

Allegato 5

**Volumi sollevati e stima delle perdite
lungo la rete (dati forniti dal Comune)**

ACQUA PRODOTTA DAL COMUNE DI COMERIO (m³)
ANNO 2008

	FONTANONE	TOTALI
GEN	30.840	30.840
FEB	25.728	25.728
MAR	29.097	29.097
APR	28.717	28.717
MAG	33.286	33.286
GIU	31.675	31.675
LUG	31.538	31.538
AGO	31.791	31.791
SET	28.232	28.232
OTT	29.397	29.397
NOV	30.115	30.115
DIC	0	0
TOTALI	330.416	330.416

ACQUA SOLLEVATA DAL COMUNE DI COMERIO (m³)
ANNO 2008

	TOTALI SORGENTI	TOTALI POZZI	%SORGENTI	%POZZI	RANCO	TOTALI
	30.840	0	100,0%	0,0%	5.986	5.986
	25.728	0	100,0%	0,0%	5.576	5.576
	29.097	0	100,0%	0,0%	6.335	6.335
	28.717	0	100,0%	0,0%	4.915	4.915
	33.286	0	100,0%	0,0%	6.220	6.220
	31.675	0	100,0%	0,0%	5.436	5.436
	31.538	0	100,0%	0,0%	6.226	6.226
	31.791	0	100,0%	0,0%	6.944	6.944
	28.232	0	100,0%	0,0%	5.729	5.729
	29.397	0	100,0%	0,0%	5.348	5.348
	30.115	0	100,0%	0,0%	4.951	4.951
	0	0	#DIV/0!	#DIV/0!	0	0
TOTALI	330.416	0	100,0%	0,0%	63.666	63.666

ACQUA PRODOTTA DAL COMUNE DI COMERIO (m³)				ACQUA SOLLEVATA DAL COMUNE DI COMERIO (m³)			
ANNO 2007				ANNO 2007			
FONTANONE	TOTALI	TOTALI SORGENTI	TOTALI POZZI	%SORGENTI	%POZZI	RANCO	TOTALI
GEN	38.207	38.207	0	100,0%	0,0%	8.633	8.633
FEB	35.279	35.279	0	100,0%	0,0%	8.218	8.218
MAR	35.858	35.858	0	100,0%	0,0%	9.329	9.329
APR	36.414	36.414	0	100,0%	0,0%	10.350	10.350
MAG	43.253	43.253	0	100,0%	0,0%	13.871	13.871
GIU	37.053	37.053	0	100,0%	0,0%	9.117	9.117
LUG	40.159	40.159	0	100,0%	0,0%	9.111	9.111
AGO	36.734	36.734	0	100,0%	0,0%	8.049	8.049
SET	35.257	35.257	0	100,0%	0,0%	7.883	7.883
OTT	35.337	35.337	0	100,0%	0,0%	7.468	7.468
NOV	36.200	36.200	0	100,0%	0,0%	6.873	6.873
DIC	33.267	33.267	0	100,0%	0,0%	6.183	6.183
TOTALI	443.018	443.018	0	100,0%	0,0%	105.085	105.085

ACQUA PRODOTTA DAL COMUNE DI COMERIO (m³)					ACQUA SOLLEVATA DAL COMUNE DI COMERIO (m³)				
ANNO 2006					ANNO 2006				
FONTANONE	TOTALI	TOTALI SORGENTI	TOTALI POZZI	%SORGENTI	%POZZI	RANCO	TOTALI		
GEN	27.965	27.965	0	100,0%	0,0%	10.392	10.392		
FEB	24.016	24.016	0	100,0%	0,0%	8.060	8.060		
MAR	25.981	25.981	0	100,0%	0,0%	6.789	6.789		
APR	26.357	26.357	0	100,0%	0,0%	6.245	6.245		
MAG	36.376	36.376	0	100,0%	0,0%	8.658	8.658		
GIU	40.996	40.996	0	100,0%	0,0%	10.290	10.290		
LUG	41.313	41.313	0	100,0%	0,0%	10.999	10.999		
AGO	39.858	39.858	0	100,0%	0,0%	12.829	12.829		
SET	38.618	38.618	0	100,0%	0,0%	11.582	11.582		
OTT	37.517	37.517	0	100,0%	0,0%	7.293	7.293		
NOV	37.899	37.899	0	100,0%	0,0%	7.779	7.779		
DIC	39.356	39.356	0	100,0%	0,0%	8.341	8.341		
TOTALI	416.252	416.252	0	100,0%	0,0%	109.257	109.257		

