



UNIONE MONTANA ALPI GRAIE

CITTA' METROPOLITANA DI TORINO

PROGETTO NUOVA SCIOVIA "COLLE DELLE LANCE"

ITALIA

REGIONE PIEMONTE

PROVINCIA DI
TORINO

COMUNE DI
USSEGLIO

PROGETTO DEFINITIVO

Verifiche di stabilità pendio

CODICE GENERALE ELABORATO

COMMESSA	CODICE OPERA	AREA PROGETTAZIONE	LIVELLO PROGETTO	N° ELABORATO	VERSIONE
ST122-20	RICDL	GE	D	11.5	0

IDENTIFICAZIONE FILE: ST122-20_RICDL_GE_D_11.5_0.doc

Versione	Data	Disegnato	Approvato	Oggetto
0	08/2021	AP	FB	Prima emissione
1				
2				
3				

RESPONSABILE DI PROGETTO



- dott. ing. Francesco BELMONDO

PROGETTISTI



- dott. ing. Francesco BELMONDO

- dott. ing. Alberto BETTINI

TIMBRI - FIRME



RESPONSABILE DEL PROCEDIMENTO

arch. Marco MICHELOTTI

FIRMA

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REGIONE PIEMONTE

CITTÀ METROPOLITANA DI TORINO

COMUNE DI USSEGLIO

**REALIZZAZIONE DELLA NUOVA SCIOVIA
“COLLE DELLE LANCE”**

PROGETTO DEFINITIVO

VERIFICHE DI STABILITÀ

A blue ink signature is written over a circular professional stamp. The stamp contains the text: "ORDINE GEOLOGI REGIONE PIEMONTE", "MASSIMO CECCUCCI", "GEOLOGO", "A.P. SEZ. A", and "N. 475". The outer ring of the stamp says "ALBO PROFESSIONALISTI".

Dott. Geol. Massimo Ceccucci

AGOSTO 2021

REGIONE PIEMONTE
CITTÀ METROPOLITA DI TORINO
COMUNE DI USSEGLIO

REALIZZAZIONE DELLA NUOVA SCIOVIA
"COLLE DELLE LANCE"
PROGETTO DEFINITIVO

VERIFICHE DI STABILITÀ

AGOSTO 2021

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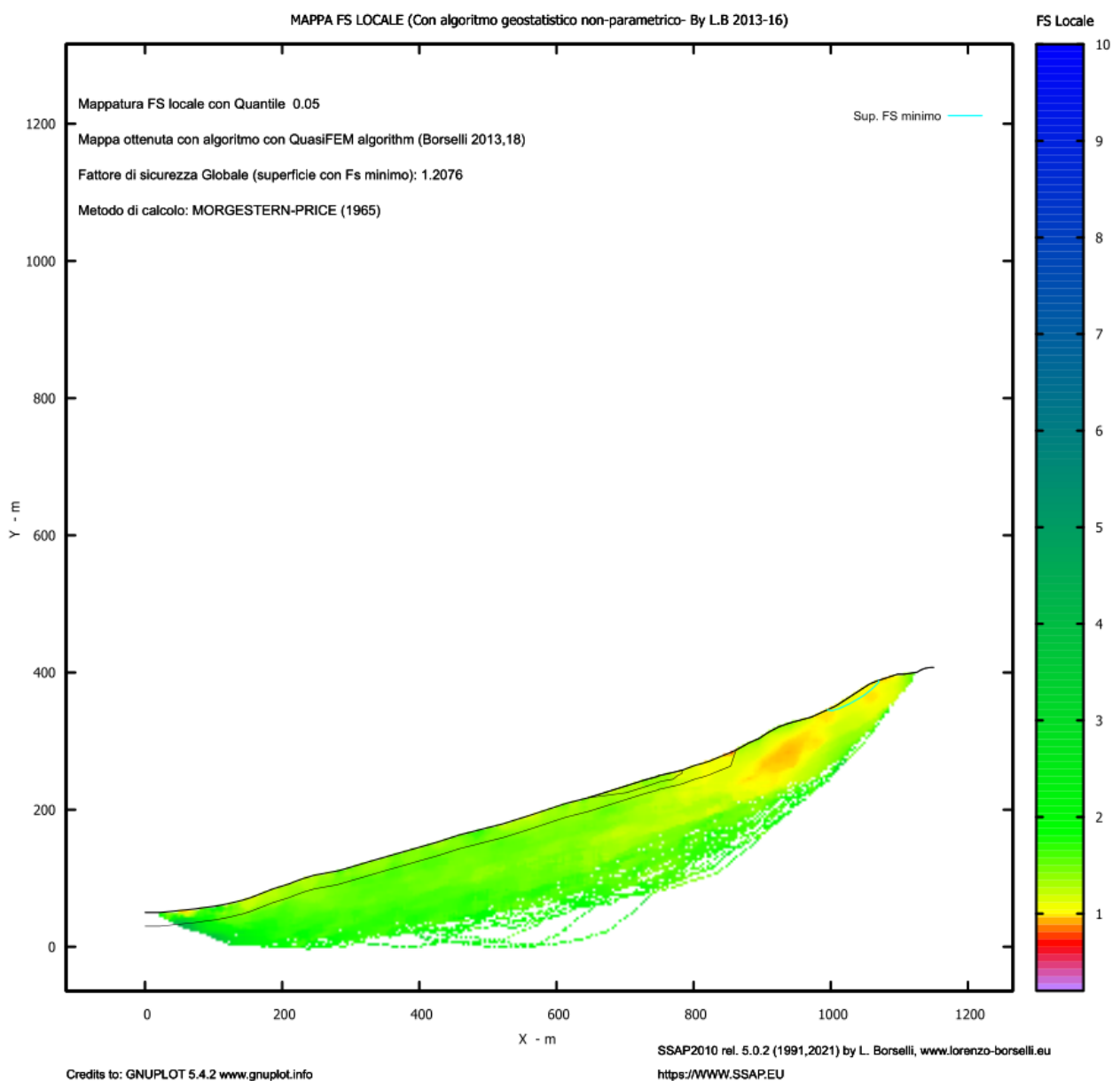
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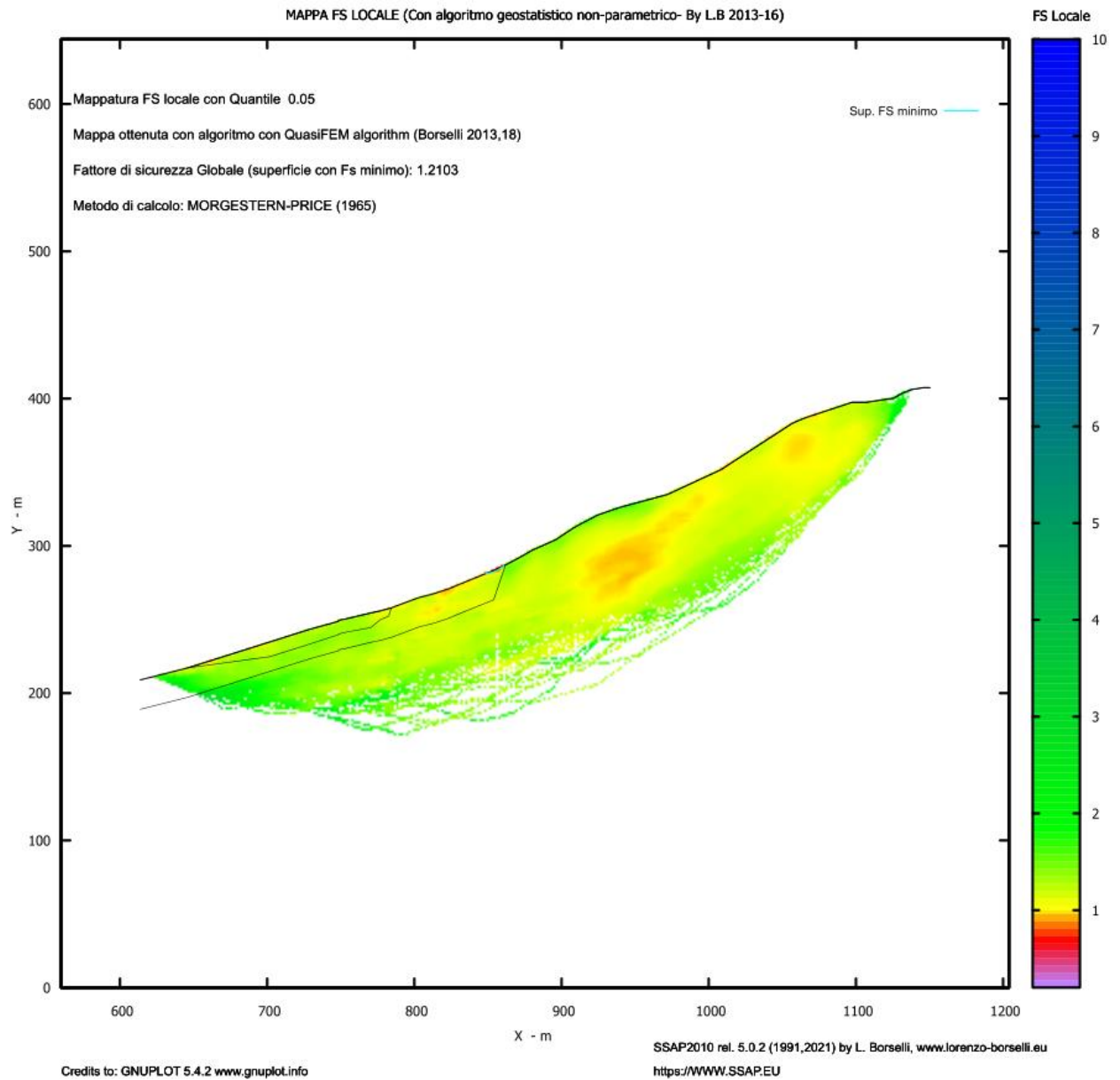
1 VERIFICHE DI STABILITÀ DEL PENDIO

Con lo scopo di determinare il grado di equilibrio globale del pendio sono state eseguite verifiche di stabilità. Le analisi sono state condotte utilizzando il codice di calcolo SSAP2010 (SLOPE STABILITY ANALYSIS PROGRAM).

Le verifiche sono state eseguite lungo la sezione topografica ricostruita negli elaborati progettuali e disposta tra le due stazioni secondo l'allineamento dei sostegni di linea. I calcoli sono stati eseguiti considerando l'intero pendio e, in seconda battuta, la porzione sommitale considerata la più critica in virtù delle pendenze della topografia.

I valori dei coefficienti di sicurezza sono risultati superiori ai valori limite per tutto il tracciato. I valori più bassi vengono calcolati per il settore sommitale che, di fatto, risulta quello caratterizzato dalle pendenze maggiori. In tal senso va ribadito come tale porzione sia contraddistinta dalla superficialità dell'ammasso roccioso, spesso affiorante, fattore che rende possibile la maggiore inclinazione della superficie.





1.1 ANALISI DI STABILITÀ INTERO TRACCIATO

SSAP 5.0.2 - Slope Stability Analysis Program (1991,2021)
WWW.SSAP.EU Build No. 12007

Ultima Revisione struttura tabelle del report: 21 Febbraio 2021

----- PARAMETRI DEL MODELLO DEL PENDIO -----

___ PARAMETRI GEOMETRICI - Coordinate X Y (in m) ___

SUP T.		SUP 2		SUP 3		SUP 4			
X	Y	X	Y	X	Y	X	Y		
0.00	50.00	645.79	217.12	0.00	30.00	-	-		
21.78	50.00	701.68	224.72	21.78	30.00	-	-		
37.67	51.63	728.73	233.25	37.67	31.63	-	-		
73.25	55.27	748.38	239.74	73.25	35.27	-	-		
86.42	57.17	748.40	240.02	86.42	37.17	-	-		
105.04	59.64	748.54	240.18	105.04	39.64	-	-		
124.17	63.61	753.48	241.42	124.17	43.61	-	-		
139.04	67.30	770.33	244.44	139.04	47.30	-	-		
141.29	67.64	776.76	249.80	141.29	47.64	-	-		
154.36	71.72	782.60	252.40	154.36	51.72	-	-		
185.90	84.27	784.23	257.85	185.90	64.27	-	-		
186.52	84.43	782.60	257.40	186.52	64.43	-	-		
210.09	91.75	776.76	255.80	210.09	71.75	-	-		
219.29	95.43	770.33	254.44	219.29	75.43	-	-		
231.33	99.86	753.48	250.42	231.33	79.86	-	-		
238.95	102.10	748.54	249.42	238.95	82.10	-	-		
245.91	104.14	748.40	248.92	245.91	84.14	-	-		
262.68	107.29	748.38	248.74	262.68	87.29	-	-		
272.09	109.05	728.73	243.25	272.09	89.05	-	-		
281.51	110.82	701.68	234.72	281.51	90.82	-	-		
282.47	111.10	645.79	217.12	282.47	91.10	-	-		
295.41	114.82	-	-	295.41	94.82	-	-		
310.12	119.19	-	-	310.12	99.19	-	-		
329.03	124.81	-	-	329.03	104.81	-	-		
349.62	130.73	-	-	349.62	110.73	-	-		
427.11	153.00	-	-	427.11	133.00	-	-		
440.27	157.24	-	-	440.27	137.24	-	-		
459.37	163.39	-	-	459.37	143.39	-	-		
486.50	170.12	-	-	486.50	150.12	-	-		
486.70	170.30	-	-	486.70	150.30	-	-		
488.75	170.89	-	-	488.75	150.89	-	-		
521.74	179.13	-	-	521.74	159.13	-	-		

