.47
14	200.09	51.87
15	224.02	63.38
16	261.26	69.58
17	289.18	80.21
18	310.9	95.71
19	344.58	107.22
20	376.94	110.76
21	433.51	116.0 2

Vertici strato 3

N	X (m)	y (m)
1	0.0	-10.56
2	13.59	-7.3
3	29.81	-2.65
4	33.05	-1.72
5	39.85	0.02
6	54.66	2.02
7	70.5	4.15
8	87.26	6.45
9	90.23	7.38
10	93.4	8.38
11	96.57	9.37
12	100.79	10.7
13	108.18	13.01
14	111.13	14.19
15	115.57	15.33
16	117.58	15.96
17	119.26	16.49
18	124.31	18.08
19	127.17	18.98
20	131.46	20.67
21	138.89	23.6
22	144.47	25.8
23	150.88	28.32
24	155.61	30.19
25	163.73	33.38
26	171.63	36.49
27	179.77	39.7
28	185.34	41.9
29	192.38	44.67
30	194.63	45.56
31	202.06	48.48
32	207.37	50.36
33	212.01	51.32
34	216.59	52.5
35	222.0	53.88
36	224.95	55.07
37	226.44	55.02
38	230.89	56.16
39	236.44	57.58
40	243.1	59.29
41	251.98	61.57
42	265.52	65.03
43	273.41	67.06
44	277.44	68.18
45	285.22	71.4
46	299.4	77.28
47	308.54	81.07
48	314.66	83.6
49	327.98	89.12
50	334.95	91.81
51	377.91	98.27
52	396.1	101.0
53	414.03	103.62
54	433.51	106.0 6

Vertici superficie Nr...1

N	X m	y m
1	39.95	11.88

2	48.71	13.21
3	53.26	14.02
4	58.12	15.53
5	64.29	17.64
6	70.5	18.02
7	81.13	21.02
8	93.9	23.5
9	101.03	24.85
10	109.98	30.0
11	118.88	31.91
12	128.0	36.58
13	139.9	40.13
14	142.92	40.79
15	159.6	43.29
16	172.1	48.29
17	184.1	53.29
18	192.1	58.29
19	200.1	63.29
20	216.6	68.29
21	239.1	73.29
22	264.1	78.29
23	274.1	83.29
24	284.1	88.29
25	292.6	93.29
26	300.6	98.29
27	303.97	100.54
28	308.1	103.29
29	318.1	108.29
30	330.6	113.29
31	363.1	118.29
32	370.6	123.29
33	378.99	132.5
34	379.52	133.12

Coefficienti parziali per i parametri geotecnici del terreno

Tangente angolo di resistenza al taglio	1.25
Coesione efficace	1.25
Coesione non drenata	1.4
Riduzione parametri geotecnici terreno	Si

Stratigrafia

c: coesione; cu: coesione non drenata; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo; K: Modulo di Winkler

Strato	c (kg/cm²)	cu (kg/cm²)	Fi (°)	G (Kg/m³)	Gs (Kg/m³)	K (Kg/cm³)	Litologia	
1	0.0383		29.60	1837	2063	0.00		
2	0		26.51	1695	1905	0.00		
3	0.3305		30.52	2402	2698	0.00		
4	0.4352		33.31	2402	2698	0.00		

Muri di sostegno - Caratteristiche geometriche

N°	x (m)	y (m)	Base mensola a valle (m)	Base mensola a monte (m)	Altezza muro (m)	Spessore testa (m)	Spessore base (m)	Peso specifico (Kg/m³)
1	44.4	12.47	0	0.1	6	2	4	2800
2	67.63	24.82	0	0.1	4	3	4	2800
3	79.52	32.65	0	0.1	4	3	4	2800
4	91.8	38.76	0	0.1	4	3	4	2800
5	104.22	44.35	0	0.1	4	3	4	2800

6	125.19	51.53	0	0.1	4	3	4	2800
7	141.61	58.93	0	0.1	4	3	4	2800
8	161.24	65	0	0.1	4	3	4	2800
9	176.97	71	0	0.1	4	3	4	2800
10	193.25	77.09	0	0.1	4	3	4	2800
11	208.12	82.89	0	0.1	4	3	4	2800
12	224.58	89.05	0	0.1	4	3	4	2800
13	240.15	95.01	0	0.1	4	3	4	2800
14	260.98	101.02	0	0.1	4	3	4	2800
15	276.21	106.92	0	0.1	4	3	4	2800
16	293.01	113.08	0	0.1	4	3	4	2800
17	308.41	118.99	0	0.1	4	3	4	2800
18	324.17	124.95	0	0.1	4	3	4	2800
19	340.09	129.07	0	0.1	4	3	4	280 0

Pali...

N°	x (m)	y (m)	Diametro (m)	Lunghezza (m)	Inclinazione (°)	Interasse (m)
1	41.34258	10.96566	0.2	6	90	3.6
2	43.73619	10.96566	0.2	6	90	3.6