ACQUA PRODOTTA DAL COMUNE DI COMERIO (m³)				ACQUA SOLLEVATA DAL COMUNE DI COMERIO (m³)			
ANNO 2005				ANNO 2005			
FONTANONE	TOTALI	TOTALI SORGENTI	TOTALI POZZI	%SORGENTI	%POZZI	RANCO	TOTALI
GEN	23.651	23.651	0	100,0%	0,0%	5.040	5.040
FEB	22.257	22.257	0	100,0%	0,0%	4.757	4.757
MAR	25.349	25.349	0	100,0%	0,0%	5.721	5.721
APR	23.753	23.753	0	100,0%	0,0%	5.209	5.209
MAG	32.563	32.563	0	100,0%	0,0%	6.970	6.970
GIU	33.500	33.500	0	100,0%	0,0%	7.388	7.388
LUG	37.113	37.113	0	100,0%	0,0%	8.444	8.444
AGO	32.476	32.476	0	100,0%	0,0%	7.408	7.408
SET	27.784	27.784	0	100,0%	0,0%	7.840	7.840
OTT	26.185	26.185	0	100,0%	0,0%	7.711	7.711
NOV	26.132	26.132	0	100,0%	0,0%	9.030	9.030
DIC	27.639	27.639	0	100,0%	0,0%	10.290	10.290
TOTALI	338.403	338.403	0	100,0%	0,0%	85.809	85.809

ACQUA PRODOTTA DAL COMUNE DI COMERIO (m³)				ACQUA SOLLEVATA DAL COMUNE DI COMERIO (m³)			
ANNO 2004		ANNO 2004		ANNO 2004		ANNO 2004	
FONTANONE	TOTALI	TOTALI SORGENTI	TOTALI POZZI	%SORGENTI	%POZZI	RANCO	TOTALI
GEN	28.155	28.155	0	100,0%	0,0%	11.641	11.641
FEB	26.676	26.676	0	100,0%	0,0%	10.699	10.699
MAR	28.145	28.145	0	100,0%	0,0%	11.558	11.558
APR	28.250	28.250	0	100,0%	0,0%	11.391	11.391
MAG	30.821	30.821	0	100,0%	0,0%	12.556	12.556
GIU	33.128	33.128	0	100,0%	0,0%	13.813	13.813
LUG	35.379	35.379	0	100,0%	0,0%	14.037	14.037
AGO	33.745	33.745	0	100,0%	0,0%	13.381	13.381
SET	33.379	33.379	0	100,0%	0,0%	12.808	12.808
OTT	31.672	31.672	0	100,0%	0,0%	11.661	11.661
NOV	23.661	23.661	0	100,0%	0,0%	5.121	5.121
DIC	23.303	23.303	0	100,0%	0,0%	5.199	5.199
TOTALI	356.312	356.312	0	100,0%	0,0%	133.864	133.864

**ACQUA SOLLEVATA DAL COMUNE DI COMERIO (m³)
ANNO 2003**

TOTALI

ACQUA PRODOTTA DAL COMUNE DI COMERIO (m³)						
ANNO 2002						
	FONTANONE	TOTALI	TOTALI SORGENTI	TOTALI POZZI	%SORGENTI	%POZZI
GEN	30.296	30.296	30.296	0	100,0%	0,0%
FEB	25.393	25.393	25.393	0	100,0%	0,0%
MAR	29.078	29.078	29.078	0	100,0%	0,0%
APR	29.762	29.762	29.762	0	100,0%	0,0%
MAG	31.143	31.143	31.143	0	100,0%	0,0%
GIU	33.354	33.354	33.354	0	100,0%	0,0%
LUG	33.571	33.571	33.571	0	100,0%	0,0%
AGO	32.890	32.890	32.890	0	100,0%	0,0%
SET	30.722	30.722	30.722	0	100,0%	0,0%
OTT	31.900	31.900	31.900	0	100,0%	0,0%
NOV	25.941	25.941	25.941	0	100,0%	0,0%
DIC	24.499	24.499	24.499	0	100,0%	0,0%
TOTALI	358.548	358.548	358.548	0	100,0%	0,0%