559.33	190.99	-	-	559.33	170.99	-	-
613.66	209.00	-	-	613.66	189.00	-	-
645.79	217.12	-	-	645.79	197.12	-	-
701.68	234.72	-	-	701.68	214.72	-	-
728.73	243.25	-	-	728.73	223.25	-	-
748.38	248.74	-	-	748.38	228.74	-	-
748.40	248.92	-	-	748.40	228.92	-	-
748.54	249.42	-	-	748.54	229.42	-	-
753.48	250.42	-	-	753.48	230.42	-	-
770.33	254.44	-	-	770.33	234.44	-	-
776.76	255.80	-	-	776.76	235.80	-	-
782.60	257.40	-	-	782.60	237.40	-	-
784.23	257.85	-	-	784.23	237.85	-	-
802.49	264.72	-	-	802.49	244.72	-	-
813.44	267.55	-	-	813.44	247.55	-	-
823.56	270.91	-	-	823.56	250.91	-	-
828.33	272.99	-	-	828.33	252.99	-	-
839.85	277.67	-	-	839.85	257.67	-	-
853.85	283.30	-	-	853.85	263.30	-	-
855.20	283.93	-	-	861.84	286.90	-	-
861.84	287.00	-	-	871.76	292.18	-	-
871.76	292.28	-	-	879.92	296.94	-	-
879.92	297.04	-	-	895.85	303.95	-	-
895.85	304.05	-	-	907.64	311.79	-	-
907.64	311.89	-	-	912.69	314.66	-	-
912.69	314.76	-	-	920.40	318.68	-	-
920.40	318.78	-	-	924.21	320.73	-	-
924.21	320.83	-	-	930.29	322.84	-	-
930.29	322.94	-	-	939.66	326.09	-	-
939.66	326.19	-	-	971.77	334.78	-	-
971.77	334.88	-	-	989.00	342.71	-	-
989.00	342.81	-	-	1007.86	351.40	-	-
1007.86	351.50	-	-	1056.51	382.97	-	-
1056.51	383.07	-	-	1060.91	384.99	-	-
1060.91	385.09	-	-	1062.74	385.71	-	-
1062.74	385.81	-	-	1066.89	387.33	-	-
1066.89	387.43	-	-	1097.42	397.41	-	-
1097.42	397.51	-	-	1098.99	397.41	-	-
1098.99	397.51	-	-	1107.42	397.41	-	-
1107.42	397.51	-	-	1125.89	400.25	-	-
1125.89	400.35	-	-	1129.39	402.42	-	-
1129.39	402.52	-	-	1132.42	404.05	-	-
1132.42	404.15	-	-	1137.96	406.11	-	-
1137.96	406.21	-	-	1145.87	407.33	-	-
1145.87	407.43	-	-	1145.90	407.33	-	-
1145.90	407.43	-	-	1150.03	407.33	-	-

1150.03 407.43 - - 1150.33 407.33 - -

1150.33 407.43 - - - - - -

ASSENZA DI FALDA

----- PARAMETRI GEOMECCANICI -----

	fi`	C`	Cu	Gamm	Gamm_sat	STR_IDX	sgci	GSI	mi	D
STRATO 1	30.00	0.00	0.00	18.00	19.00	1.858	0.00	0.00	0.00	0.00
STRATO 2	28.00	0.00	0.00	19.00	20.00	1.664	0.00	0.00	0.00	0.00
STRATO 3	30.00	20.00	0.00	22.00	23.00	2.680	0.00	0.00	0.00	0.00

LEGENDA: fi` _____ Angolo di attrito interno efficace(in gradi)

C` _____ Coesione efficace (in Kpa)

Cu _____ Resistenza al taglio Non drenata (in Kpa)

Gamm _____ Peso di volume terreno fuori falda (in KN/m^3)

Gamm_sat _____ Peso di volume terreno immerso (in KN/m^3)

STR_IDX _____ Indice di resistenza (usato in solo in 'SNIFF SEARCH) (adimensionale)

---- SOLO Per AMMASSI ROCCIOSI FRATTURATI - Parametri Criterio di Rottura di Hoek (2002)-

sgci _____ Resistenza Compressione Uniassiale Roccia Intatta (in MPa)

GSI _____ Geological Strenght Index ammasso(adimensionale)

mi _____ Indice litologico ammasso(adimensionale)

D _____ Fattore di disturbo ammasso(adimensionale)

Fattore di riduzione NTC2018: gammaPHI=1.25 e gammaC=1.25 - DISATTIVATO (solo per ROCCE)

Uso CRITERIO DI ROTTURA Hoek et al.(2002,2006) - non-lineare - Generalizzato, secondo Lei et al.(2016)

----- INFORMAZIONI GENERAZIONE SUPERFICI RANDOM -----

*** PARAMETRI PER LA GENERAZIONE DELLE SUPERFICI

MOTORE DI RICERCA: RANDOM SEARCH - Siegel (1981)

FILTRAGGIO SUPERFICI : ATTIVATO

LUNGHEZZA MEDIA SEGMENTI (m)*: 46.0 (+/-) 50%

INTERVALLO ASCISSE RANDOM STARTING POINT (Xmin .. Xmax): 23.01 1058.30

LIVELLO MINIMO CONSIDERATO (Ymin): 0.00

INTERVALLO ASCISSE AMMESSO PER LA TERMINAZIONE (Xmin .. Xmax): 138.04 1127.32

TOTALE SUPERFICI GENERATE : 10000

----- INFORMAZIONI PARAMETRI DI CALCOLO -----

METODO DI CALCOLO : MORGENSTERN - PRICE (Morgenstern & Price, 1965)

METODO DI ESPLORAZIONE CAMPO VALORI (lambda0,Fs0) ADOTTATO : A (rapido)

COEFFICIENTE SISMICO UTILIZZATO Kh : 0.0430

COEFFICIENTE SISMICO UTILIZZATO Kv (assunto Positivo): 0.0220

COEFFICIENTE c=Kv/Kh UTILIZZATO : 0.5000

FORZA ORIZZONTALE ADDIZIONALE IN TESTA (kN/m): 0.00

FORZA ORIZZONTALE ADDIZIONALE ALLA BASE (kN/m): 0.00

----- RISULTATO FINALE ELABORAZIONI -----

* DATI RELATIVI ALLE 10 SUPERFICI GENERATE CON MINOR F_s *Fattore di sicurezza (F_s) 1.2076 - Min. - X Y Lambda= 0.7219

994.71 345.44

1001.66 344.29

1012.24 347.46

1027.96 354.65

1040.76 362.03

1048.80 366.97

1060.49 376.38

1067.59 383.30

1070.05 385.70

1070.05 388.47

Fattore di sicurezza (F_s) 1.2081 - N.2 -- X Y Lambda= 0.6754

994.09 345.16

1000.67 342.27

1009.46 343.45

1023.52 349.82

1029.79 353.71

1038.97 359.63

1053.25 368.22

1060.02 374.38

1065.98 380.10

1072.58 386.60

1072.58 389.31

Fattore di sicurezza (F_s) 1.2082 - N.3 -- X Y Lambda= 0.7064

999.53 347.66

1008.82 344.72

1023.21 349.25

1033.75 354.19

1043.89 359.12

1050.17 363.28

1059.53 371.57

1069.18 380.19

1075.23 387.68

1075.23 390.18

Fattore di sicurezza (F_s) 1.2094 - N.4 -- X Y Lambda= 0.6970

999.77 347.77

1010.95 346.79

1028.55 353.26

1036.80 358.37
 1047.28 366.15
 1057.78 373.90
 1069.79 385.51
 1069.79 388.39

Fattore di sicurezza (FS) 1.2108 - N.5 -- X Y Lambda= 0.7018
 996.66 346.34
 1002.96 344.06
 1009.89 345.98
 1015.94 348.16
 1026.16 353.42
 1040.16 361.20
 1048.18 366.84
 1060.80 376.14
 1068.61 382.78
 1075.66 387.24
 1076.29 387.88
 1076.29 390.54

Fattore di sicurezza (FS) 1.2119 - N.6 -- X Y Lambda= 0.6960
 997.07 346.53
 1006.15 344.65
 1019.03 348.88
 1033.85 356.95
 1049.29 366.28
 1064.89 375.89
 1070.84 380.97
 1078.70 388.61
 1078.70 391.33

Fattore di sicurezza (FS) 1.2122 - N.7 -- X Y Lambda= 0.6817
 1000.29 348.01
 1010.44 345.00
 1022.25 348.61
 1037.98 357.88
 1050.37 367.33
 1061.31 376.03
 1066.48 380.95
 1070.28 386.04
 1070.28 388.55

Fattore di sicurezza (FS) 1.2163 - N.8 -- X Y Lambda= 0.7145
 996.33 346.19
 1007.53 344.98
 1017.24 348.79

1024.23 352.28
 1035.90 357.89
 1043.57 362.17
 1057.20 370.51
 1071.33 380.13
 1082.34 389.85
 1082.34 392.53

Fattore di sicurezza (FS) 1.2168 - N.9 -- X Y Lambda= 0.6840
 988.39 342.53
 1002.80 340.95
 1027.50 350.63
 1036.27 355.68
 1059.74 372.83
 1070.64 382.86
 1075.49 387.48
 1075.49 390.27

Fattore di sicurezza (FS) 1.2173 - N.10 -- X Y Lambda= 0.6976
 990.16 343.34
 1010.35 345.10
 1034.55 355.73
 1054.61 367.94
 1081.57 389.54
 1081.57 392.28

----- ANALISI DEFICIT DI RESISTENZA -----

DATI RELATIVI ALLE 10 SUPERFICI GENERATE CON MINOR FS *

Analisi Deficit in riferimento a FS(progetto) = 1.200

Sup N.	FS	FTR(kN/m)	FTA(kN/m)	Bilancio(kN/m)	ESITO
1	1.208	8471.8	7015.5	53.2	Surplus
2	1.208	10537.9	8722.8	70.5	Surplus
3	1.208	11434.9	9464.4	77.6	Surplus
4	1.209	8524.5	7048.4	66.4	Surplus
5	1.211	9178.6	7580.8	81.6	Surplus
6	1.212	10401.3	8582.7	102.1	Surplus
7	1.212	9684.3	7989.3	97.1	Surplus
8	1.216	10883.1	8948.0	145.5	Surplus
9	1.217	12071.8	9921.2	166.4	Surplus
10	1.217	11684.3	9598.4	166.2	Surplus

Esito analisi: SURPLUS di RESISTENZA!

Valore minimo di SURPLUS di RESISTENZA (kN/m): 53.2

FTR --> Forza totale Resistente lungo la superficie di scivolamento

FTA --> Forza totale Agente lungo la superficie di scivolamento

Il Deficit o il Surplus di resistenza viene espresso in kN per metro di LARGHEZZA rispetto al fronte della scarpata

TABELLA PARAMETRI CONCI DELLA SUPERFICIE INDIVIDUATA CON MINOR FS

X (m)	dx (m)	alpha (°)	W (kN/m)	ru (-)	U (kPa)	phi' (°)	(c',Cu) (kPa)
994.713	0.160	-9.43	0.15	0.00	0.00	30.00	0.00
994.873	0.614	-9.43	3.78	0.00	0.00	30.00	20.00
995.486	0.614	-9.43	9.07	0.00	0.00	30.00	20.00
996.100	0.614	-9.43	14.37	0.00	0.00	30.00	20.00
996.714	0.614	-9.43	19.67	0.00	0.00	30.00	20.00
997.327	0.614	-9.43	24.97	0.00	0.00	30.00	20.00
997.941	0.614	-9.43	30.27	0.00	0.00	30.00	20.00
998.555	0.614	-9.43	35.57	0.00	0.00	30.00	20.00
999.169	0.614	-9.43	40.87	0.00	0.00	30.00	20.00
999.782	0.614	-9.43	46.17	0.00	0.00	30.00	20.00
1000.396	0.614	-9.43	51.46	0.00	0.00	30.00	20.00
1001.010	0.614	-9.43	56.76	0.00	0.00	30.00	20.00
1001.623	0.033	-9.43	3.25	0.00	0.00	30.00	20.00
1001.657	0.614	16.69	60.38	0.00	0.00	30.00	20.00
1002.271	0.614	16.69	61.74	0.00	0.00	30.00	20.00
1002.884	0.614	16.69	63.10	0.00	0.00	30.00	20.00
1003.498	0.614	16.69	64.46	0.00	0.00	30.00	20.00
1004.112	0.614	16.69	65.82	0.00	0.00	30.00	20.00
1004.725	0.614	16.69	67.18	0.00	0.00	30.00	20.00
1005.339	0.614	16.69	68.54	0.00	0.00	30.00	20.00
1005.953	0.614	16.69	69.90	0.00	0.00	30.00	20.00
1006.567	0.614	16.69	71.26	0.00	0.00	30.00	20.00
1007.180	0.614	16.69	72.62	0.00	0.00	30.00	20.00
1007.794	0.066	16.69	7.90	0.00	0.00	30.00	20.00
1007.860	0.614	16.69	74.92	0.00	0.00	30.00	20.00
1008.474	0.614	16.69	77.87	0.00	0.00	30.00	20.00
1009.087	0.614	16.69	80.82	0.00	0.00	30.00	20.00
1009.701	0.614	16.69	83.77	0.00	0.00	30.00	20.00
1010.315	0.614	16.69	86.72	0.00	0.00	30.00	20.00
1010.929	0.614	16.69	89.67	0.00	0.00	30.00	20.00
1011.542	0.614	16.69	92.62	0.00	0.00	30.00	20.00
1012.156	0.083	16.69	12.71	0.00	0.00	30.00	20.00
1012.239	0.614	24.58	95.31	0.00	0.00	30.00	20.00
1012.852	0.614	24.58	96.92	0.00	0.00	30.00	20.00