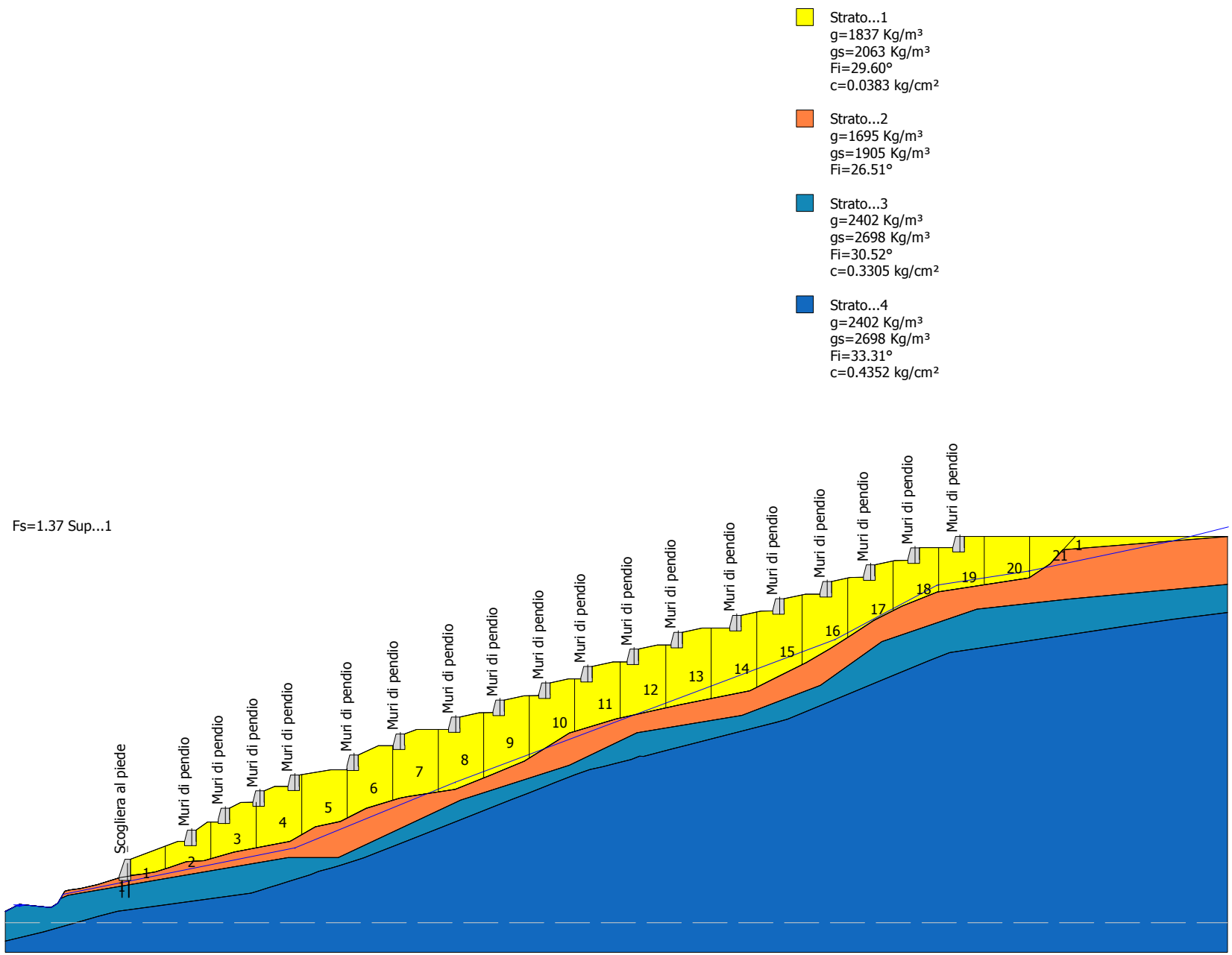
Superficie Nr...1 Fattore di sicurezza=1.37

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	16.14	11.0	16.44	261036.1	8092.12	4176.58	0.03	24.4	0.0	247744.0	95407.2
2	16.14	12.5	16.53	289588.1	8977.23	4633.41	0.0	21.8	0.0	277081.6	90195.7
3	16.14	13.5	16.59	551511.2	17096.85	8824.18	0.0	21.8	0.0	527012.9	172185.0
4	16.14	16.1	16.8	633486.8	19638.09	10135.79	0.03	24.4	0.0	595885.7	228762.8
5	16.14	20.2	17.19	582294.7	18051.13	9316.72	0.0	21.8	0.0	555490.4	188018.3
6	16.14	21.2	17.3	681478.4	21125.83	10903.66	0.0	21.8	0.0	650719.9	221729.7
7	16.14	10.5	16.41	752563.9	23329.48	12041.02	0.0	21.8	0.0	722797.7	233590.6
8	16.14	17.0	16.88	780355.1	24191.01	12485.68	0.03	24.4	1708.2	707612.3	272132.4
9	16.14	23.6	17.61	783561.1	24290.39	12536.98	0.03	24.4	1788.7	709512.3	284851.4
10	16.14	30.4	18.72	711033.3	22042.03	11376.53	0.0	21.8	0.0	694958.6	256141.6
11	16.14	16.5	16.83	680395.3	21092.25	10886.33	0.0	21.8	0.0	648580.4	214899.0
12	16.14	12.5	16.53	738975.7	22908.25	11823.61	0.0	21.8	445.3	700198.5	227918.8
13	16.14	11.7	16.48	825778.2	25599.12	13212.45	0.0	21.8	3059.2	743964.3	241395.0
14	16.14	13.8	16.61	773070.6	23965.19	12369.13	0.03	24.4	5490.7	646422.3	245015.2
15	16.14	26.6	18.04	770086.7	23872.69	12321.39	0.0	21.8	5555.8	656458.3	233213.7
16	16.14	30.7	18.77	680769.9	21103.87	10892.32	0.03	24.4	2800.7	606247.8	260551.1
17	16.14	30.6	18.75	565440.4	17528.65	9047.05	0.0	21.8	1254.1	533224.3	196859.1
18	16.14	22.4	17.46	504454.2	15638.08	8071.27	0.0	21.8	1731.9	455732.1	156662.1
19	16.14	8.7	16.33	494517.9	15330.05	7912.29	0.0	21.8	2511.6	437924.8	140789.8
20	16.14	9.1	16.34	480925.7	14908.7	7694.81	0.03	24.4	2455.2	421770.2	158640.0
21	16.14	42.2	21.77	216664.3	6716.59	3466.63	0.03	24.4	0.0	216525.8	112871.7

CARICO LIMITE PALI ESISTENTI

Superficie Nr...1 Fattore di sicurezza=1.37

pali alla base x=41.34258 Y=10.96566 Plim=608.8 Kg Sbalzo del palo 6.53 m
pali alla base x=43.73619 Y=10.96566 Plim=608.8 Kg Sbalzo del palo 6.53 m


Strato...1
g=1837 Kg/m³
gs=2063 Kg/m³
Fi=29.60°
c=0.0383 kg/cm²
Strato...2
g=1695 Kg/m³
gs=1905 Kg/m³
Fi=26.51°
Strato...3
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=30.52°
c=0.3305 kg/cm²
Strato...4
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=33.31°
c=0.4352 kg/cm²
Fs=1.37 Sup...1
Scogliera al piede
Muri di pendio
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ANALISI SUPERFICIE GENERICA 3
Linea separatrice CAPPELLACCIO DI ALTERAZIONE SUBSTRATO ROCCIOSO e strato COLTRE NATURALE

Analisi di stabilità dei pendii con: JANBU (1956)

==========

Lat./Long. 44.417087/9.129564
Normativa NTC 2008
Numero di strati 4.0
Numero dei conci 23.0
Grado di sicurezza ritenuto accettabile 1.1
Coefficiente parziale resistenza 1.1
Analisi Condizione drenata
Superficie di forma generica

==========

Coefficienti sismici [N.T.C.]