RATEO CONSUNI ACQUEDOTTO AL 31 dicembre 2007

ACQUEDOTTO ANNO 2007															RATEO CONSUNSI ACQUEDOTTO AL 31 dicembre 2007									
															PERDITE DI RETE									
COMUNI DI BACINO GESTITI	CONSUMI COMPETENZA SENZA MINIMI	Imnesso in rete 01/01/2007 31/12/2007	Imnesso in rete 2006	diff. Imnesso 2007/2006	diff. Imnesso 2007/2006	Imnesso in rete 2005	diff. Imnesso 2007/2005	Imnesso in rete	diff. Imnesso 2007/2004			differenza 2007/2005	perdite 2005	perdite 2004	perdite 2003									
	m3	m3	m3	m3	%	m3	m3	m3	m3	%	%	%	%	%	%									
BACINO	m3	m3	m3	m3	%	m3	m3	m3	m3	%	%	%	%	%	%									
COMERIO	230.873	443.018	416.252	26.766	6,43%	380.402	62.616	356.312	86.706	47,89%	2,40%	45,49%	40,23%	42,05%	44,36%									
TOTALI GENERALI	18.333.756	28.750.950	26.405.743	2.345.207	8,88%	26.887.946	1.863.004	26.374.708	2.376.242	36,23%	1,56%	34,67%	36,15%	34,91%	34,33%									

Allegato 6

**Approvazione dello Studio per
l'individuazione del reticolo idrico
minore da parte
della Regione Lombardia**



Regione Lombardia

Regione Lombardia - Giunta Sicurezza, Polizia locale e Protezione civile Sede territoriale di Varese P 08/11/2004 17.23
Y155.2004.0006662

Giunta Regionale
Direzione Generale Sicurezza, Polizia Locale e
Protezione Civile

Al Comune di
21025 COMERIO VA

Comune di COMERIO
10 NOV 2004
PROT. 6063
Cat. X Classe 4 Fasc.

OGGETTO: Definizione e regolamentazione del reticolo idrico di competenza del Comune.

Con riferimento all'incontro tenutosi in data 04/10/2004 presso la sede dello scrivente, in allegato alla presente si trasmette il parere relativo alla definizione e regolamentazione del reticolo idrico di competenza comunale.

Distinti saluti.

IL DIRIGENTE
Chiara Bossi

Chiara Bossi

Allegati:
- parere;
- copia progetto.

Referente:
geom. Domenico Nocerino – tel. 0332-338424
geom. Domenico Paolillo – tel. 0332-338433.



Marco Parnigian
Cordiale
MP

Regione Lombardia

DIREZIONE GENERALE SICUREZZA, POLIZIA LOCALE E PROTEZIONE CIVILE
SEDE TERRITORIALE DI VARESE
STRUTTURA SVILUPPO DEL TERRITORIO

DELIBERAZIONE GIUNTA REGIONALE 25 GENNAIO 2002 N. 7/7868

COMUNE DI COMERIO (VA)

OGGETTO: Definizione e regolamentazione del reticolo idrico di competenza del Comune.
Domanda in data 19/12/2003

PARERE

VISTO il Regio Decreto 25 luglio 1904, n. 523 "Testo unico delle disposizioni di legge intorno alle opere idrauliche delle diverse categorie";

VISTA la Deliberazione di Giunta Regionale 25 gennaio 2002, n. 7/7868 "Determinazione del reticolo idrico principale. Trasferimento delle funzioni relative alla polizia idraulica concernenti il reticolo idrico minore come indicato dall'art. 3 comma 114 della l.r. 1/2000 - Determinazione dei canoni regionali di polizia idraulica";

VISTA la Deliberazione di Giunta Regionale 1 agosto 2003, n. 7/13950 "Determinazione del reticolo idrico principale. Trasferimento delle funzioni relative alla polizia idraulica concernenti il reticolo idrico minore come indicato dall'art. 3, comma 114 della l.r. 1/2000 - Determinazione dei canoni regionali di polizia idraulica";

VISTO che l'allegato B alla Deliberazione di Giunta Regionale 25 gennaio 2002, n. 7/7868 "Criteri per l'esercizio dell'attività di Polizia Idraulica di competenza comunale", prevede che ogni amministrazione comunale debba dotarsi di apposito elaborato tecnico, costituito da una parte cartografica e da una parte normativa, da sottoporre alla Sede Territoriale della Regione Lombardia competente, per l'espressione di parere tecnico vincolante sullo stesso;

CONSIDERATO che l'art. 4 del deliberato della Deliberazione di Giunta Regionale 1 agosto 2003, n. 7/13950, dispone che "i comuni definiscano il reticolo idrico minore entro il 31 dicembre 2004";

PRESENTO ATTO della documentazione tecnica trasmessa dal comune di **COMERIO (VA)** protocollata al numero Y155.2004.0004447 in data 19/12/2003, successivamente integrata con nota del 22.03.2004 prot. n. 1651, costituita dagli elaborati di seguito elencati:

1. Relazione tecnica;
2. Delibera Giunta Comunale n. 41/2003;
3. Tav. 1 - individuazione del reticolo principale e minore;
4. Tav. 2 - fattibilità geologica;
5. Tav. 3 - identificazione in mappa dei corsi d'acqua..