1013.466	0.614	24.58	98.54	0.00	0.00	30.00	20.00
1014.080	0.614	24.58	100.16	0.00	0.00	30.00	20.00
1014.694	0.614	24.58	101.78	0.00	0.00	30.00	20.00
1015.307	0.614	24.58	103.40	0.00	0.00	30.00	20.00
1015.921	0.614	24.58	105.02	0.00	0.00	30.00	20.00
1016.535	0.614	24.58	106.63	0.00	0.00	30.00	20.00
1017.148	0.614	24.58	108.25	0.00	0.00	30.00	20.00
1017.762	0.614	24.58	109.87	0.00	0.00	30.00	20.00
1018.376	0.614	24.58	111.49	0.00	0.00	30.00	20.00
1018.989	0.614	24.58	113.11	0.00	0.00	30.00	20.00
1019.603	0.614	24.58	114.73	0.00	0.00	30.00	20.00
1020.217	0.614	24.58	116.34	0.00	0.00	30.00	20.00
1020.831	0.614	24.58	117.96	0.00	0.00	30.00	20.00
1021.444	0.614	24.58	119.58	0.00	0.00	30.00	20.00
1022.058	0.614	24.58	121.20	0.00	0.00	30.00	20.00
1022.672	0.614	24.58	122.82	0.00	0.00	30.00	20.00
1023.285	0.614	24.58	124.44	0.00	0.00	30.00	20.00
1023.899	0.614	24.58	126.06	0.00	0.00	30.00	20.00
1024.513	0.614	24.58	127.67	0.00	0.00	30.00	20.00
1025.127	0.614	24.58	129.29	0.00	0.00	30.00	20.00
1025.740	0.614	24.58	130.91	0.00	0.00	30.00	20.00
1026.354	0.614	24.58	132.53	0.00	0.00	30.00	20.00
1026.968	0.614	24.58	134.15	0.00	0.00	30.00	20.00
1027.581	0.383	24.58	84.47	0.00	0.00	30.00	20.00
1027.964	0.614	29.98	136.27	0.00	0.00	30.00	20.00
1028.578	0.614	29.98	136.88	0.00	0.00	30.00	20.00
1029.192	0.614	29.98	137.49	0.00	0.00	30.00	20.00
1029.805	0.614	29.98	138.10	0.00	0.00	30.00	20.00
1030.419	0.614	29.98	138.71	0.00	0.00	30.00	20.00
1031.033	0.614	29.98	139.32	0.00	0.00	30.00	20.00
1031.646	0.614	29.98	139.92	0.00	0.00	30.00	20.00
1032.260	0.614	29.98	140.53	0.00	0.00	30.00	20.00
1032.874	0.614	29.98	141.14	0.00	0.00	30.00	20.00
1033.488	0.614	29.98	141.75	0.00	0.00	30.00	20.00
1034.101	0.614	29.98	142.36	0.00	0.00	30.00	20.00
1034.715	0.614	29.98	142.97	0.00	0.00	30.00	20.00
1035.329	0.614	29.98	143.58	0.00	0.00	30.00	20.00
1035.942	0.614	29.98	144.19	0.00	0.00	30.00	20.00
1036.556	0.614	29.98	144.80	0.00	0.00	30.00	20.00
1037.170	0.614	29.98	145.40	0.00	0.00	30.00	20.00
1037.783	0.614	29.98	146.01	0.00	0.00	30.00	20.00
1038.397	0.614	29.98	146.62	0.00	0.00	30.00	20.00
1039.011	0.614	29.98	147.23	0.00	0.00	30.00	20.00
1039.625	0.614	29.98	147.84	0.00	0.00	30.00	20.00
1040.238	0.517	29.98	124.95	0.00	0.00	30.00	20.00
1040.755	0.614	31.56	148.80	0.00	0.00	30.00	20.00

1041.369	0.614	31.56	149.10	0.00	0.00	30.00	20.00
1041.982	0.614	31.56	149.39	0.00	0.00	30.00	20.00
1042.596	0.614	31.56	149.69	0.00	0.00	30.00	20.00
1043.210	0.614	31.56	149.98	0.00	0.00	30.00	20.00
1043.824	0.614	31.56	150.27	0.00	0.00	30.00	20.00
1044.437	0.614	31.56	150.57	0.00	0.00	30.00	20.00
1045.051	0.614	31.56	150.86	0.00	0.00	30.00	20.00
1045.665	0.614	31.56	151.16	0.00	0.00	30.00	20.00
1046.278	0.614	31.56	151.45	0.00	0.00	30.00	20.00
1046.892	0.614	31.56	151.74	0.00	0.00	30.00	20.00
1047.506	0.614	31.56	152.04	0.00	0.00	30.00	20.00
1048.120	0.614	31.56	152.33	0.00	0.00	30.00	20.00
1048.733	0.066	31.56	16.34	0.00	0.00	30.00	20.00
1048.799	0.614	38.81	151.85	0.00	0.00	30.00	20.00
1049.413	0.614	38.81	150.54	0.00	0.00	30.00	20.00
1050.026	0.614	38.81	149.23	0.00	0.00	30.00	20.00
1050.640	0.614	38.81	147.92	0.00	0.00	30.00	20.00
1051.254	0.614	38.81	146.60	0.00	0.00	30.00	20.00
1051.868	0.614	38.81	145.29	0.00	0.00	30.00	20.00
1052.481	0.614	38.81	143.98	0.00	0.00	30.00	20.00
1053.095	0.614	38.81	142.67	0.00	0.00	30.00	20.00
1053.709	0.614	38.81	141.35	0.00	0.00	30.00	20.00
1054.322	0.614	38.81	140.04	0.00	0.00	30.00	20.00
1054.936	0.614	38.81	138.73	0.00	0.00	30.00	20.00
1055.550	0.614	38.81	137.42	0.00	0.00	30.00	20.00
1056.164	0.346	38.81	76.99	0.00	0.00	30.00	20.00
1056.510	0.614	38.81	134.56	0.00	0.00	30.00	20.00
1057.124	0.614	38.81	131.64	0.00	0.00	30.00	20.00
1057.737	0.614	38.81	128.73	0.00	0.00	30.00	20.00
1058.351	0.614	38.81	125.81	0.00	0.00	30.00	20.00
1058.965	0.614	38.81	122.89	0.00	0.00	30.00	20.00
1059.579	0.614	38.81	119.98	0.00	0.00	30.00	20.00
1060.192	0.301	38.81	57.87	0.00	0.00	30.00	20.00
1060.494	0.416	44.28	78.41	0.00	0.00	30.00	20.00
1060.910	0.614	44.28	111.67	0.00	0.00	30.00	20.00
1061.524	0.614	44.28	106.75	0.00	0.00	30.00	20.00
1062.137	0.603	44.28	100.03	0.00	0.00	30.00	20.00
1062.740	0.614	44.28	97.00	0.00	0.00	30.00	20.00
1063.354	0.614	44.28	92.06	0.00	0.00	30.00	20.00
1063.967	0.614	44.28	87.11	0.00	0.00	30.00	20.00
1064.581	0.614	44.28	82.17	0.00	0.00	30.00	20.00
1065.195	0.614	44.28	77.23	0.00	0.00	30.00	20.00
1065.809	0.614	44.28	72.29	0.00	0.00	30.00	20.00
1066.422	0.468	44.28	51.77	0.00	0.00	30.00	20.00
1066.890	0.614	44.28	63.32	0.00	0.00	30.00	20.00
1067.504	0.090	44.28	8.79	0.00	0.00	30.00	20.00

1067.593	0.614	44.29	57.08	0.00	0.00	30.00	20.00
1068.207	0.614	44.29	51.62	0.00	0.00	30.00	20.00
1068.821	0.614	44.29	46.17	0.00	0.00	30.00	20.00
1069.434	0.614	44.29	40.71	0.00	0.00	30.00	20.00

LEGENDA SIMBOLI

X(m) : Ascissa sinistra concio

dx(m) : Larghezza concio

alpha(°) : Angolo pendenza base concio

W(kN/m) : Forza peso concio

ru(-) : Coefficiente locale pressione interstiziale

U(kPa) : Pressione totale dei pori base concio

phi'(°) : Angolo di attrito efficace base concio

c'/Cu (kPa) : Coesione efficace o Resistenza al taglio in condizioni non drenate

TABELLA DIAGRAMMA DELLE FORZE DELLA SUPERFICIE INDIVIDUATA CON MINOR FS

X (m)	ht (m)	yt (m)	yt' (--)	E(x) (kN/m)	T(x) (kN/m)	E' (kN)	rho(x) (kN)	FS_qFEM (--)	FS_srmFEM (--)			
994.713	0.000	345.442	-0.008	0.0000000000E+000	0.0000000000E+000	0.0000000000E+000	3.1669085767E+000	0.040	42.803	1.901		
994.873	0.025	345.441	-0.008	5.8614628630E-001	5.7052086497E-004	4.1826177312E+000	0.040	42.803	8.524			
995.486	0.122	345.436	-0.006	4.3522561676E+000	5.0473371064E-002	9.5984685805E+000	0.040	30.381	5.238			
996.100	0.222	345.434	0.002	1.2367504509E+001	4.9047842274E-001	1.8455463654E+001	0.040	35.216	3.668			
996.714	0.328	345.438	0.013	2.7004872745E+001	2.4333001240E+000	3.0988869931E+001	0.076	17.548	2.762			
997.327	0.442	345.450	0.023	5.0403882346E+001	7.2037480433E+000	4.4842948473E+001	0.145	9.563	2.364			
997.941	0.561	345.467	0.035	8.2046032207E+001	1.4688423976E+001	6.2302582266E+001	0.207	6.666	2.169			
998.555	0.688	345.492	0.056	1.2687535628E+002	2.5833027084E+001	7.2173841517E+001	0.261	5.283	2.039			
999.169	0.833	345.535	0.080	1.7063369326E+002	3.7456288613E+001	6.6324985068E+001	0.297	4.693	1.947			
999.782	0.990	345.590	0.096	2.0828401035E+002	4.7993162071E+001	6.0087593536E+001	0.319	4.328	1.874			
1000.396	1.155	345.653	0.115	2.4438644437E+002	5.8434527156E+001	5.7799488605E+001	0.335	4.047	1.811			
1001.010	1.336	345.732	0.144	2.7922829429E+002	6.9174406660E+001	5.4824642097E+001	0.351	3.828	1.756			
1001.623	1.535	345.829	0.160	3.1167934037E+002	7.9957375587E+001	4.7700682198E+001	0.365	3.657	1.705			
1001.657	1.547	345.835	0.208	3.1326643660E+002	8.0520136555E+001	4.7375583953E+001	0.366	3.650	1.703			
1002.271	1.492	345.964	0.230	3.4185961860E+002	9.1400065925E+001	4.5082883163E+001	0.388	3.492	1.652			
1002.884	1.461	346.118	0.279	3.6860209685E+002	1.0255725793E+002	4.3192101982E+001	0.410	3.319	1.601			
1003.498	1.466	346.307	0.328	3.9487449504E+002	1.1462576444E+002	4.1847752172E+001	0.434	3.118	1.548			
1004.112	1.496	346.521	0.359	4.1996689062E+002	1.2708438744E+002	3.9482680591E+001	0.458	2.907	1.497			
1004.725	1.539	346.747	0.377	4.4333635120E+002	1.3946022351E+002	3.7051170728E+001	0.480	2.705	1.452			
1005.339	1.591	346.984	0.392	4.6544426144E+002	1.5182649502E+002	3.5418965600E+001	0.501	2.516	1.413			
1005.953	1.652	347.228	0.395	4.8681031979E+002	1.6428620440E+002	3.3978279540E+001	0.522	2.342	1.381			
1006.567	1.707	347.468	0.376	5.0714990226E+002	1.7642801174E+002	3.1801970594E+001	0.541	2.192	1.356			
1007.180	1.746	347.690	0.370	5.2584471415E+002	1.8774479771E+002	3.1008511464E+001	0.558	2.069	1.340			
1007.794	1.794	347.923	0.380	5.4521038852E+002	1.9975206037E+002	3.2312273273E+001	0.575	1.965	1.329			
1007.860	1.800	347.949	0.403	5.4734968190E+002	2.0110328895E+002	3.2443854527E+001	0.577	1.955	1.329			
1008.474	1.864	348.197	0.410	5.6754654182E+002	2.1408069846E+002	3.2860068651E+001	0.592	1.875	1.323			
1009.087	1.935	348.452	0.420	5.8768280763E+002	2.2741631394E+002	3.2583640813E+001	0.606	1.815	1.321			
1009.701	2.012	348.713	0.432	6.0754037431E+002	2.4102520570E+002	3.1943400960E+001	0.621	1.770	1.321			
1010.315	2.097	348.981	0.443	6.2689079653E+002	2.5479257498E+002	3.0923101316E+001	0.636	1.739	1.322			
1010.929	2.189	349.257	0.456	6.4549602640E+002	2.6858599155E+002	2.9507348503E+001	0.650	1.718	1.323			
1011.542	2.288	349.541	0.468	6.6310872442E+002	2.8226689009E+002	2.7680659321E+001	0.664	1.708	1.325			
1012.156	2.395	349.832	0.475	6.7947183833E+002	2.9569869485E+002	2.4952901186E+001	0.677	1.705	1.325			
1012.239	2.410	349.871	0.479	6.8151629116E+002	2.9745506829E+002	2.4397580331E+001	0.679	1.706	1.325			
1012.852	2.423	350.165	0.480	6.9500937948E+002	3.0989328466E+002	2.0390749896E+001	0.694	1.704	1.324			