==========

Dati generali

Tipo opera: 2 - Opere ordinarie
Classe d'uso: Classe II
Vita nominale: 50.0 [anni]
Vita di riferimento: 50.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo: C
Categoria topografica: T3

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s²]	F0 [-]	TC* [sec]
S.L.O.	30.0	0.28	2.5	0.2
S.L.D.	50.0	0.35	2.55	0.22
S.L.V.	475.0	0.85	2.51	0.28
S.L.C.	975.0	1.13	2.48	0.29

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii e Fondazioni

S.L. Stato limite	amax [m/s²]	beta [-]	kh [-]	kv [sec]
S.L.O.	0.504	0.2	0.0103	0.0051
S.L.D.	0.63	0.2	0.0128	0.0064
S.L.V.	1.53	0.2	0.0312	0.0156
S.L.C.	2.034	0.24	0.0498	0.0249

Coefficiente azione sismica orizzontale 0.031
Coefficiente azione sismica verticale 0.01 6

Vertici profilo

N	X m	y m
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	21.06	7.15
8	22.59	7.61
9	26.5	8.1
10	32.75	9.52
11	40.67	11.99

12	40.78	12.47
13	44.4	12.47
14	44.4	18.47
15	61.26	24.82
16	67.63	24.82
17	67.63	28.82
18	71.75	31.66
19	75.51	31.66
20	75.89	32.65
21	79.52	32.65
22	79.52	36.65
23	83.49	38.64
24	88.14	38.73
25	88.15	38.76
26	91.8	38.76
27	91.8	42.76
28	95.64	44.36
29	104.22	44.36
30	104.22	48.36
31	115.54	50.26
32	121.1	50.26
33	121.74	51.53
34	125.19	51.53
35	125.19	55.53
36	132.31	58.76
37	137.8	58.76
38	137.88	58.93
39	141.61	58.93
40	141.61	62.93
41	145.87	64.54
42	157.55	64.54
43	157.72	65.0
44	161.24	65.0
45	161.24	69.0
46	168.1	70.49
47	173.12	70.52
48	173.29	71.0
49	176.97	71.0
50	176.97	75.0
51	184.02	76.51
52	189.04	76.57
53	189.24	77.09
54	193.25	77.09
55	193.25	81.09
56	199.73	82.47
57	204.74	82.5
58	204.89	82.89
59	208.12	82.89
60	208.12	86.89
61	215.56	88.51
62	220.57	88.54
63	220.77	89.05
64	224.58	89.05
65	224.58	93.05
66	231.36	94.51
67	236.37	94.54
68	236.54	95.01
69	240.15	95.01
70	240.15	99.01
71	247.18	100.51
72	257.19	100.54

73	257.37	101.02
74	260.98	101.02
75	260.98	105.02
76	268.02	106.57
77	273.03	106.6
78	273.15	106.92
79	276.21	106.92
80	276.21	110.92
81	283.9	112.51
82	288.91	112.54
83	289.11	113.08
84	293.01	113.08
85	293.01	117.08
86	299.66	118.51
87	304.67	118.6
88	304.82	118.99
89	308.41	118.99
90	308.41	122.99
91	315.6	124.51
92	320.61	124.54
93	320.77	124.95
94	324.17	124.95
95	324.17	128.95
96	324.74	129.07
97	340.09	129.07
98	340.09	133.07
99	433.51	133.0 2

Falda

Nr.	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	20.45	6.09
8	102.78	22.6
9	102.8	22.6
10	159.6	45.8
11	159.6	45.8
12	294.28	96.5
13	294.29	96.5
14	330.58	115.8
15	330.6	115.8
16	363.07	120.8
17	363.1	120.8
18	414.33	131.5
19	433.8	136.4 5

Vertici strato 1

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	21.06	7.15
9	22.59	7.61

10	26.5	8.1
11	32.75	9.52
12	42.61	12.6
13	48.71	13.21
14	53.26	14.02
15	58.12	15.53
16	64.29	17.64
17	70.5	18.02
18	81.13	21.02
19	93.9	23.5
20	101.03	24.85
21	109.98	30.03
22	118.88	31.91
23	128.0	36.58
24	139.9	40.13
25	142.92	40.79
26	159.6	43.29
27	172.1	48.29
28	184.1	53.29
29	192.1	58.29
30	200.1	63.29
31	216.6	68.29
32	239.1	73.29
33	264.1	78.29
34	274.1	83.29
35	284.1	88.29
36	292.6	93.29
37	300.6	98.29
38	308.1	103.29
39	318.1	108.29
40	330.6	113.29
41	363.1	118.29
42	370.6	123.29
43	375.1	128.29
44	375.1	128.29
45	375.1	128.29
46	433.51	133. 0

Vertici strato 2

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	19.56	4.52
9	22.25	5.7
10	66.68	13.34
11	100.36	19.1
12	118.09	19.1
13	161.53	39.47
14	200.09	51.87
15	224.02	63.38
16	261.26	69.58
17	289.18	80.21
18	310.9	95.71
19	344.58	107.22
20	376.94	110.76
21	433.51	116.0 2