RICHIAMATO l'esame istruttorio avvenuto in data 04/10/2004 alla presenza del tecnico comunale geom. Giuseppe Papa e del professionista incaricato dott. geol. Marco Parmigiani, durante il quale si è riscontrata la proposta di elencazione dei corpi idrici appartenenti al reticolo minore, sia alla luce degli atti in possesso della Struttura che alla luce delle mappe catastali vigenti e storiche;

RITENUTO, come già rilevato in occasione dell'incontro con l'Amministrazione proponente sopracitato, che:

- . al punto 4.1, 2° comma della Relazione tecnica si chiede se la "ristrutturazione" sia da indicare tra le attività vietate in modo assoluto all'interno delle fasce di rispetto, stante la definizione vigente di tale tipologia di intervento che, come è noto, comprende la demolizione con ricostruzione;
- . al punto 4.1, 6° comma, non è chiaro se laddove si prescrive che gli interventi manutentivi e conservativi sono ammessi solo allorché non incidano su superficie e volume, si intenda superficie coperta o superficie lorda pavimentabile. Analogamente per il punto successivo del medesimo comma. Con riferimento all'ultimo punto relativo alle operazioni di recupero e smaltimento dei rifiuti, ancorché ammesse dalle N.T.A. di P.A.I., se ne valuti l'opportunità;
- . all'art. 5, 2° comma non è chiaro il concetto di "funzionalità ecologica";
- . all'art. 5, 3° comma, non si comprende a quale "piano" si faccia riferimento.

Si rileva inoltre la mancanza di una norma transitoria volta a disciplinare i manufatti che insistono nelle fasce di rispetto, così come individuate dal presente studio in attuazione alla normativa vigente e ad integrazione di quanto disposto dal R.D. 523/1904, nonché ogni altra situazione comunque inconciliabile con la normativa vigente in materia e pertanto non suscettibile di sanatoria.

Si invita inoltre a condividere le scelte di zonizzazione e delle connesse normative afferenti i corsi d'acqua che interessano i territori comunali contermini con le Amministrazioni competenti al fine di ottimizzare ed omogeneizzare la pianificazione territoriale.

Alla luce di quanto evidenziato e per le indicazioni sopra esposte, si esprime

PARERE FAVOREVOLE

alla proposta di individuazione del reticolo idrico minore sul territorio del comune di **COMERIO (VA)** sulla base dello studio redatto da geom. Giuseppe Papa, con le **PRESCRIZIONI** di seguito elencate:

- . al punto 4.1, 2° comma, aggiungere la "ristrutturazione" tra gli interventi vietati in modo assoluto all'interno delle fasce di rispetto;
- . al punto 4.1, 6° comma, il punto specificare che trattasi di superficie coperta, in quanto maggiormente garantista rispetto alla finalità di tutela idraulica;
- . al punto 4.1, 6° comma, ultimo punto eliminare possibilità di esercitare le operazioni di recupero e smaltimento dei rifiuti, quale attività consentita all'interno della fascia di rispetto assoluta dei corsi d'acqua;

- . all'art. 5, 2° comma, eliminare i riferimenti al concetto di "funzionalità ecologica" in quanto non se ne indicano i contenuti e le valenze;
 - . all'art. 5, 3° comma, sostituire il richiamo a "il piano" con altro maggiormente confacente al contesto, trattandosi - in tutta evidenza - di un refuso lessicale,
- si formulano inoltre le seguenti RACCOMANDAZIONI:
- . inserire una norma transitoria avente ad oggetto la graduale e progressiva dismissione degli edifici e dei manufatti che versano in condizioni di insanabilità ai sensi del R.D. 523/1904, così come integrato dalle norme qui approvate e comunque atte a favorire l'assunzione di ogni misura di mitigazione opportuna a garantire il ripristino delle condizioni naturali delle aree fasciate;
 - . concertare le scelte di azionamento e di disciplina idraulico-urbanistica dei corsi d'acqua che interessano anche i territori dei comuni contermini con le Amministrazioni preposte al fine di ottimizzare la pianificazione.

Si rammenta che l'elaborato tecnico dovrà essere oggetto di apposita variante allo strumento urbanistico, così come previsto dal comma 4 art. 3 dell'allegato B alla Deliberazione di Giunta Regionale 25 gennaio 2002, n. 7/7868.