1013.466	2.438	350.461	0.493	7.0654431797E+002	3.2156148581E+002	1.8028915246E+001	0.708	1.694	1.321
1014.080	2.467	350.771	0.516	7.1713844174E+002	3.3309852104E+002	1.6630488295E+001	0.723	1.673	1.317
1014.694	2.510	351.094	0.537	7.2695692217E+002	3.4453448729E+002	1.5514396751E+001	0.737	1.644	1.313
1015.307	2.565	351.430	0.558	7.3618113217E+002	3.5592267203E+002	1.4707710639E+001	0.751	1.606	1.307
1015.921	2.633	351.779	0.578	7.4500946943E+002	3.6733309761E+002	1.4238863851E+001	0.765	1.562	1.301
1016.535	2.713	352.140	0.584	7.5365820721E+002	3.7884419284E+002	1.3828916054E+001	0.779	1.513	1.295
1017.148	2.789	352.496	0.564	7.6198336610E+002	3.9000532362E+002	1.3116612266E+001	0.792	1.463	1.288
1017.762	2.844	352.832	0.547	7.6975780753E+002	4.0037314555E+002	1.2635997104E+001	0.804	1.418	1.282
1018.376	2.899	353.168	0.548	7.7749304945E+002	4.1069769615E+002	1.2572476761E+001	0.816	1.378	1.276
1018.989	2.955	353.505	0.548	7.8518952470E+002	4.2101656466E+002	1.2509654847E+001	0.827	1.342	1.270
1019.603	3.011	353.841	0.549	7.9284765772E+002	4.3136243310E+002	1.2447436204E+001	0.838	1.309	1.264
1020.217	3.067	354.178	0.549	8.0046776452E+002	4.4175925270E+002	1.2385576189E+001	0.849	1.280	1.258
1020.831	3.124	354.516	0.550	8.0804996928E+002	4.5221819608E+002	1.2323740571E+001	0.860	1.254	1.252
1021.444	3.181	354.853	0.550	8.1559417778E+002	4.6273693052E+002	1.2261517876E+001	0.871	1.230	1.245
1022.058	3.238	355.191	0.551	8.2310000911E+002	4.7329638616E+002	1.2198316775E+001	0.881	1.208	1.239
1022.672	3.296	355.530	0.552	8.3056664327E+002	4.8385198518E+002	1.2154442052E+001	0.892	1.189	1.233
1023.285	3.355	355.869	0.563	8.3801862187E+002	4.9436260594E+002	1.2307182252E+001	0.902	1.171	1.226
1023.899	3.425	356.221	0.570	8.4567273250E+002	5.0502065532E+002	1.2179054643E+001	0.912	1.156	1.220
1024.513	3.493	356.569	0.565	8.5296744463E+002	5.1523226600E+002	1.1425343396E+001	0.922	1.142	1.214
1025.127	3.557	356.914	0.560	8.5969643453E+002	5.2485434847E+002	1.0340438165E+001	0.930	1.131	1.208
1025.740	3.619	357.257	0.557	8.6565951162E+002	5.3374480270E+002	8.9341603062E+000	0.938	1.122	1.202
1026.354	3.679	357.598	0.555	8.7066240709E+002	5.4177222883E+002	7.2159613842E+000	0.945	1.114	1.196
1026.968	3.739	357.938	0.554	8.7451653139E+002	5.4882543022E+002	5.1948771514E+000	0.951	1.108	1.191
1027.581	3.798	358.278	0.563	8.7703870640E+002	5.5482265466E+002	2.8352512528E+000	0.956	1.103	1.186
1027.964	3.844	358.499	0.572	8.7781959223E+002	5.5810569543E+002	1.1293461461E+000	0.959	1.100	1.183
1028.578	3.839	358.847	0.575	8.7761587352E+002	5.6230627579E+002	-1.4919781398E+000	0.965	1.095	1.178
1029.192	3.841	359.204	0.588	8.7598830750E+002	5.6552151688E+002	-3.6599350747E+000	0.971	1.090	1.173
1029.805	3.852	359.570	0.601	8.7312359375E+002	5.6779925753E+002	-5.5212992135E+000	0.976	1.084	1.169
1030.419	3.871	359.942	0.613	8.6921135101E+002	5.6921901840E+002	-7.0711393947E+000	0.980	1.078	1.165
1031.033	3.897	360.322	0.624	8.6444433148E+002	5.6988352938E+002	-8.3040943294E+000	0.984	1.072	1.161
1031.646	3.929	360.708	0.634	8.5901873443E+002	5.6990966166E+002	-9.2141966770E+000	0.987	1.065	1.157
1032.260	3.967	361.100	0.628	8.5313463651E+002	5.6941842066E+002	-9.5704385791E+000	0.990	1.058	1.153
1032.874	3.992	361.479	0.617	8.4727178081E+002	5.6849927586E+002	-9.5732829523E+000	0.992	1.052	1.149
1033.488	4.016	361.857	0.616	8.4138419165E+002	5.6728187791E+002	-9.6311366609E+000	0.993	1.046	1.145
1034.101	4.039	362.235	0.615	8.3545032511E+002	5.6584315165E+002	-9.7096325289E+000	0.995	1.040	1.142
1034.715	4.063	362.612	0.615	8.2946638850E+002	5.6423164796E+002	-9.7933803622E+000	0.995	1.035	1.138
1035.329	4.087	362.990	0.615	8.2342972815E+002	5.6247358868E+002	-9.8805273696E+000	0.996	1.031	1.135
1035.942	4.110	363.368	0.620	8.1733882551E+002	5.6057503382E+002	-1.0054434431E+001	0.997	1.027	1.131
1036.556	4.140	363.751	0.624	8.1108870804E+002	5.5848105408E+002	-1.0243115384E+001	0.997	1.023	1.127
1037.170	4.168	364.133	0.621	8.0476621451E+002	5.5621971075E+002	-1.0411261770E+001	0.997	1.019	1.124
1037.783	4.194	364.514	0.618	7.9830971070E+002	5.5375592466E+002	-1.0678284444E+001	0.997	1.016	1.120
1038.397	4.219	364.892	0.616	7.9165946803E+002	5.5105013275E+002	-1.1041280878E+001	0.996	1.012	1.116
1039.011	4.242	365.270	0.614	7.8475741492E+002	5.4806591691E+002	-1.1497689506E+001	0.996	1.009	1.112
1039.625	4.265	365.646	0.613	7.7754696689E+002	5.4476977989E+002	-1.2044515485E+001	0.994	1.006	1.108
1040.238	4.286	366.022	0.615	7.6997372829E+002	5.4113004951E+002	-1.2773073882E+001	0.993	1.003	1.104
1040.755	4.307	366.341	0.617	7.6318521157E+002	5.3773160891E+002	-1.3451268620E+001	0.992	1.001	1.101
1041.369	4.309	366.719	0.619	7.5470142042E+002	5.3334241976E+002	-1.4214122068E+001	0.990	0.998	1.097
1041.982	4.313	367.101	0.624	7.4573850510E+002	5.2851260963E+002	-1.4940085377E+001	0.988	0.996	1.093
1042.596	4.321	367.485	0.629	7.3636365162E+002	5.2323247263E+002	-1.5556610017E+001	0.986	0.994	1.089
1043.210	4.331	367.872	0.633	7.2664400124E+002	5.1748920615E+002	-1.6063642661E+001	0.983	0.992	1.085
1043.824	4.344	368.262	0.651	7.1664680544E+002	5.1126057052E+002	-1.7001049403E+001	0.980	0.991	1.080
1044.437	4.376	368.671	0.647	7.0577656270E+002	5.0394691137E+002	-1.8075747497E+001	0.975	0.990	1.076
1045.051	4.385	369.057	0.628	6.9446026030E+002	4.9589795115E+002	-1.8393142318E+001	0.969	0.988	1.071
1045.665	4.393	369.442	0.628	6.8320044062E+002	4.8758963315E+002	-1.8606677946E+001	0.962	0.986	1.067
1046.278	4.402	369.828	0.628	6.7162204019E+002	4.7884037036E+002	-1.9307586207E+001	0.954	0.983	1.063
1046.892	4.410	370.213	0.628	6.5950191125E+002	4.6955823028E+002	-2.0353494874E+001	0.946	0.980	1.060
1047.506	4.419	370.599	0.628	6.4663974096E+002	4.5965323139E+002	-2.1708220270E+001	0.937	0.976	1.057
1048.120	4.428	370.984	0.628	6.3285679414E+002	4.4904341583E+002	-2.3339393078E+001	0.927	0.972	1.054
1048.733	4.436	371.369	0.628	6.1799248872E+002	4.3766866895E+002	-2.4854099051E+001	0.917	0.966	1.051
1048.799	4.437	371.411	0.715	6.1635368113E+002	4.3643449409E+002	-2.5223093163E+001	0.915	0.966	1.051
1049.413	4.388	371.855	0.687	5.9914942544E+002	4.2363521512E+002	-2.9559780109E+001	0.907	0.960	1.049
1050.026	4.293	372.254	0.663	5.8007139761E+002	4.0937437300E+002	-3.2425303664E+001	0.897	0.955	1.047
1050.640	4.214	372.669	0.689	5.5934993922E+002	3.9369474004E+002	-3.4920104620E+001	0.885	0.952	1.045

1051.254	4.152	373.100	0.719	5.3720974126E+002	3.7669321543E+002	-3.7253343531E+001	0.871	0.949	1.044
1051.868	4.109	373.551	0.760	5.1362441734E+002	3.5829945530E+002	-3.9826267047E+001	0.854	0.948	1.043
1052.481	4.097	374.032	0.790	4.8832616001E+002	3.3827240936E+002	-4.1559439003E+001	0.833	0.948	1.042
1053.095	4.092	374.520	0.783	4.6261350509E+002	3.1769360885E+002	-4.1104973629E+001	0.810	0.951	1.042
1053.709	4.071	374.993	0.740	4.3787306794E+002	2.9764204731E+002	-3.8457194154E+001	0.786	0.955	1.042
1054.322	4.013	375.428	0.700	4.1541035213E+002	2.7919960692E+002	-3.6042660382E+001	0.762	0.961	1.044
1054.936	3.944	375.853	0.684	3.9363356351E+002	2.6130347086E+002	-3.4930176163E+001	0.737	0.968	1.046
1055.550	3.864	376.267	0.684	3.7253633377E+002	2.4400306091E+002	-3.4725527276E+001	0.712	0.975	1.050
1056.164	3.796	376.693	0.701	3.5101073541E+002	2.2640744062E+002	-3.5703245944E+001	0.684	0.985	1.055
1056.510	3.766	376.941	0.691	3.3851854778E+002	2.1625148462E+002	-3.5380998915E+001	0.667	0.990	1.058
1057.124	3.688	377.357	0.671	3.1754104860E+002	1.9935406030E+002	-3.3810185822E+001	0.642	0.999	1.065
1057.737	3.602	377.764	0.658	2.9701922866E+002	1.8307249736E+002	-3.3156109970E+001	0.616	1.009	1.073
1058.351	3.509	378.165	0.649	2.7684455566E+002	1.6734868163E+002	-3.2594043358E+001	0.589	1.019	1.082
1058.965	3.411	378.560	0.640	2.5701262786E+002	1.5218468430E+002	-3.2074737713E+001	0.561	1.029	1.092
1059.579	3.308	378.951	0.634	2.3747536132E+002	1.3756770081E+002	-3.1627851787E+001	0.533	1.039	1.103
1060.192	3.202	379.339	0.621	2.1819195052E+002	1.2350441495E+002	-3.0263750695E+001	0.503	1.049	1.115
1060.494	3.140	379.519	0.637	2.0923930905E+002	1.1713815956E+002	-3.0976247052E+001	0.489	1.053	1.120
1060.910	3.011	379.796	0.646	1.9560910499E+002	1.0767100624E+002	-3.1922525410E+001	0.469	1.061	1.130
1061.524	2.801	380.184	0.644	1.7676204635E+002	9.4993902422E+001	-3.0785270680E+001	0.443	1.074	1.144
1062.137	2.605	380.587	0.674	1.5782262907E+002	8.2532367887E+001	-3.1090591774E+001	0.414	1.090	1.160
1062.740	2.436	381.005	0.732	1.3895195551E+002	7.0354356619E+001	-3.1916484229E+001	0.381	1.109	1.178
1063.354	2.309	381.477	0.773	1.1898945804E+002	5.7799913697E+001	-3.1773201343E+001	0.342	1.134	1.200
1063.967	2.187	381.953	0.775	9.9952873128E+001	4.6122103433E+001	-2.9972718307E+001	0.299	1.165	1.226
1064.581	2.064	382.428	0.772	8.2200325661E+001	3.5564665608E+001	-2.7752968475E+001	0.255	1.200	1.255
1065.195	1.938	382.901	0.729	6.5888307452E+001	2.6224163588E+001	-2.4809005260E+001	0.208	1.241	1.288
1065.809	1.762	383.323	0.679	5.1749241128E+001	1.8088736113E+001	-2.1727478110E+001	0.160	1.284	1.322
1066.422	1.575	383.735	0.654	3.9219552873E+001	1.1237354036E+001	-1.8476085108E+001	0.111	1.331	1.359
1066.890	1.415	384.031	0.623	3.1269238751E+001	7.4298210605E+000	-1.5919949824E+001	0.080	1.366	1.386
1067.504	1.194	384.408	0.620	2.2366573294E+001	3.8717940572E+000	-1.4067845502E+001	0.047	1.412	1.422
1067.593	1.165	384.467	0.633	2.1111056966E+001	3.4341249251E+000	-1.3693838113E+001	0.043	1.420	1.428
1068.207	0.953	384.853	0.771	1.4009119578E+001	1.5182973503E+000	-1.2124213406E+001	0.040	1.472	1.471
1068.821	0.914	385.413	0.852	6.2295474727E+000	2.7156328058E-001	-9.8635502290E+000	0.040	1.575	1.562
1069.434	0.802	385.899	0.852	1.9023946743E+000	2.4306934891E-002	-5.0753159827E+000	0.040	1.671	1.649