Vertici strato 3

N	X (m)	y (m)
1	0.0	-10.56
2	13.59	-7.3
3	29.81	-2.65
4	33.05	-1.72
5	39.85	0.02
6	54.66	2.02
7	70.5	4.15
8	87.26	6.45
9	90.23	7.38
10	93.4	8.38
11	96.57	9.37
12	100.79	10.7
13	108.18	13.01
14	111.13	14.19
15	115.57	15.33
16	117.58	15.96
17	119.26	16.49
18	124.31	18.08
19	127.17	18.98
20	131.46	20.67
21	138.89	23.6
22	144.47	25.8
23	150.88	28.32
24	155.61	30.19
25	163.73	33.38
26	171.63	36.49
27	179.77	39.7
28	185.34	41.9
29	192.38	44.67
30	194.63	45.56
31	202.06	48.48
32	207.37	50.36
33	212.01	51.32
34	216.59	52.5
35	222.0	53.88
36	224.95	55.07
37	226.44	55.02
38	230.89	56.16
39	236.44	57.58
40	243.1	59.29
41	251.98	61.57
42	265.52	65.03
43	273.41	67.06
44	277.44	68.18
45	285.22	71.4
46	299.4	77.28
47	308.54	81.07
48	314.66	83.6
49	327.98	89.12
50	334.95	91.81
51	377.91	98.27
52	396.1	101.0
53	414.03	103.62
54	433.51	106.0 6

Vertici superficie Nr...1

N	X m	y m
1	20.25	5.89

2	22.25	5.7
3	66.68	13.34
4	100.36	19.1
5	118.09	19.1
6	161.53	39.47
7	200.09	51.87
8	224.02	63.38
9	261.26	69.58
10	289.18	80.21
11	310.9	95.71
12	344.58	107.22
13	363.1	118.29
14	370.6	123.29
15	378.99	132.5
16	379.46	133.12

Coefficienti parziali per i parametri geotecnici del terreno

Tangente angolo di resistenza al taglio	1.25
Coesione efficace	1.25
Coesione non drenata	1.4
Riduzione parametri geotecnici terreno	Si

Stratigrafia

c: coesione; cu: coesione non drenata; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo; K: Modulo di Winkler

Strato	c (kg/cm²)	cu (kg/cm²)	Fi (°)	G (Kg/m³)	Gs (Kg/m³)	K (Kg/cm³)	Litologia	
1	0.0383		29.60	1837	2063	0.00		
2	0		26.51	1695	1905	0.00		
3	0.3305		30.52	2402	2698	0.00		
4	0.4352		33.31	2402	2698	0.00		

Muri di sostegno - Caratteristiche geometriche

N°	x (m)	y (m)	Base mensola a valle (m)	Base mensola a monte (m)	Altezza muro (m)	Spessore testa (m)	Spessore base (m)	Peso specifico (Kg/m³)
1	44.4	12.47	0	0.1	6	2	4	2800
2	67.63	24.82	0	0.1	4	3	4	2800
3	79.52	32.65	0	0.1	4	3	4	2800
4	91.8	38.76	0	0.1	4	3	4	2800
5	104.22	44.35	0	0.1	4	3	4	2800
6	125.19	51.53	0	0.1	4	3	4	2800
7	141.61	58.93	0	0.1	4	3	4	2800
8	161.24	65	0	0.1	4	3	4	2800
9	176.97	71	0	0.1	4	3	4	2800
10	193.25	77.09	0	0.1	4	3	4	2800
11	208.12	82.89	0	0.1	4	3	4	2800
12	224.58	89.05	0	0.1	4	3	4	2800
13	240.15	95.01	0	0.1	4	3	4	2800
14	260.98	101.02	0	0.1	4	3	4	2800
15	276.21	106.92	0	0.1	4	3	4	2800
16	293.01	113.08	0	0.1	4	3	4	2800
17	308.41	118.99	0	0.1	4	3	4	2800
18	324.17	124.95	0	0.1	4	3	4	2800
19	340.09	129.07	0	0.1	4	3	4	280 0

Pali...

N°	x (m)	y (m)	Diametro (m)	Lunghezza (m)	Inclinazione (°)	Interasse (m)
1	41.34258	10.96566	0.2	6	90	3.6
2	43.73619	10.96566	0.2	6	90	3.6

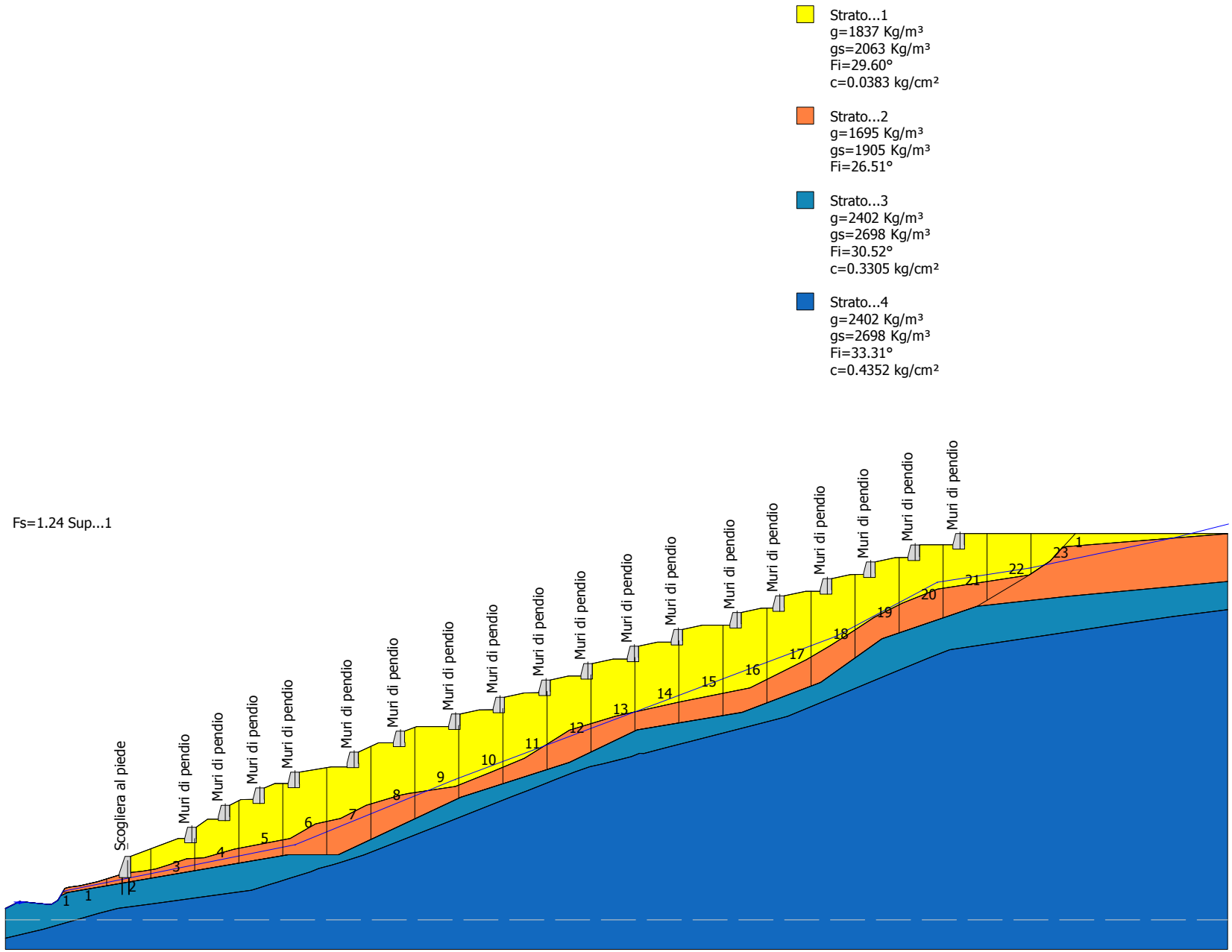
Superficie Nr...1 Fattore di sicurezza=1.24