In allegato alla presente si restituiscono, debitamente timbrati e firmati, i seguenti elaborati:

1. Relazione tecnica;
 2. Delibera Giunta Comunale n. 41/2003;
 3. Tav. 1 - individuazione del reticolo principale e minore;
 4. Tav. 2 - fattibilità geologica;
 5. Tav. 3 - identificazione in mappa dei corsi d'acqua.
- copia dei quali è trattenuta nell'archivio della scrivente Struttura.

IL DIRIGENTE
Chiara Bossi

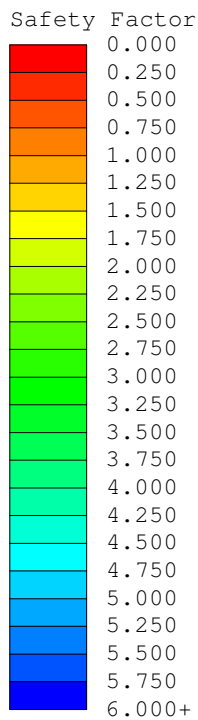
Chiara Bossi

Referenti:

geom. Domenico Nocerino -- tel. 0332-338424
geom. Domenico Paolillo -- tel. 0332-338433

Allegato 7

Analisi di stabilità del pendio



Global Minimums

Method: janbu corrected FS: 1.250830
Center: 112.616, 76.025 Radius: 6.860

Method: spencer FS: 1.305180
Center: 112.616, 76.025 Radius: 6.860

Method: gle/morgenstern-price FS: 1.304940
Center: 112.616, 76.025 Radius: 6.860

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.259906
Factor of Safety, standard deviation: 0.092229
Probability of Failure: 0.300%