LEGENDA SIMBOLI

X(m) : Ascissa sinistra concio

ht(m) : Altezza linea di thrust da nodo sinistro base concio

yt(m) : coordinata Y linea di trust

yt'(-) : gradiente pendenza locale linea di trust

E(x)(kN/m) : Forza Normale interconcio

T(x)(kN/m) : Forza Tangenziale interconcio

E' (kN) : derivata Forza normale interconcio

Rho(x) (-) : fattore mobilizzazione resistenza al taglio verticale interconcio ZhU et al.(2003)

FS_qFEM(x)(-) : fattore di sicurezza locale stimato (locale in X) by qFEM

FS_srmFEM(x)(-) : fattore di sicurezza locale stimato (locale in X) by SRM Procedure

TABELLA SFORZI DI TAGLIO DISTRIBUITI LUNGO SUPERFICIE INDIVIDUATA CON MINOR FS

X (m)	dx (m)	dl (m)	alpha (°)	TauStress (kPa)	TauF (kN/m)	TauStrength (kPa)	TauS (kN/m)
994.713	0.160	0.162	-9.435	-0.113	-0.018	0.522	0.084
994.873	0.614	0.622	-9.435	-0.755	-0.470	23.542	14.646
995.486	0.614	0.622	-9.435	-1.816	-1.130	28.906	17.983
996.100	0.614	0.622	-9.435	-2.876	-1.789	35.643	22.174

996.714	0.614	0.622	-9.435	-3.936	-2.449	44.014	27.382
997.327	0.614	0.622	-9.435	-4.996	-3.108	52.246	32.504
997.941	0.614	0.622	-9.435	-6.056	-3.768	61.644	38.350
998.555	0.614	0.622	-9.435	-7.116	-4.427	67.118	41.756
999.169	0.614	0.622	-9.435	-8.176	-5.087	70.661	43.960
999.782	0.614	0.622	-9.435	-9.236	-5.746	75.426	46.924
1000.396	0.614	0.622	-9.435	-10.296	-6.406	80.677	50.191
1001.010	0.614	0.622	-9.435	-11.356	-7.065	85.614	53.262
1001.623	0.033	0.034	-9.435	-11.915	-0.404	87.616	2.973
1001.657	0.614	0.641	16.692	30.680	19.657	74.994	48.049
1002.271	0.614	0.641	16.692	31.371	20.099	76.243	48.849
1002.884	0.614	0.641	16.692	32.062	20.542	77.696	49.780
1003.498	0.614	0.641	16.692	32.753	20.985	78.981	50.604
1004.112	0.614	0.641	16.692	33.444	21.428	80.114	51.330
1004.725	0.614	0.641	16.692	34.135	21.870	81.271	52.071
1005.339	0.614	0.641	16.692	34.826	22.313	82.461	52.833
1005.953	0.614	0.641	16.692	35.517	22.756	83.518	53.511
1006.567	0.614	0.641	16.692	36.207	23.198	84.412	54.084
1007.180	0.614	0.641	16.692	36.898	23.641	85.794	54.969
1007.794	0.066	0.069	16.692	37.281	2.570	86.613	5.972
1007.860	0.614	0.641	16.692	38.068	24.390	88.069	56.427
1008.474	0.614	0.641	16.692	39.567	25.351	90.700	58.112
1009.087	0.614	0.641	16.692	41.066	26.311	93.304	59.781
1009.701	0.614	0.641	16.692	42.565	27.272	95.871	61.425
1010.315	0.614	0.641	16.692	44.064	28.232	98.395	63.043
1010.929	0.614	0.641	16.692	45.563	29.192	100.875	64.631
1011.542	0.614	0.641	16.692	47.062	30.153	103.311	66.192
1012.156	0.083	0.086	16.692	47.912	4.136	104.610	9.031
1012.239	0.614	0.675	24.581	63.881	43.112	93.206	62.902
1012.852	0.614	0.675	24.581	64.966	43.844	94.416	63.719
1013.466	0.614	0.675	24.581	66.051	44.576	95.648	64.550
1014.080	0.614	0.675	24.581	67.136	45.308	96.881	65.382
1014.694	0.614	0.675	24.581	68.221	46.040	98.115	66.215
1015.307	0.614	0.675	24.581	69.305	46.772	99.352	67.050
1015.921	0.614	0.675	24.581	70.390	47.504	100.591	67.886
1016.535	0.614	0.675	24.581	71.475	48.236	101.816	68.712
1017.148	0.614	0.675	24.581	72.560	48.968	103.025	69.529
1017.762	0.614	0.675	24.581	73.645	49.701	104.260	70.362
1018.376	0.614	0.675	24.581	74.729	50.433	105.495	71.196
1018.989	0.614	0.675	24.581	75.814	51.165	106.732	72.031
1019.603	0.614	0.675	24.581	76.899	51.897	107.970	72.866
1020.217	0.614	0.675	24.581	77.984	52.629	109.208	73.701
1020.831	0.614	0.675	24.581	79.069	53.361	110.446	74.537
1021.444	0.614	0.675	24.581	80.153	54.093	111.684	75.372
1022.058	0.614	0.675	24.581	81.238	54.825	112.920	76.206
1022.672	0.614	0.675	24.581	82.323	55.557	114.154	77.039

1023.285	0.614	0.675	24.581	83.408	56.289	115.395	77.877
1023.899	0.614	0.675	24.581	84.493	57.022	116.616	78.701
1024.513	0.614	0.675	24.581	85.577	57.754	117.832	79.522
1025.127	0.614	0.675	24.581	86.662	58.486	119.044	80.339
1025.740	0.614	0.675	24.581	87.747	59.218	120.251	81.154
1026.354	0.614	0.675	24.581	88.832	59.950	121.454	81.966
1026.968	0.614	0.675	24.581	89.916	60.682	122.655	82.776
1027.581	0.383	0.421	24.581	90.797	38.209	123.633	52.028
1027.964	0.614	0.709	29.979	102.772	72.814	113.355	80.313
1028.578	0.614	0.709	29.979	103.231	73.140	113.919	80.712
1029.192	0.614	0.709	29.979	103.690	73.465	114.476	81.107
1029.805	0.614	0.709	29.979	104.150	73.791	115.021	81.493
1030.419	0.614	0.709	29.979	104.609	74.116	115.551	81.868
1031.033	0.614	0.709	29.979	105.068	74.441	116.064	82.232
1031.646	0.614	0.709	29.979	105.527	74.767	116.559	82.583
1032.260	0.614	0.709	29.979	105.987	75.092	117.041	82.924
1032.874	0.614	0.709	29.979	106.446	75.417	117.505	83.253
1033.488	0.614	0.709	29.979	106.905	75.743	117.957	83.573
1034.101	0.614	0.709	29.979	107.364	76.068	118.402	83.888
1034.715	0.614	0.709	29.979	107.824	76.394	118.843	84.201
1035.329	0.614	0.709	29.979	108.283	76.719	119.284	84.513
1035.942	0.614	0.709	29.979	108.742	77.044	119.732	84.831
1036.556	0.614	0.709	29.979	109.201	77.370	120.176	85.146
1037.170	0.614	0.709	29.979	109.661	77.695	120.626	85.464
1037.783	0.614	0.709	29.979	110.120	78.020	121.081	85.787
1038.397	0.614	0.709	29.979	110.579	78.346	121.542	86.113
1039.011	0.614	0.709	29.979	111.038	78.671	122.007	86.443
1039.625	0.614	0.709	29.979	111.498	78.997	122.477	86.776
1040.238	0.517	0.597	29.979	111.921	66.765	122.922	73.327
1040.755	0.614	0.720	31.556	115.169	82.946	120.005	86.429
1041.369	0.614	0.720	31.556	115.397	83.110	120.287	86.631
1041.982	0.614	0.720	31.556	115.624	83.273	120.570	86.836
1042.596	0.614	0.720	31.556	115.852	83.437	120.856	87.041
1043.210	0.614	0.720	31.556	116.079	83.601	121.146	87.250
1043.824	0.614	0.720	31.556	116.307	83.765	121.553	87.543
1044.437	0.614	0.720	31.556	116.534	83.929	121.892	87.787
1045.051	0.614	0.720	31.556	116.762	84.093	122.138	87.965
1045.665	0.614	0.720	31.556	116.989	84.257	122.420	88.168
1046.278	0.614	0.720	31.556	117.217	84.420	122.719	88.383
1046.892	0.614	0.720	31.556	117.444	84.584	123.036	88.612
1047.506	0.614	0.720	31.556	117.672	84.748	123.369	88.851
1048.120	0.614	0.720	31.556	117.899	84.912	123.714	89.099
1048.733	0.066	0.077	31.556	118.025	9.108	123.850	9.557
1048.799	0.614	0.788	38.807	126.848	99.899	108.948	85.802
1049.413	0.614	0.788	38.807	125.752	99.036	108.792	85.679
1050.026	0.614	0.788	38.807	124.656	98.172	108.619	85.543

1050.640	0.614	0.788	38.807	123.559	97.309	108.408	85.377
1051.254	0.614	0.788	38.807	122.463	96.446	108.225	85.233
1051.868	0.614	0.788	38.807	121.367	95.582	108.136	85.162
1052.481	0.614	0.788	38.807	120.270	94.719	107.625	84.760
1053.095	0.614	0.788	38.807	119.174	93.855	106.694	84.027
1053.709	0.614	0.788	38.807	118.078	92.992	105.341	82.962
1054.322	0.614	0.788	38.807	116.981	92.129	104.403	82.222
1054.936	0.614	0.788	38.807	115.885	91.265	103.445	81.468
1055.550	0.614	0.788	38.807	114.789	90.402	102.835	80.987
1056.164	0.346	0.445	38.807	113.931	50.651	102.421	45.534
1056.510	0.614	0.788	38.807	112.403	88.523	100.984	79.530
1057.124	0.614	0.788	38.807	109.967	86.604	99.131	78.070
1057.737	0.614	0.788	38.807	107.530	84.685	97.301	76.629
1058.351	0.614	0.788	38.807	105.094	82.766	95.470	75.187
1058.965	0.614	0.788	38.807	102.657	80.848	93.644	73.749
1059.579	0.614	0.788	38.807	100.221	78.929	91.816	72.309
1060.192	0.301	0.387	38.807	98.404	38.071	90.183	34.890
1060.494	0.416	0.581	44.278	98.019	56.988	80.572	46.844
1060.910	0.614	0.857	44.278	94.681	81.159	78.105	66.951
1061.524	0.614	0.857	44.278	90.513	77.586	75.719	64.905
1062.137	0.603	0.842	44.278	86.383	72.703	73.432	61.803
1062.740	0.614	0.857	44.278	82.241	70.496	71.245	61.070
1063.354	0.614	0.857	44.278	78.051	66.904	68.515	58.730
1063.967	0.614	0.857	44.278	73.861	63.312	65.663	56.285
1064.581	0.614	0.857	44.278	69.670	59.720	62.763	53.799
1065.195	0.614	0.857	44.278	65.480	56.128	59.868	51.318
1065.809	0.614	0.857	44.278	61.290	52.537	56.934	48.803
1066.422	0.468	0.653	44.278	57.598	37.629	53.986	35.269
1066.890	0.614	0.857	44.278	53.690	46.022	51.129	43.827
1067.504	0.090	0.125	44.278	51.042	6.392	49.400	6.186
1067.593	0.614	0.857	44.289	48.392	41.488	47.400	40.638
1068.207	0.614	0.857	44.289	43.768	37.524	44.538	38.185
1068.821	0.614	0.857	44.289	39.143	33.559	41.510	35.589
1069.434	0.614	0.857	44.289	34.519	29.595	38.872	33.327