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	15.61	7.9	15.76	42056.25	1303.74	672.9	0.0	21.8	661.4	30538.3	10863.1
2	15.61	9.8	15.84	152757.7	4735.49	2444.12	0.26	25.2	1362.4	118570.3	87617.6
3	15.61	9.8	15.84	398687.2	12359.3	6379.0	0.26	25.2	1809.3	344831.8	183211.9
4	15.61	9.7	15.84	538569.1	16695.64	8617.11	0.26	25.2	2263.6	470694.5	236347.3
5	15.61	9.7	15.84	665043.0	20616.33	10640.69	0.26	25.2	2724.9	583653.8	284065.1
6	15.61	1.2	15.62	908510.0	28163.81	14536.16	0.26	25.2	5058.5	821574.9	378634.5
7	15.61	19.1	16.52	911279.6	28249.67	14580.47	0.0	21.8	8564.4	733399.8	273435.9
8	15.61	25.1	17.24	937083.0	29049.57	14993.33	0.0	21.8	8578.0	761309.4	296244.7
9	15.61	25.1	17.24	899824.7	27894.56	14397.2	0.26	25.2	7634.0	705570.2	368945.8
10	15.61	18.2	16.43	896294.7	27785.13	14340.72	0.26	25.2	7499.2	710446.8	351702.5
11	15.61	17.8	16.4	922246.4	28589.64	14755.94	0.0	21.8	8305.1	747835.6	276760.5
12	15.61	21.8	16.81	922976.0	28612.26	14767.62	0.0	21.8	8557.1	745152.3	282656.8
13	15.61	25.7	17.32	900040.6	27901.26	14400.65	0.0	21.8	7564.8	741957.8	290067.3
14	15.61	10.3	15.87	930379.6	28841.77	14886.08	0.26	25.2	8272.7	750901.9	355401.1
15	15.61	9.5	15.83	975212.9	30231.6	15603.41	0.26	25.2	11435.5	749538.0	353848.9
16	15.61	16.1	16.25	1079499.0	33464.47	17271.98	0.0	21.8	13764.0	816871.1	299502.2
17	15.61	20.8	16.71	1098060.0	34039.87	17568.97	0.26	25.2	14420.0	793434.3	395238.6
18	15.61	32.6	18.54	1029909.0	31927.16	16478.54	0.0	21.8	12328.0	811354.8	339408.5
19	15.61	29.7	17.96	938249.6	29085.74	15012.0	0.26	25.2	11068.5	692718.7	380162.6
20	15.61	18.9	16.5	894651.1	27734.18	14314.42	0.0	21.8	12258.7	663337.0	246972.9
21	15.61	21.8	16.82	843736.3	26155.83	13499.78	0.0	21.8	11061.2	633491.1	240448.1
22	15.61	31.0	18.21	557112.8	17270.5	8913.81	0.0	21.8	5646.3	451520.8	185579.2
23	15.61	42.5	21.17	205157.7	6359.89	3282.52	0.03	24.4	0.0	199604.4	116374.0

CARICO LIMITE PALI

Superficie Nr...1 Fattore di sicurezza=1.24

pali alla base x=41.34258 Y=10.96566 Plim=5056.0 Kg Sbalzo del palo 3.07 m
pali alla base x=43.73619 Y=10.96566 Plim=5056.0 Kg Sbalzo del palo 3.07 m


Strato...1
g=1837 Kg/m³
gs=2063 Kg/m³
Fi=29.60°
c=0.0383 kg/cm²
Strato...2
g=1695 Kg/m³
gs=1905 Kg/m³
Fi=26.51°
Strato...3
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=30.52°
c=0.3305 kg/cm²
Strato...4
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=33.31°
c=0.4352 kg/cm²
Fs=1.24 Sup...1
Scogliera al piede
Muri di pendio
Muri di pendio
Muri di pendio
Muri di pendio
Muri di pendio
Muri di pendio
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Muri di pendio
Muri di pendio
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ANALISI SUPERFICIE GENERICA 4
Linea separatrice SUBSTRATO ROCCIOSO e strato CAPPELLACCIO DI ALTERAZIONE SUBSTRATO ROCCIOSO

Analisi di stabilità dei pendii con: JANBU (1956)

Lat./Long.	44.417087/9.129564
Normativa	NTC 2008
Numero di strati	4.0
Numero dei conci	25.0
Grado di sicurezza ritenuto accettabile	1.1
Coefficiente parziale resistenza	1.1
Analisi	Condizione drenata
Superficie di forma generica	

Coefficienti sismici [N.T.C.]