Reliability index: 2.81804 (normal distribution)
Reliability index: 3.12377 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.306843
Factor of Safety, standard deviation: 0.087343
Probability of Failure: 0.000%
Reliability index: 3.51308 (normal distribution)
Reliability index: 3.97518 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.312770
Factor of Safety, standard deviation: 0.089606
Probability of Failure: 0.000%
Reliability index: 3.49049 (normal distribution)
Reliability index: 3.95751 (lognormal distribution)

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 1

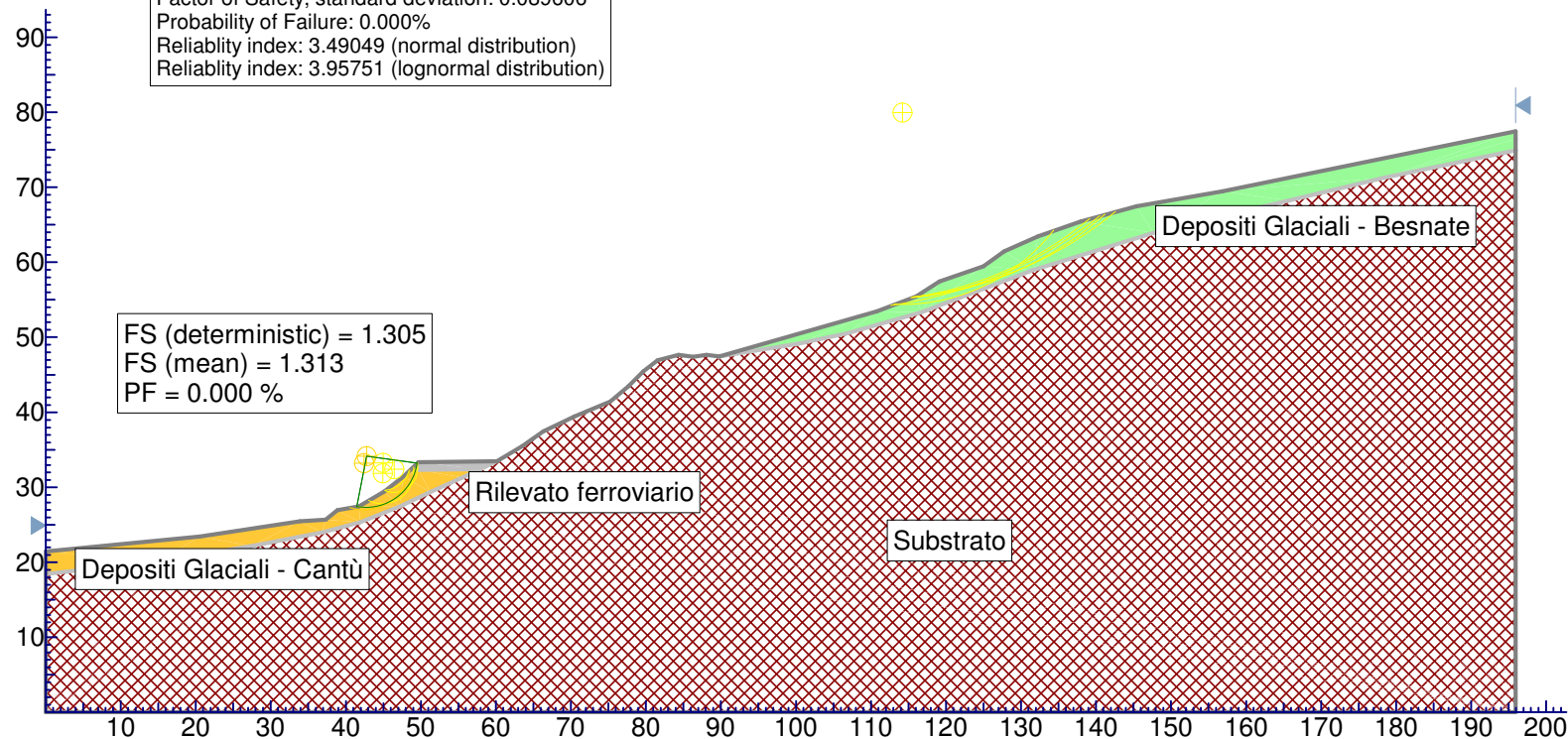
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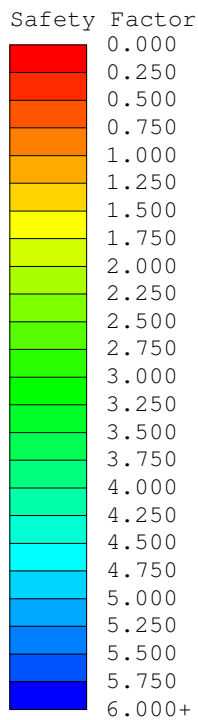
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Rilevato ferroviario
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Material: Depositi Glaciali - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 3.5 kPa Friction Angle: 27 degrees