LEGENDA SIMBOLI

X(m) : Ascissa sinistra concio
 dx(m) : Larghezza concio
 dl(m) : lunghezza base concio
 alpha(°) : Angolo pendenza base concio
 TauStress(kPa) : Sforzo di taglio su base concio
 TauF (kN/m) : Forza di taglio su base concio
 TauStrength(kPa) : Resistenza al taglio su base concio
 TauS (kN/m) : Forza resistente al taglio su base concio

1.2 ANALISI DI STABILITÀ TRATTO SUPERIORE TRACCIATO

 SSAP 5.0.2 - Slope Stability Analysis Program (1991,2021)
 WWW.SSAP.EU

 Ultima Revisione struttura tabelle del report: 21 Febbraio 2021

----- PARAMETRI DEL MODELLO DEL PENDIO -----

__ PARAMETRI GEOMETRICI - Coordinate X Y (in m) __

SUP T.		SUP 2		SUP 3		SUP 4			
X	Y	X	Y	X	Y	X	Y		
613.66	209.00	645.79	217.12	613.66	189.00	-	-		
645.79	217.12	701.68	224.72	645.79	197.12	-	-		
701.68	234.72	728.73	233.25	701.68	214.72	-	-		
728.73	243.25	748.38	239.74	728.73	223.25	-	-		
748.38	248.74	748.40	240.02	748.38	228.74	-	-		
748.40	248.92	748.54	240.18	748.40	228.92	-	-		
748.54	249.42	753.48	241.42	748.54	229.42	-	-		
753.48	250.42	770.33	244.44	753.48	230.42	-	-		
770.33	254.44	776.76	249.80	770.33	234.44	-	-		
776.76	255.80	782.60	252.40	776.76	235.80	-	-		
782.60	257.40	784.23	257.85	782.60	237.40	-	-		
784.23	257.85	782.60	257.40	784.23	237.85	-	-		
802.49	264.72	776.76	255.80	802.49	244.72	-	-		
813.44	267.55	770.33	254.44	813.44	247.55	-	-		
823.56	270.91	753.48	250.42	823.56	250.91	-	-		
828.33	272.99	748.54	249.42	828.33	252.99	-	-		
839.85	277.67	748.40	248.92	839.85	257.67	-	-		
853.85	283.30	748.38	248.74	853.85	263.30	-	-		
855.20	283.93	728.73	243.25	861.84	286.90	-	-		
861.84	287.00	701.68	234.72	871.76	292.18	-	-		
871.76	292.28	645.79	217.12	879.92	296.94	-	-		
879.92	297.04	-	-	895.85	303.95	-	-		
895.85	304.05	-	-	907.64	311.79	-	-		
907.64	311.89	-	-	912.69	314.66	-	-		
912.69	314.76	-	-	920.40	318.68	-	-		
920.40	318.78	-	-	924.21	320.73	-	-		
924.21	320.83	-	-	930.29	322.84	-	-		
930.29	322.94	-	-	939.66	326.09	-	-		
939.66	326.19	-	-	971.77	334.78	-	-		
971.77	334.88	-	-	989.00	342.71	-	-		
989.00	342.81	-	-	1007.86	351.40	-	-		
1007.86	351.50	-	-	1056.51	382.97	-	-		

1056.51	383.07	-	-	1060.91	384.99	-	-
1060.91	385.09	-	-	1062.74	385.71	-	-
1062.74	385.81	-	-	1066.89	387.33	-	-
1066.89	387.43	-	-	1097.42	397.41	-	-
1097.42	397.51	-	-	1098.99	397.41	-	-
1098.99	397.51	-	-	1107.42	397.41	-	-
1107.42	397.51	-	-	1125.89	400.25	-	-
1125.89	400.35	-	-	1129.39	402.42	-	-
1129.39	402.52	-	-	1132.42	404.05	-	-
1132.42	404.15	-	-	1137.96	406.11	-	-
1137.96	406.21	-	-	1145.87	407.33	-	-
1145.87	407.43	-	-	1145.90	407.33	-	-
1145.90	407.43	-	-	1150.03	407.33	-	-
1150.03	407.43	-	-	1150.33	407.33	-	-
1150.33	407.43	-	-	-	-	-	-

ASSENZA DI FALDA

----- PARAMETRI GEOMECCANICI -----

	fi`	C`	Cu	Gamm	Gamm_sat	STR_IDX	sgci	GSI	mi	D
STRATO 1	30.00	0.00	0.00	0.00	18.00	19.00	1.858	0.00	0.00	0.00
STRATO 2	28.00	0.00	0.00	0.00	19.00	20.00	1.664	0.00	0.00	0.00
STRATO 3	30.00	20.00	0.00	0.00	22.00	23.00	2.680	0.00	0.00	0.00

LEGENDA: fi` _____ Angolo di attrito interno efficace(in gradi)

C` _____ Coesione efficace (in Kpa)

Cu _____ Resistenza al taglio Non drenata (in Kpa)

Gamm _____ Peso di volume terreno fuori falda (in KN/m^3)

Gamm_sat _____ Peso di volume terreno immerso (in KN/m^3)

STR_IDX _____ Indice di resistenza (usato in solo in 'SNIFF SEARCH) (adimensionale)

---- SOLO Per AMMASSI ROCCIOSI FRATTURATI - Parametri Criterio di Rottura di Hoek (2002)-

sigci _____ Resistenza Compressione Uniassiale Roccia Intatta (in MPa)

GSI _____ Geological Strenght Index ammasso(adimensionale)

mi _____ Indice litologico ammasso(adimensionale)

D _____ Fattore di disturbo ammasso(adimensionale)

Fattore di riduzione NTC2018: gammaPHI=1.25 e gammaC=1.25 - DISATTIVATO (solo per ROCCE)

Uso CRITERIO DI ROTTURA Hoek et al.(2002,2006) - non-lineare - Generalizzato, secondo Lei et al.(2016)

----- SOVRACCARICHI PRESENTI -----

TABELLA SOVRACCARICHI IN SUPERFICIE

N.	da X1	a X2	SX1	SX2	Alpha	WsH1	WsH2	WsV1	WsV2
(-)	(m)	(m)	(kPa)	(kPa)	(°)	(kN/m)	(kN/m)	(kN/m)	(kN/m)
1	618.0000	620.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
2	700.0000	702.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
3	748.0000	750.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
4	755.0000	757.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
5	782.0000	784.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00

6	855.0000	857.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
7	930.0000	932.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
8	988.0000	990.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
9	1060.0000	1062.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00
10	1098.0000	1100.0000	20.00	20.00	90.00	0.00	0.00	20.00	20.00

LEGENDA SIMBOLI

N.(-) : NUMERO SOVRACCARICO

X1(m) : Posizione carico da X1

X2(m) : a X2

SX1(kPa) : Carico in X1 (Kpa)

SX2(kPa) : Carico in X2 (Kpa)

Alpha(°) : Inclinazione carico (gradi):

Componenti distribuzione forza unitaria applicata:

WsH1, WsH2(kN/m) : forza unitaria Orizzontale (per metro di proiezione Verticale) : da X1 a X2

WsV1, WsV2(kN/m) : forza unitaria Verticale (per metro di proiezione Orizzontale) : da X1 a X2

----- INFORMAZIONI GENERAZIONE SUPERFICI RANDOM -----

*** PARAMETRI PER LA GENERAZIONE DELLE SUPERFICI

MOTORE DI RICERCA: RANDOM SEARCH - Siegel (1981)

FILTRAGGIO SUPERFICI : ATTIVATO

COORDINATE X1,X2,Y OSTACOLO : 0.00 0.00 0.00

LUNGHEZZA MEDIA SEGMENTI (m)*: 21.5 (+/-) 50%

INTERVALLO ASCISSE RANDOM STARTING POINT (Xmin .. Xmax): 624.39 1107.40

LIVELLO MINIMO CONSIDERATO (Ymin): 0.00

INTERVALLO ASCISSE AMMESSO PER LA TERMINAZIONE (Xmin .. Xmax): 678.06 1139.60

TOTALE SUPERFICI GENERATE : 10000

----- INFORMAZIONI PARAMETRI DI CALCOLO -----

METODO DI CALCOLO : MORGENSTERN - PRICE (Morgenstern & Price, 1965)

METODO DI ESPLORAZIONE CAMPO VALORI (lambda0,Fs0) ADOTTATO : A (rapido)

COEFFICIENTE SISMICO UTILIZZATO Kh : 0.0400

COEFFICIENTE SISMICO UTILIZZATO Kv (assunto Positivo): 0.0200

COEFFICIENTE c=Kv/Kh UTILIZZATO : 0.5000

FORZA ORIZZONTALE ADDIZIONALE IN TESTA (kN/m): 0.00

FORZA ORIZZONTALE ADDIZIONALE ALLA BASE (kN/m): 0.00

Le forze orizzontali addizionali in testa e alla base sono poste uguali a 0 durante tutte le verifiche globali.

I valori >0 impostati dall'utente sono utilizzati solo in caso di verifica singola

----- RISULTATO FINALE ELABORAZIONI -----

* DATI RELATIVI ALLE 10 SUPERFICI GENERATE CON MINOR Fs *

Fattore di sicurezza (FS)	1.2103	- Min.	- X	Y	Lambda=	1.0653
	848.24		281.04			
	852.86		281.95			
	856.48		283.50			
	860.86		286.55			

Fattore di sicurezza (FS) 1.2169 - N.2 -- X Y Lambda= 0.6890
 1000.59 348.15
 1014.35 348.73
 1033.05 355.36
 1042.00 360.52
 1052.55 367.98
 1068.06 379.05
 1079.07 388.23
 1079.72 388.78
 1079.72 391.66

Fattore di sicurezza (FS) 1.2185 - N.3 -- X Y Lambda= 0.7227
 1000.34 348.03
 1012.07 347.18
 1022.12 351.80
 1038.28 360.59
 1045.85 366.50
 1053.17 372.85
 1064.35 383.65
 1064.35 386.44

Fattore di sicurezza (FS) 1.2202 - N.4 -- X Y Lambda= 0.7072
 1008.31 351.79
 1011.88 351.05
 1017.15 351.79
 1021.70 352.90
 1026.77 353.95
 1031.69 356.37
 1035.43 358.04
 1038.60 359.83
 1044.33 363.19
 1048.64 366.43
 1053.59 370.69
 1056.36 373.03
 1061.56 377.04
 1068.56 382.65
 1072.25 386.51
 1072.25 389.20

Fattore di sicurezza (FS) 1.2276 - N.5 -- X Y Lambda= 0.6895
 993.03 344.67
 1008.71 343.57
 1026.11 349.66
 1052.07 364.70
 1072.00 386.51
 1072.00 389.12

Fattore di sicurezza (FS) 1.2278 - N.6 -- X Y Lambda= 0.7041
 985.93 341.40
 1006.16 343.49
 1019.72 349.54
 1039.30 359.93
 1054.31 370.37
 1065.09 382.36
 1067.54 385.06
 1067.54 387.64

Fattore di sicurezza (FS) 1.2278 - N.7 -- X Y Lambda= 0.7609
 1004.89 350.13
 1012.30 349.54
 1023.60 354.74
 1041.46 364.46
 1049.62 371.16
 1063.24 383.23
 1063.24 386.01

Fattore di sicurezza (FS) 1.2320 - N.8 -- X Y Lambda= 0.7161
 989.50 343.04
 1009.00 346.93
 1036.79 357.82
 1059.23 371.71
 1078.15 388.50
 1078.15 391.15

Fattore di sicurezza (FS) 1.2324 - N.9 -- X Y Lambda= 0.6952
 994.45 345.32
 1002.28 341.71
 1016.77 344.91
 1035.23 354.57
 1045.95 359.26
 1065.04 370.84
 1078.74 379.21
 1090.87 392.89
 1090.87 395.35

Fattore di sicurezza (FS) 1.2332 - N.10 -- X Y Lambda= 0.7097
 988.21 342.44
 997.89 339.92
 1016.20 345.84
 1028.52 349.75
 1041.58 355.49
 1058.14 368.58
 1066.98 376.59

1080.62 387.42

1082.83 389.99

1082.83 392.69

----- ANALISI DEFICIT DI RESISTENZA -----

DATI RELATIVI ALLE 10 SUPERFICI GENERATE CON MINOR F_s *# Analisi Deficit in riferimento a $F_s(\text{progetto}) = 1.200$

Sup N.	FS	FTR(kN/m)	FTA(kN/m)	Bilancio(kN/m)	ESITO
1	1.210	98.4	81.3	0.8	Surplus
2	1.217	10012.8	8228.0	139.2	Surplus
3	1.219	7046.6	5783.0	107.0	Surplus
4	1.220	7731.3	6336.2	127.9	Surplus
5	1.228	11570.2	9425.0	260.2	Surplus
6	1.228	9564.6	7790.1	216.5	Surplus
7	1.228	5483.4	4466.0	124.2	Surplus
8	1.232	10354.9	8405.0	268.9	Surplus
9	1.232	15980.7	12966.9	420.5	Surplus
10	1.233	14767.8	11975.3	397.4	Surplus

Esito analisi: SURPLUS di RESISTENZA!