Dati generali

Tipo opera:	2 - Opere ordinarie
Classe d'uso:	Classe II
Vita nominale:	50.0 [anni]
Vita di riferimento:	50.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T3

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s²]	F0 [-]	TC* [sec]
S.L.O.	30.0	0.28	2.5	0.2
S.L.D.	50.0	0.35	2.55	0.22
S.L.V.	475.0	0.85	2.51	0.28
S.L.C.	975.0	1.13	2.48	0.29

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii e Fondazioni

S.L. Stato limite	amax [m/s²]	beta [-]	kh [-]	kv [sec]
S.L.O.	0.504	0.2	0.0103	0.0051
S.L.D.	0.63	0.2	0.0128	0.0064
S.L.V.	1.53	0.2	0.0312	0.0156
S.L.C.	2.034	0.24	0.0498	0.0249

Coefficiente azione sismica orizzontale	0.031
Coefficiente azione sismica verticale	0.01 6

Vertici profilo

N	X m	y m
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	21.06	7.15
8	22.59	7.61
9	26.5	8.1
10	32.75	9.52
11	40.67	11.99

12	40.78	12.47
13	44.4	12.47
14	44.4	18.47
15	61.26	24.82
16	67.63	24.82
17	67.63	28.82
18	71.75	31.66
19	75.51	31.66
20	75.89	32.65
21	79.52	32.65
22	79.52	36.65
23	83.49	38.64
24	88.14	38.73
25	88.15	38.76
26	91.8	38.76
27	91.8	42.76
28	95.64	44.36
29	104.22	44.36
30	104.22	48.36
31	115.54	50.26
32	121.1	50.26
33	121.74	51.53
34	125.19	51.53
35	125.19	55.53
36	132.31	58.76
37	137.8	58.76
38	137.88	58.93
39	141.61	58.93
40	141.61	62.93
41	145.87	64.54
42	157.55	64.54
43	157.72	65.0
44	161.24	65.0
45	161.24	69.0
46	168.1	70.49
47	173.12	70.52
48	173.29	71.0
49	176.97	71.0
50	176.97	75.0
51	184.02	76.51
52	189.04	76.57
53	189.24	77.09
54	193.25	77.09
55	193.25	81.09
56	199.73	82.47
57	204.74	82.5
58	204.89	82.89
59	208.12	82.89
60	208.12	86.89
61	215.56	88.51
62	220.57	88.54
63	220.77	89.05
64	224.58	89.05
65	224.58	93.05
66	231.36	94.51
67	236.37	94.54
68	236.54	95.01
69	240.15	95.01
70	240.15	99.01
71	247.18	100.51
72	257.19	100.54

73	257.37	101.02
74	260.98	101.02
75	260.98	105.02
76	268.02	106.57
77	273.03	106.6
78	273.15	106.92
79	276.21	106.92
80	276.21	110.92
81	283.9	112.51
82	288.91	112.54
83	289.11	113.08
84	293.01	113.08
85	293.01	117.08
86	299.66	118.51
87	304.67	118.6
88	304.82	118.99
89	308.41	118.99
90	308.41	122.99
91	315.6	124.51
92	320.61	124.54
93	320.77	124.95
94	324.17	124.95
95	324.17	128.95
96	324.74	129.07
97	340.09	129.07
98	340.09	133.07
99	433.51	133.0 2

Falda

Nr.	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	10.01	2.0
4	15.11	1.47
5	16.36	1.44
6	18.66	2.93
7	20.45	6.09
8	102.78	22.6
9	102.8	22.6
10	159.6	45.8
11	159.6	45.8
12	294.28	96.5
13	294.29	96.5
14	330.58	115.8
15	330.6	115.8
16	363.07	120.8
17	363.1	120.8
18	414.33	131.5
19	433.8	136.4 5

Vertici strato 1

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	21.06	7.15
9	22.59	7.61

10	26.5	8.1
11	32.75	9.52
12	42.61	12.6
13	48.71	13.21
14	53.26	14.02
15	58.12	15.53
16	64.29	17.64
17	70.5	18.02
18	81.13	21.02
19	93.9	23.5
20	101.03	24.85
21	109.98	30.03
22	118.88	31.91
23	128.0	36.58
24	139.9	40.13
25	142.92	40.79
26	159.6	43.29
27	172.1	48.29
28	184.1	53.29
29	192.1	58.29
30	200.1	63.29
31	216.6	68.29
32	239.1	73.29
33	264.1	78.29
34	274.1	83.29
35	284.1	88.29
36	292.6	93.29
37	300.6	98.29
38	308.1	103.29
39	318.1	108.29
40	330.6	113.29
41	363.1	118.29
42	370.6	123.29
43	375.1	128.29
44	375.1	128.29
45	375.1	128.29
46	433.51	133. 0

Vertici strato 2

N	X (m)	y (m)
1	0.0	0.0
2	5.02	2.5
3	5.02	2.5
4	10.01	2.0
5	15.11	1.47
6	16.36	1.44
7	18.66	2.93
8	19.56	4.52
9	22.25	5.7
10	66.68	13.34
11	100.36	19.1
12	118.09	19.1
13	161.53	39.47
14	200.09	51.87
15	224.02	63.38
16	261.26	69.58
17	289.18	80.21
18	310.9	95.71
19	344.58	107.22
20	376.94	110.76
21	433.51	116.0 2

Vertici strato 3

N	X (m)	y (m)
1	0.0	-10.56
2	13.59	-7.3
3	29.81	-2.65
4	33.05	-1.72
5	39.85	0.02
6	54.66	2.02
7	70.5	4.15
8	87.26	6.45
9	90.23	7.38
10	93.4	8.38
11	96.57	9.37
12	100.79	10.7
13	108.18	13.01
14	111.13	14.19
15	115.57	15.33
16	117.58	15.96
17	119.26	16.49
18	124.31	18.08
19	127.17	18.98
20	131.46	20.67
21	138.89	23.6
22	144.47	25.8
23	150.88	28.32
24	155.61	30.19
25	163.73	33.38
26	171.63	36.49
27	179.77	39.7
28	185.34	41.9
29	192.38	44.67
30	194.63	45.56
31	202.06	48.48
32	207.37	50.36
33	212.01	51.32
34	216.59	52.5
35	222.0	53.88
36	224.95	55.07
37	226.44	55.02
38	230.89	56.16
39	236.44	57.58
40	243.1	59.29
41	251.98	61.57
42	265.52	65.03
43	273.41	67.06
44	277.44	68.18
45	285.22	71.4
46	299.4	77.28
47	308.54	81.07
48	314.66	83.6
49	327.98	89.12
50	334.95	91.81
51	377.91	98.27
52	396.1	101.0
53	414.03	103.62
54	433.51	106.0 6