Global Minimums

Method: janbu corrected FS: 1.053360
Center: 114.806, 75.137 Radius: 3.697

Method: spencer FS: 1.041910
Center: 114.806, 75.137 Radius: 3.697

Method: gle/morgenstern-price FS: 1.039230
Center: 114.806, 75.137 Radius: 3.697

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.056310
Factor of Safety, standard deviation: 0.177058
Probability of Failure: 37.600%
Reliability index: 0.31803 (normal distribution)
Reliability index: 0.24587 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.049130
Factor of Safety, standard deviation: 0.159985
Probability of Failure: 37.800%
Reliability index: 0.30709 (normal distribution)
Reliability index: 0.24052 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.046594
Factor of Safety, standard deviation: 0.159882
Probability of Failure: 38.900%
Reliability index: 0.29143 (normal distribution)
Reliability index: 0.22390 (lognormal distribution)

Comerio - PGT

Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 1

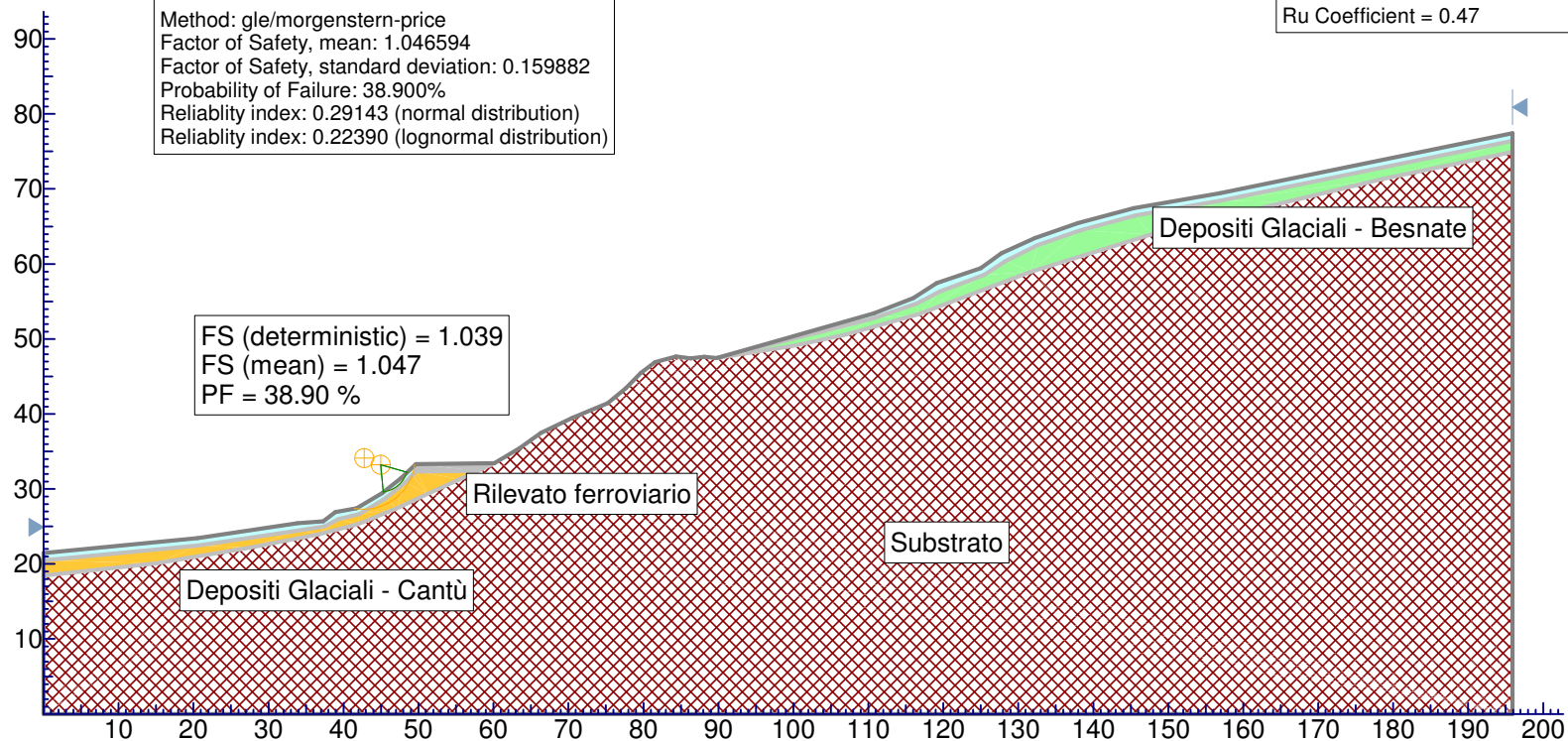
Material Properties

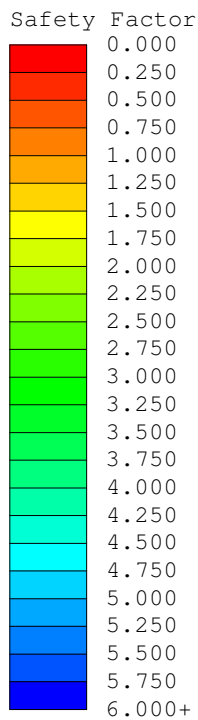
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Rilevato ferroviario
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees
Ru Coefficient = 0.46

Material: Depositi Glaciali - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 3.5 kPa Friction Angle: 27 degrees
Ru Coefficient = 0.47





Global Minimums

Method: janbu corrected FS: 0.868145
Center: 112.616, 76.025 Radius: 6.860

Method: spencer FS: 0.940909
Center: 112.616, 76.025 Radius: 6.860

Method: gle/morgenstern-price FS: 0.935513
Center: 112.616, 76.025 Radius: 6.860

Probabilistic Analysis Results (Global Minimum)

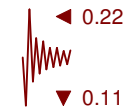
Method: janbu corrected
Factor of Safety, mean: 0.873821
Factor of Safety, standard deviation: 0.063430
Probability of Failure: 97.400%
Reliability index: -1.98926 (normal distribution)
Reliability index: -1.89681 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.933002
Factor of Safety, standard deviation: 0.062788
Probability of Failure: 85.249%
Reliability index: -1.06704 (normal distribution)
Reliability index: -1.06525 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.946101
Factor of Safety, standard deviation: 0.062942
Probability of Failure: 80.200%
Reliability index: -0.85633 (normal distribution)
Reliability index: -0.86697 (lognormal distribution)