Valore minimo di SURPLUS di RESISTENZA (kN/m): 0.8

FTR --> Forza totale Resistente lungo la superficie di scivolamento

FTA --> Forza totale Agente lungo la superficie di scivolamento

Il Deficit o il Surplus di resistenza viene espresso in kN per metro di LARGHEZZA rispetto al fronte della scarpata

TABELLA PARAMETRI CONCI DELLA SUPERFICIE INDIVIDUATA CON MINOR F_s

X	dx	alpha	W	ru	U	phi'	(c',Cu)
(m)	(m)	(°)	(kN/m)	(-)	(kPa)	(°)	(kPa)
848.241	0.175	11.08	0.06	0.00	0.00	0.00	30.00
848.416	0.175	11.08	0.17	0.00	0.00	0.00	30.00
848.591	0.175	11.08	0.29	0.00	0.00	0.00	30.00
848.766	0.175	11.08	0.41	0.00	0.00	0.00	30.00
848.942	0.175	11.08	0.52	0.00	0.00	0.00	30.00
849.117	0.175	11.08	0.64	0.00	0.00	0.00	30.00
849.292	0.175	11.08	0.76	0.00	0.00	0.00	30.00
849.467	0.175	11.08	0.87	0.00	0.00	0.00	30.00
849.642	0.175	11.08	0.99	0.00	0.00	0.00	30.00
849.818	0.175	11.08	1.10	0.00	0.00	0.00	30.00
849.993	0.175	11.08	1.22	0.00	0.00	0.00	30.00
850.168	0.175	11.08	1.34	0.00	0.00	0.00	30.00
850.343	0.175	11.08	1.45	0.00	0.00	0.00	30.00

850.518	0.175	11.08	1.57	0.00	0.00	30.00	0.00
850.694	0.175	11.08	1.69	0.00	0.00	30.00	0.00
850.869	0.175	11.08	1.80	0.00	0.00	30.00	0.00
851.044	0.175	11.08	1.92	0.00	0.00	30.00	0.00
851.219	0.175	11.08	2.03	0.00	0.00	30.00	0.00
851.394	0.175	11.08	2.15	0.00	0.00	30.00	0.00
851.570	0.175	11.08	2.27	0.00	0.00	30.00	0.00
851.745	0.175	11.08	2.38	0.00	0.00	30.00	0.00
851.920	0.175	11.08	2.50	0.00	0.00	30.00	0.00
852.095	0.175	11.08	2.62	0.00	0.00	30.00	0.00
852.270	0.175	11.08	2.73	0.00	0.00	30.00	0.00
852.446	0.175	11.08	2.85	0.00	0.00	30.00	0.00
852.621	0.175	11.08	2.96	0.00	0.00	30.00	0.00
852.796	0.063	11.08	1.10	0.00	0.00	30.00	0.00
852.859	0.175	23.14	3.06	0.00	0.00	30.00	0.00
853.035	0.175	23.14	3.04	0.00	0.00	30.00	0.00
853.210	0.175	23.14	3.03	0.00	0.00	30.00	0.00
853.385	0.175	23.14	3.01	0.00	0.00	30.00	0.00
853.560	0.175	23.14	3.00	0.00	0.00	30.00	0.00
853.735	0.115	23.14	1.96	0.00	0.00	30.00	0.00
853.850	0.175	23.14	2.99	0.00	0.00	30.00	0.00
854.025	0.175	23.14	3.02	0.00	0.00	30.00	0.00
854.200	0.175	23.14	3.04	0.00	0.00	30.00	0.00
854.376	0.175	23.14	3.06	0.00	0.00	30.00	0.00
854.551	0.175	23.14	3.08	0.00	0.00	30.00	0.00
854.726	0.175	23.14	3.11	0.00	0.00	30.00	0.00
854.901	0.099	23.14	1.76	0.00	0.00	30.00	0.00
855.000	0.175	23.14	6.71	0.00	0.00	30.00	0.00
855.175	0.025	23.14	0.95	0.00	0.00	30.00	0.00
855.200	0.175	23.14	6.74	0.00	0.00	30.00	0.00
855.375	0.175	23.14	6.76	0.00	0.00	30.00	0.00
855.550	0.175	23.14	6.78	0.00	0.00	30.00	0.00
855.726	0.175	23.14	6.80	0.00	0.00	30.00	0.00
855.901	0.175	23.14	6.82	0.00	0.00	30.00	0.00
856.076	0.175	23.14	6.84	0.00	0.00	30.00	0.00
856.251	0.175	23.14	6.86	0.00	0.00	30.00	0.00
856.426	0.054	23.14	2.14	0.00	0.00	30.00	0.00
856.481	0.175	34.86	6.81	0.00	0.00	30.00	0.00
856.656	0.175	34.86	6.67	0.00	0.00	30.00	0.00
856.831	0.169	34.86	6.30	0.00	0.00	30.00	0.00
857.000	0.175	34.86	2.84	0.00	0.00	30.00	0.00
857.175	0.175	34.86	2.71	0.00	0.00	30.00	0.00
857.350	0.175	34.86	2.58	0.00	0.00	30.00	0.00
857.526	0.175	34.86	2.45	0.00	0.00	30.00	0.00
857.701	0.175	34.86	2.31	0.00	0.00	30.00	0.00
857.876	0.175	34.86	2.18	0.00	0.00	30.00	0.00

858.051	0.175	34.86	2.05	0.00	0.00	30.00	0.00
858.226	0.175	34.86	1.92	0.00	0.00	30.00	0.00
858.402	0.175	34.86	1.79	0.00	0.00	30.00	0.00
858.577	0.175	34.86	1.65	0.00	0.00	30.00	0.00
858.752	0.175	34.86	1.52	0.00	0.00	30.00	0.00
858.927	0.175	34.86	1.39	0.00	0.00	30.00	0.00
859.102	0.175	34.86	1.26	0.00	0.00	30.00	0.00
859.278	0.175	34.86	1.13	0.00	0.00	30.00	0.00
859.453	0.175	34.86	0.99	0.00	0.00	30.00	0.00
859.628	0.175	34.86	0.86	0.00	0.00	30.00	0.00
859.803	0.175	34.86	0.73	0.00	0.00	30.00	0.00
859.978	0.175	34.86	0.60	0.00	0.00	30.00	0.00
860.154	0.175	34.86	0.47	0.00	0.00	30.00	0.00
860.329	0.175	34.86	0.33	0.00	0.00	30.00	0.00
860.504	0.175	34.86	0.20	0.00	0.00	30.00	0.00
860.679	0.175	34.86	0.07	0.00	0.00	30.00	0.00
860.854	0.005	34.86	0.00	0.00	0.00	30.00	0.00

LEGENDA SIMBOLI

X(m) : Ascissa sinistra concio

dx(m) : Larghezza concio

alpha(°) : Angolo pendenza base concio

W(kN/m) : Forza peso concio

ru(-) : Coefficiente locale pressione interstiziale

U(kPa) : Pressione totale dei pori base concio

phi'(°) : Angolo di attrito efficace base concio

c'/Cu (kPa) : Coesione efficace o Resistenza al taglio in condizioni non drenate

TABELLA DIAGRAMMA DELLE FORZE DELLA SUPERFICIE INDIVIDUATA CON MINOR FS

X (m)	ht (m)	yt (m)	yt' (--)	E(x) (kN/m)	T(x) (kN/m)	E' (kN)	rho(x) (kN)	FS_qFEM (--)	FS_srmFEM (--)		
848.241	0.000	281.044	0.248	0.0000000000E+000	0.0000000000E+000	0.0000000000E+000	6.6394854059E-002	0.040	50.000	8.104	
848.416	0.009	281.088	0.248	1.8703389971E-002	8.0886449967E-005	1.4711917399E-001	0.040	50.000	8.104		
848.591	0.018	281.131	0.249	5.1549348930E-002	8.7986297686E-004	2.5494883832E-001	0.040	28.107	8.403		
848.766	0.028	281.175	0.250	1.0803536669E-001	4.3962198724E-003	3.8467698229E-001	0.085	9.624	6.287		
848.942	0.037	281.219	0.252	1.8633700065E-001	1.3431949874E-002	5.2763130013E-001	0.151	6.052	4.788		
849.117	0.047	281.263	0.253	2.9291303598E-001	3.0980895274E-002	6.3818055954E-001	0.222	4.573	3.887		
849.292	0.057	281.307	0.254	4.0995022149E-001	5.1922656700E-002	7.5276479573E-001	0.266	3.880	3.417		
849.467	0.068	281.352	0.255	5.5667563105E-001	8.1965653182E-002	9.3756263329E-001	0.309	3.368	3.035		
849.642	0.078	281.397	0.257	7.3846445940E-001	1.2294763636E-001	1.1365928285E+000	0.349	2.980	2.728		
849.818	0.089	281.442	0.258	9.5492841290E-001	1.7646052058E-001	1.3332285689E+000	0.387	2.674	2.480		
849.993	0.100	281.487	0.259	1.2056167879E+000	2.4396245547E-001	1.5272546458E+000	0.424	2.422	2.275		
850.168	0.111	281.533	0.260	1.4900658834E+000	3.2687230042E-001	1.7153680786E+000	0.460	2.209	2.102		
850.343	0.122	281.578	0.260	1.8066676586E+000	4.2656467631E-001	1.8927444811E+000	0.495	2.026	1.954		
850.518	0.133	281.624	0.261	2.1532679872E+000	5.4455169095E-001	2.0652301019E+000	0.530	1.866	1.827		
850.694	0.145	281.670	0.262	2.5303073057E+000	6.8256240987E-001	2.2403337145E+000	0.566	1.725	1.716		
850.869	0.157	281.716	0.263	2.9382625003E+000	8.4241374330E-001	2.4182012939E+000	0.601	1.600	1.619		
851.044	0.169	281.762	0.264	3.3776251562E+000	1.0259764192E+000	2.5987561452E+000	0.637	1.490	1.533		
851.219	0.181	281.808	0.265	3.8488452862E+000	1.2351103358E+000	2.7824710570E+000	0.673	1.393	1.457		
851.394	0.193	281.855	0.267	4.3525801367E+000	1.4730974814E+000	2.9684863539E+000	0.709	1.308	1.391		