Vertici superficie Nr...1

N	X m	y m
1	17.27	2.14

2	26.86	0.43
3	39.85	0.02
4	54.66	2.02
5	70.5	4.15
6	87.26	6.45
7	90.23	7.38
8	93.4	8.38
9	96.57	9.37
10	100.79	10.7
11	108.18	13.01
12	111.13	14.19
13	115.57	15.33
14	117.58	15.96
15	119.26	16.49
16	124.31	18.08
17	127.17	18.98
18	131.46	20.67
19	138.89	23.6
20	144.47	25.8
21	150.88	28.32
22	155.61	30.19
23	163.73	33.38
24	171.63	36.49
25	179.77	39.7
26	185.34	41.9
27	192.38	44.67
28	194.63	45.56
29	202.06	48.48
30	207.37	50.36
31	212.01	51.32
32	216.59	52.5
33	222.0	53.88
34	224.95	55.07
35	226.44	55.02
36	230.89	56.16
37	236.44	57.58
38	243.1	59.29
39	251.98	61.57
40	265.52	65.03
41	273.41	67.06
42	277.44	68.18
43	285.22	71.4
44	299.4	77.28
45	308.54	81.07
46	314.66	83.6
47	327.98	89.12
48	334.95	91.81
49	357.78	100.53
50	380.61	112.19
51	405.32	128.03
52	413.36	132.85
53	413.56	133.1

Coefficienti parziali per i parametri geotecnici del terreno

Tangente angolo di resistenza al taglio	1.25
Coesione efficace	1.25
Coesione non drenata	1.4
Riduzione parametri geotecnici terreno	Si

Stratigrafia

c: coesione; cu: coesione non drenata; Fi: Angolo di attrito; G: Peso Specifico; Gs: Peso Specifico Saturo; K: Modulo di Winkler

Strato	c (kg/cm²)	cu (kg/cm²)	Fi (°)	G (Kg/m³)	Gs (Kg/m³)	K (Kg/cm³)	Litologia	
1	0.0383		29.60	1837	2063	0.00		
2	0		26.51	1695	1905	0.00		
3	0.3305		30.52	2402	2698	0.00		
4	0.4352		33.31	2402	2698	0.00		

Muri di sostegno - Caratteristiche geometriche

N°	x (m)	y (m)	Base mensola a valle (m)	Base mensola a monte (m)	Altezza muro (m)	Spessore testa (m)	Spessore base (m)	Peso specifico (Kg/m³)
1	44.4	12.47	0	0.1	6	2	4	2800
2	67.63	24.82	0	0.1	4	3	4	2800
3	79.52	32.65	0	0.1	4	3	4	2800
4	91.8	38.76	0	0.1	4	3	4	2800
5	104.22	44.35	0	0.1	4	3	4	2800
6	125.19	51.53	0	0.1	4	3	4	2800
7	141.61	58.93	0	0.1	4	3	4	2800
8	161.24	65	0	0.1	4	3	4	2800
9	176.97	71	0	0.1	4	3	4	2800
10	193.25	77.09	0	0.1	4	3	4	2800
11	208.12	82.89	0	0.1	4	3	4	2800
12	224.58	89.05	0	0.1	4	3	4	2800
13	240.15	95.01	0	0.1	4	3	4	2800
14	260.98	101.02	0	0.1	4	3	4	2800
15	276.21	106.92	0	0.1	4	3	4	2800
16	293.01	113.08	0	0.1	4	3	4	2800
17	308.41	118.99	0	0.1	4	3	4	2800
18	324.17	124.95	0	0.1	4	3	4	2800
19	340.09	129.07	0	0.1	4	3	4	280 0

Pali...

N°	x (m)	y (m)	Diametro (m)	Lunghezza (m)	Inclinazione (°)	Interasse (m)
1	41.34258	10.96566	0.2	6	90	3.6
2	43.73619	10.96566	0.2	6	90	3.6