851.570	0.205	281.902	0.268	4.8889784972E+000	1.7421297703E+000	3.1531984849E+000	0.747	1.235	1.334
851.745	0.218	281.949	0.269	5.4574349597E+000	2.0421987299E+000	3.3319276483E+000	0.784	1.173	1.286
851.920	0.231	281.996	0.283	6.0564585496E+000	2.3700863780E+000	3.6984647858E+000	0.820	1.123	1.246
852.095	0.249	282.048	0.293	6.7533466112E+000	2.7532650995E+000	3.9141571260E+000	0.855	1.083	1.211
852.270	0.265	282.099	0.287	7.4279470237E+000	3.1241497385E+000	3.6891203643E+000	0.882	1.059	1.183
852.446	0.281	282.148	0.285	8.0459840543E+000	3.4638492305E+000	3.2919078186E+000	0.902	1.048	1.159
852.621	0.296	282.198	0.288	8.5814044567E+000	3.7581269054E+000	2.7533070128E+000	0.918	1.046	1.139
852.796	0.313	282.250	0.285	9.0107201935E+000	3.9966150587E+000	1.9023912422E+000	0.930	1.053	1.120
852.859	0.317	282.266	0.330	9.1187883703E+000	4.0592241972E+000	1.6359427847E+000	0.933	1.059	1.113
853.035	0.304	282.328	0.370	9.3724716164E+000	4.2257825663E+000	1.1816691113E+000	0.945	1.067	1.092
853.210	0.297	282.396	0.399	9.5328355110E+000	4.3475951753E+000	7.0807906139E-001	0.956	1.068	1.070
853.385	0.294	282.468	0.423	9.6205766975E+000	4.4311028824E+000	3.5996109139E-001	0.966	1.060	1.049
853.560	0.296	282.544	0.442	9.6589629178E+000	4.4903371851E+000	1.4916030487E-001	0.975	1.042	1.030
853.735	0.299	282.623	0.423	9.6728412420E+000	4.5488666354E+000	5.5871916631E-002	0.986	1.014	1.016
853.850	0.294	282.667	0.406	9.6774962151E+000	4.5896503013E+000	4.3330424441E-002	0.994	0.997	1.011
854.025	0.293	282.741	0.450	9.6858206049E+000	4.6893703622E+000	5.2289287128E-002	1.015	0.972	1.011
854.200	0.302	282.824	0.495	9.6958179514E+000	4.8416016908E+000	6.0026318275E-002	1.047	0.956	1.021
854.376	0.317	282.914	0.532	9.7068533333E+000	5.0345460043E+000	6.5189803100E-002	1.087	0.950	1.038
854.551	0.339	283.010	0.535	9.7186599224E+000	5.2459515226E+000	6.4681692024E-002	1.132	0.955	1.058
854.726	0.355	283.101	0.488	9.7295172663E+000	5.4153980875E+000	5.6955761762E-002	1.167	0.965	1.073
854.901	0.360	283.181	0.440	9.7386167530E+000	5.5265359708E+000	4.7307127677E-002	1.190	0.977	1.080
855.000	0.358	283.222	0.417	9.7430336639E+000	5.5657442535E+000	4.4620852368E-002	1.198	0.984	1.080
855.175	0.357	283.296	0.417	9.7508282055E+000	5.6118284035E+000	4.1030765660E-002	1.207	0.997	1.076
855.200	0.356	283.305	0.421	9.7518337877E+000	5.6163016776E+000	4.0718654392E-002	1.207	0.999	1.075
855.375	0.356	283.380	0.441	9.7591874297E+000	5.6278454752E+000	4.1911724909E-002	1.209	1.012	1.065
855.550	0.361	283.460	0.498	9.7665193115E+000	5.6215224993E+000	4.2392546945E-002	1.207	1.025	1.052
855.726	0.380	283.554	0.540	9.7740414296E+000	5.5855147994E+000	-5.2641723315E-002	1.198	1.035	1.037
855.901	0.400	283.649	0.496	9.7480740844E+000	5.5190288794E+000	-3.8778988160E-001	1.187	1.036	1.025
856.076	0.405	283.728	0.446	9.6381630435E+000	5.4091014313E+000	-9.8632051128E-001	1.177	1.030	1.017
856.251	0.407	283.805	0.441	9.4024754870E+000	5.2522489473E+000	-1.7399984189E+000	1.171	1.016	1.017
856.426	0.409	283.883	0.441	9.0284819041E+000	5.0438713131E+000	-2.3946472753E+000	1.171	0.998	1.023
856.481	0.410	283.907	0.473	8.8935852775E+000	4.9775582304E+000	-2.7550735926E+000	1.173	0.991	1.025
856.656	0.373	283.991	0.485	8.2534327461E+000	4.6709994028E+000	-4.0183900985E+000	1.186	0.977	1.039
856.831	0.336	284.077	0.508	7.4855744269E+000	4.2787948883E+000	-4.5458241219E+000	1.198	0.976	1.059
857.000	0.308	284.166	0.549	6.6920055719E+000	3.8269937329E+000	-4.6420728242E+000	1.199	0.992	1.085
857.175	0.285	284.266	0.593	5.8897777933E+000	3.2995423786E+000	-4.4544363268E+000	1.174	1.040	1.120
857.350	0.272	284.374	0.594	5.1312077080E+000	2.7276480384E+000	-3.7092201556E+000	1.114	1.143	1.166
857.526	0.249	284.474	0.578	4.5900975486E+000	2.2395662619E+000	-2.8686877036E+000	1.023	1.302	1.216
857.701	0.230	284.576	0.591	4.1260431235E+000	1.8118100910E+000	-2.5093424298E+000	0.921	1.528	1.278
857.876	0.212	284.681	0.601	3.7108445935E+000	1.4589537329E+000	-2.3194923500E+000	0.824	1.817	1.355
858.051	0.197	284.787	0.610	3.3133120753E+000	1.1764599726E+000	-2.2172526243E+000	0.744	2.164	1.447
858.226	0.182	284.894	0.615	2.9339375045E+000	9.5745000254E-001	-2.1093480852E+000	0.684	2.560	1.553
858.402	0.168	285.002	0.618	2.5742138497E+000	7.8189034180E-001	-1.9931332202E+000	0.637	3.019	1.668
858.577	0.154	285.111	0.620	2.2355600120E+000	6.3483009297E-001	-1.8691610158E+000	0.595	3.576	1.789
858.752	0.141	285.220	0.621	1.9192751983E+000	5.0835945191E-001	-1.7386575944E+000	0.555	4.310	1.914
858.927	0.128	285.329	0.623	1.6263486865E+000	3.9953068448E-001	-1.6033930514E+000	0.515	5.330	2.041
859.102	0.115	285.438	0.624	1.3574594564E+000	3.0706799077E-001	-1.4650197459E+000	0.474	6.763	2.171
859.278	0.103	285.547	0.625	1.1130178131E+000	2.2978131647E-001	-1.3246183518E+000	0.433	8.708	2.302
859.453	0.090	285.657	0.627	8.9332407717E-001	1.6647120666E-001	-1.1826956386E+000	0.391	10.905	2.430
859.628	0.078	285.767	0.628	6.9861098566E-001	1.1598134589E-001	-1.0395018032E+000	0.348	12.040	2.549
859.803	0.066	285.877	0.630	5.2909119227E-001	7.7096107672E-002	-8.9508070977E-001	0.305	10.741	2.642
859.978	0.055	285.987	0.631	3.8498206445E-001	4.8448034671E-002	-8.0059632506E-001	0.264	8.274	2.688
860.154	0.043	286.098	0.632	2.4856882260E-001	2.3528673838E-002	-6.9761297287E-001	0.198	5.664	2.724
860.329	0.032	286.209	0.634	1.4054421465E-001	8.7819156690E-003	-5.3076514705E-001	0.131	3.646	2.615
860.504	0.021	286.320	0.636	6.2593079113E-002	2.1326950701E-003	-3.5824560520E-001	0.071	2.388	2.239
860.679	0.011	286.432	0.637	1.5017900140E-002	2.6249420679E-004	-1.7860336950E-001	0.102	1.230	1.357
860.854	0.000	286.543	0.637	1.1926947539E-005	1.2849418762E-007	-4.6966985945E-003	0.176	14.779	12.538

LEGENDA SIMBOLI

X(m) : Ascissa sinistra concio

ht(m) : Altezza linea di thrust da nodo sinistro base concio

$y_t(m)$: coordinata Y linea di trust
 $y_t'(-)$: gradiente pendenza locale linea di trust
 $E(x)(kN/m)$: Forza Normale interconcio
 $T(x)(kN/m)$: Forza Tangenziale interconcio
 $E'(kN)$: derivata Forza normale interconcio
 $Rho(x)(-)$: fattore mobilitazione resistenza al taglio verticale interconcio ZhU et al.(2003)
 $FS_{qFEM}(x)(-)$: fattore di sicurezza locale stimato (locale in X) by qFEM
 $FS_{srmFEM}(x)(-)$: fattore di sicurezza locale stimato (locale in X) by SRM Procedure

TABELLA SFORZI DI TAGLIO DISTRIBUITI LUNGO SUPERFICIE INDIVIDUATA CON MINOR FS

X (m)	dx (m)	dl (m)	alpha (°)	TauStress (kPa)	TauF (kN/m)	TauStrength (kPa)	TauS (kN/m)
848.241	0.175	0.179	11.083	0.075	0.013	0.183	0.033
848.416	0.175	0.179	11.083	0.226	0.040	0.550	0.098
848.591	0.175	0.179	11.083	0.377	0.067	0.922	0.165
848.766	0.175	0.179	11.083	0.527	0.094	1.298	0.232
848.942	0.175	0.179	11.083	0.678	0.121	1.680	0.300
849.117	0.175	0.179	11.083	0.829	0.148	2.052	0.366
849.292	0.175	0.179	11.083	0.980	0.175	2.435	0.435
849.467	0.175	0.179	11.083	1.130	0.202	2.822	0.504
849.642	0.175	0.179	11.083	1.281	0.229	3.211	0.573
849.818	0.175	0.179	11.083	1.432	0.256	3.603	0.643
849.993	0.175	0.179	11.083	1.582	0.283	3.998	0.714
850.168	0.175	0.179	11.083	1.733	0.309	4.395	0.785
850.343	0.175	0.179	11.083	1.884	0.336	4.796	0.856
850.518	0.175	0.179	11.083	2.035	0.363	5.199	0.928
850.694	0.175	0.179	11.083	2.185	0.390	5.606	1.001
850.869	0.175	0.179	11.083	2.336	0.417	6.016	1.074
851.044	0.175	0.179	11.083	2.487	0.444	6.430	1.148
851.219	0.175	0.179	11.083	2.637	0.471	6.850	1.223
851.394	0.175	0.179	11.083	2.788	0.498	7.274	1.299
851.570	0.175	0.179	11.083	2.939	0.525	7.698	1.374
851.745	0.175	0.179	11.083	3.090	0.552	8.116	1.449
851.920	0.175	0.179	11.083	3.240	0.578	8.585	1.533
852.095	0.175	0.179	11.083	3.391	0.605	8.928	1.594
852.270	0.175	0.179	11.083	3.542	0.632	9.236	1.649
852.446	0.175	0.179	11.083	3.692	0.659	9.517	1.699
852.621	0.175	0.179	11.083	3.843	0.686	9.779	1.746
852.796	0.063	0.065	11.083	3.946	0.255	9.905	0.640
852.859	0.175	0.191	23.139	6.895	1.314	8.421	1.604
853.035	0.175	0.191	23.139	6.863	1.308	8.369	1.595
853.210	0.175	0.191	23.139	6.831	1.302	8.319	1.585
853.385	0.175	0.191	23.139	6.799	1.295	8.273	1.576
853.560	0.175	0.191	23.139	6.767	1.289	8.234	1.569

853.735	0.115	0.125	23.139	6.741	0.841	8.203	1.023
853.850	0.175	0.191	23.139	6.755	1.287	8.232	1.568
854.025	0.175	0.191	23.139	6.805	1.297	8.308	1.583
854.200	0.175	0.191	23.139	6.855	1.306	8.380	1.597
854.376	0.175	0.191	23.139	6.905	1.316	8.446	1.609
854.551	0.175	0.191	23.139	6.955	1.325	8.495	1.618
854.726	0.175	0.191	23.139	7.005	1.335	8.539	1.627
854.901	0.099	0.107	23.139	7.044	0.757	8.574	0.921
855.000	0.175	0.191	23.139	15.145	2.885	18.404	3.506
855.175	0.025	0.027	23.139	15.173	0.409	18.434	0.497
855.200	0.175	0.191	23.139	15.199	2.896	18.460	3.517
855.375	0.175	0.191	23.139	15.244	2.904	18.508	3.526
855.550	0.175	0.191	23.139	15.288	2.913	18.554	3.535
855.726	0.175	0.191	23.139	15.333	2.921	18.599	3.544
855.901	0.175	0.191	23.139	15.377	2.930	18.641	3.551
856.076	0.175	0.191	23.139	15.422	2.938	18.681	3.559
856.251	0.175	0.191	23.139	15.466	2.947	18.720	3.567
856.426	0.054	0.059	23.139	15.495	0.918	18.754	1.111
856.481	0.175	0.214	34.860	19.269	4.114	14.996	3.202
856.656	0.175	0.214	34.860	18.895	4.034	14.798	3.160
856.831	0.169	0.206	34.860	18.528	3.810	14.597	3.002
857.000	0.175	0.214	34.860	8.044	1.718	6.668	1.424
857.175	0.175	0.214	34.860	7.671	1.638	6.429	1.373
857.350	0.175	0.214	34.860	7.297	1.558	6.059	1.294
857.526	0.175	0.214	34.860	6.923	1.478	5.712	1.220
857.701	0.175	0.214	34.860	6.550	1.398	5.351	1.143
857.876	0.175	0.214	34.860	6.176	1.319	4.995	1.066
858.051	0.175	0.214	34.860	5.802	1.239	4.645	0.992
858.226	0.175	0.214	34.860	5.429	1.159	4.316	0.922
858.402	0.175	0.214	34.860	5.055	1.079	4.002	0.855
858.577	0.175	0.214	34.860	4.682	1.000	3.696	0.789
858.752	0.175	0.214	34.860	4.308	0.920	3.394	0.725
858.927	0.175	0.214	34.860	3.934	0.840	3.092	0.660
859.102	0.175	0.214	34.860	3.561	0.760	2.792	0.596
859.278	0.175	0.214	34.860	3.187	0.680	2.493	0.532
859.453	0.175	0.214	34.860	2.813	0.601	2.195	0.469
859.628	0.175	0.214	34.860	2.440	0.521	1.899	0.405
859.803	0.175	0.214	34.860	2.066	0.441	1.604	0.342
859.978	0.175	0.214	34.860	1.692	0.361	1.315	0.281
860.154	0.175	0.214	34.860	1.319	0.282	1.020	0.218
860.329	0.175	0.214	34.860	0.945	0.202	0.727	0.155
860.504	0.175	0.214	34.860	0.572	0.122	0.437	0.093
860.679	0.175	0.214	34.860	0.198	0.042	0.151	0.032
860.854	0.005	0.006	34.860	0.006	0.000	0.004	0.000

LEGENDA SIMBOLI

$X(m)$: Ascissa sinistra concio

$dx(m)$: Larghezza concio

$dl(m)$: lunghezza base concio

$\alpha(^{\circ})$: Angolo pendenza base concio

$\tau_{Stress}(kPa)$: Sforzo di taglio su base concio

$\tau_F (kN/m)$: Forza di taglio su base concio

$\tau_{Strength}(kPa)$: Resistenza al taglio su base concio

$\tau_S (kN/m)$: Forza resistente al taglio su base concio