Superficie Nr...1 Fattore di sicurezza=1.38

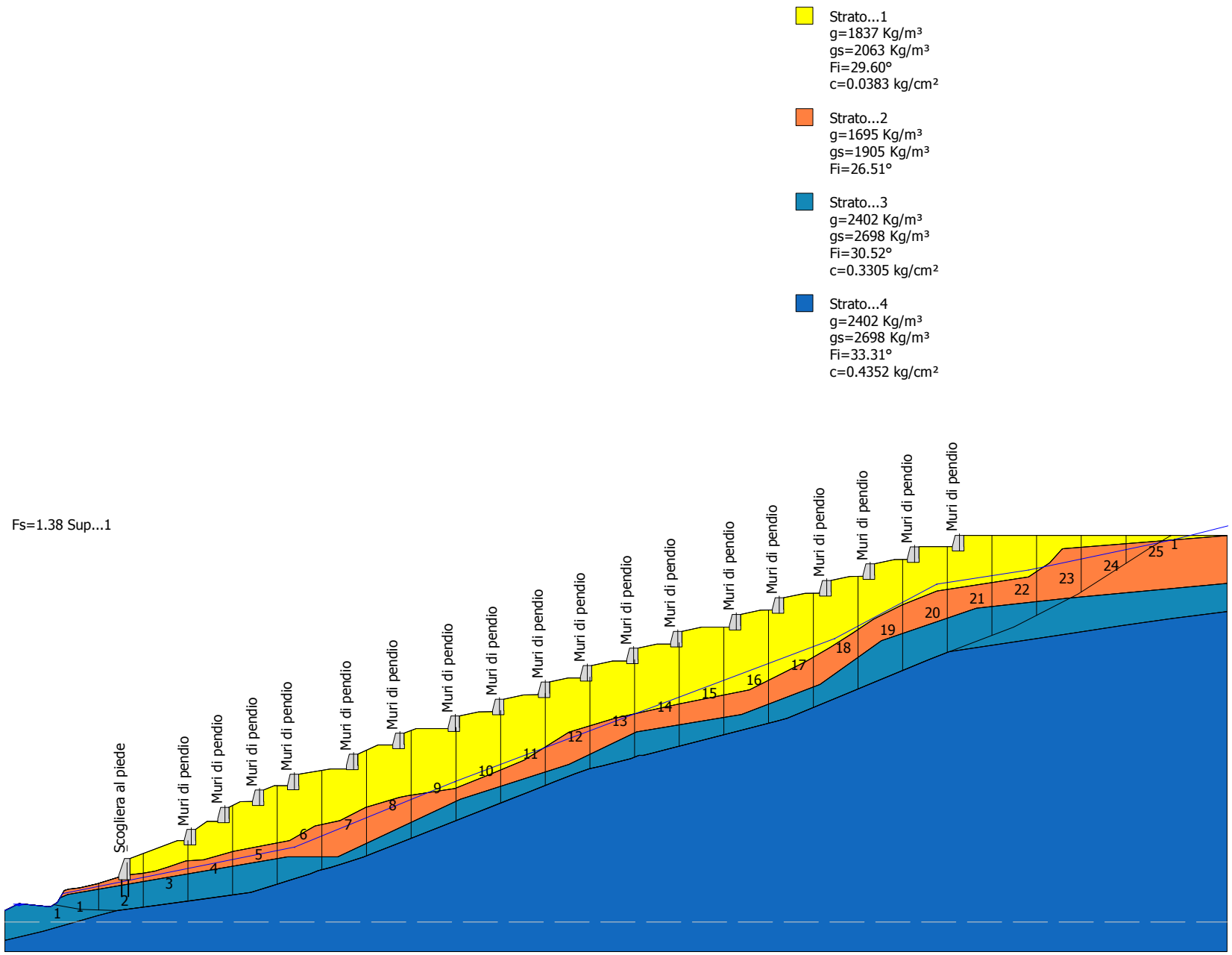
Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	15.84	-6.8	15.96	265233.4	8222.23	4243.73	0.26	25.2	5890.7	185302.3	103202.5
2	15.84	3.7	15.88	517674.8	16047.92	8282.8	0.26	25.2	9493.1	357171.3	166777.3
3	15.84	7.7	15.99	733342.8	22733.63	11733.48	0.26	25.2	11087.3	531530.3	233770.6
4	15.84	7.8	15.99	980542.3	30396.81	15688.68	0.26	25.2	12118.7	752960.7	317193.9
5	15.84	13.6	16.3	1095118.0	33948.67	17521.89	0.26	25.2	12301.2	841997.1	358162.2
6	15.84	18.0	16.66	1210877.0	37537.17	19374.03	0.26	25.2	11353.5	956782.8	411849.1
7	15.84	17.2	16.58	1072356.0	33243.05	17157.7	0.26	25.2	12803.5	806401.8	351109.2
8	15.84	21.5	17.03	1182297.0	36651.2	18916.75	0.26	25.2	13706.2	892201.9	395938.6
9	15.84	21.5	17.03	1191779.0	36945.16	19068.47	0.26	25.2	13936.6	897666.5	398129.2
10	15.84	21.5	17.03	1189609.0	36877.87	19033.74	0.26	25.2	13900.0	896176.2	397531.8
11	15.84	21.5	17.03	1166628.0	36165.48	18666.05	0.26	25.2	13623.4	878747.9	390545.3
12	15.84	20.7	16.94	1140587.0	35358.18	18249.39	0.35	27.7	0.0	1038476.0	511533.9
13	15.84	14.3	16.35	1205415.0	37367.88	19286.65	0.26	25.2	14413.2	912760.9	386645.5
14	15.84	13.7	16.31	1290498.0	40005.42	20647.96	0.26	25.2	16426.4	964428.6	405336.1
15	15.84	14.4	16.36	1285746.0	39858.14	20571.94	0.26	25.2	18431.1	928337.9	392751.5
16	15.84	14.4	16.36	1363918.0	42281.45	21822.68	0.26	25.2	20335.7	973561.1	410164.0

17	15.84	19.5	16.81	1409777.0	43703.0	822556.43	0.26	25.2	21458.7	991440.9	429697.9
18	15.84	22.5	17.15	1421019.0	44051.57	22736.3	0.35	27.7	0.0	1295438.0	634122.1
19	15.84	22.5	17.15	1462443.0	45335.7	323399.09	0.35	27.7	0.0	1333688.0	651337.1
20	15.84	21.9	17.08	1432147.0	44396.5	422914.35	0.35	27.7	0.0	1306262.0	636190.3
21	15.84	20.9	16.96	1356392.0	42048.1	521702.27	0.26	25.2	23006.8	917489.6	404365.6
22	15.84	24.2	17.36	1049678.0	32540.0	116794.85	0.26	25.2	18863.2	690986.4	322259.4
23	15.84	27.5	17.86	731379.7	22672.7	711702.08	0.26	25.2	14217.5	461525.4	236137.8
24	15.84	32.7	18.82	438708.6	13599.97	7019.34	0.0	21.8	8323.2	303166.5	113671.4
25	15.84	32.0	18.69	143645.3	4453.0	2298.33	0.0	21.8	1594.6	116612.4	43408.7

CARICO LIMITE PALI ESISTENTI

Superficie Nr...1 Fattore di sicurezza=1.38

pali alla base x=41.34258 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m
pali alla base x=43.73619 Y=10.96566 Plim=0.0 Kg Sbalzo del palo 0.00 m


Strato...1
g=1837 Kg/m³
gs=2063 Kg/m³
Fi=29.60°
c=0.0383 kg/cm²
Strato...2
g=1695 Kg/m³
gs=1905 Kg/m³
Fi=26.51°
Strato...3
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=30.52°
c=0.3305 kg/cm²
Strato...4
g=2402 Kg/m³
gs=2698 Kg/m³
Fi=33.31°
c=0.4352 kg/cm²
Fs=1.38 Sup...1
Scogliera al piede
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