Comerio - PGT

Analisi di Stabilità - Condizioni Sismiche Sezione 1



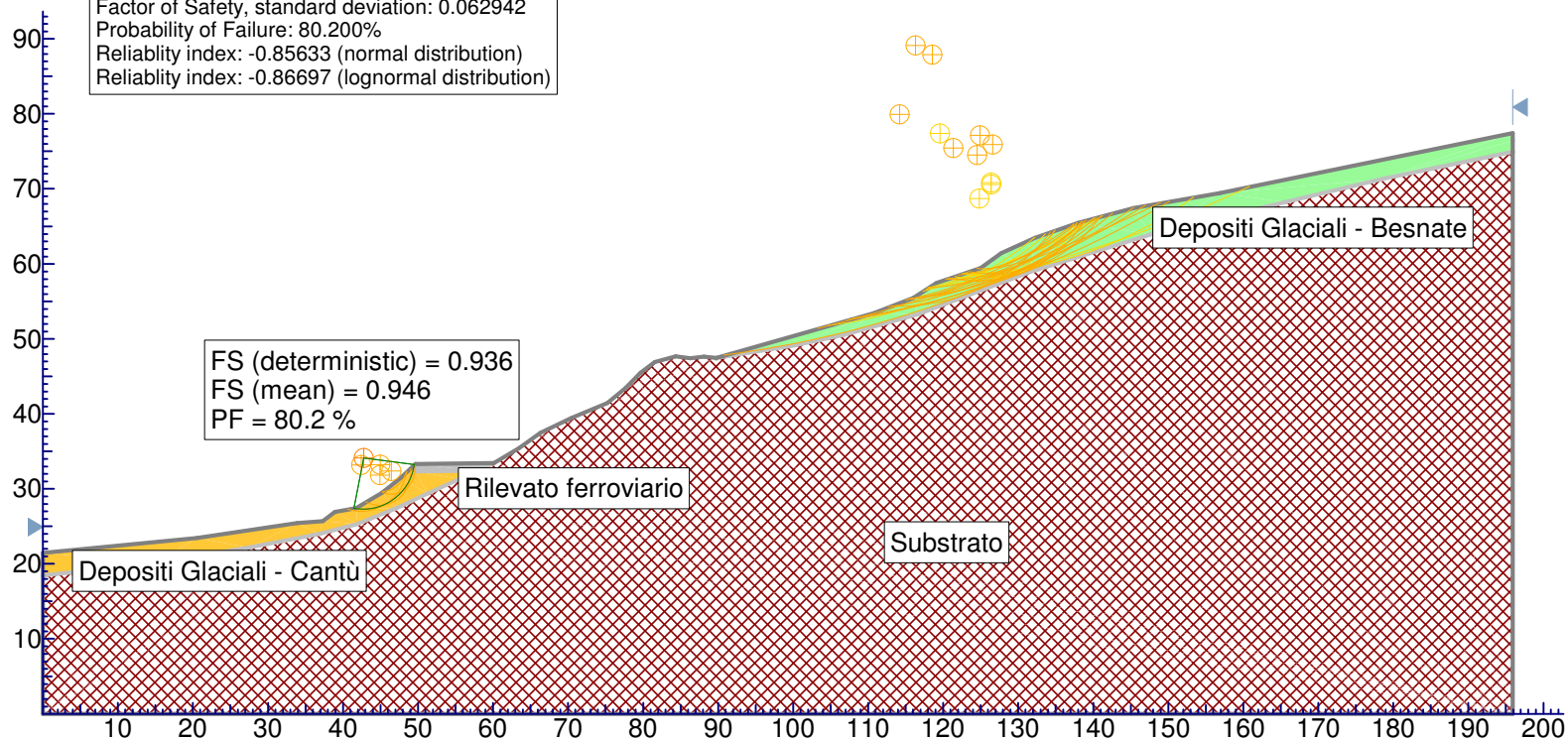
Material Properties

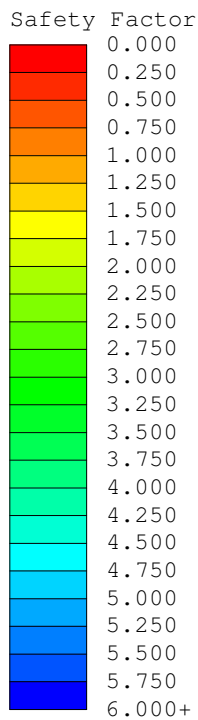
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Rilevato ferroviario
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Material: Depositi Glaciali - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 3.5 kPa Friction Angle: 27 degrees





Global Minimums

Method: janbu corrected FS: 2.100940
Center: 155.171, 129.859 Radius: 30.997

Method: spencer FS: 2.061240
Center: 155.171, 129.859 Radius: 30.997

Method: gle/morgenstern-price FS: 2.062780
Center: 155.171, 129.859 Radius: 30.997

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 2.105860
Factor of Safety, standard deviation: 0.142032
Probability of Failure: 0.000%
Reliability index: 7.78598 (normal distribution)
Reliability index: 11.02061 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 2.068772
Factor of Safety, standard deviation: 0.139347
Probability of Failure: 0.000%
Reliability index: 7.66984 (normal distribution)
Reliability index: 10.77107 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 2.067752
Factor of Safety, standard deviation: 0.139317
Probability of Failure: 0.000%
Reliability index: 7.66418 (normal distribution)
Reliability index: 10.76076 (lognormal distribution)

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 2

Material Properties

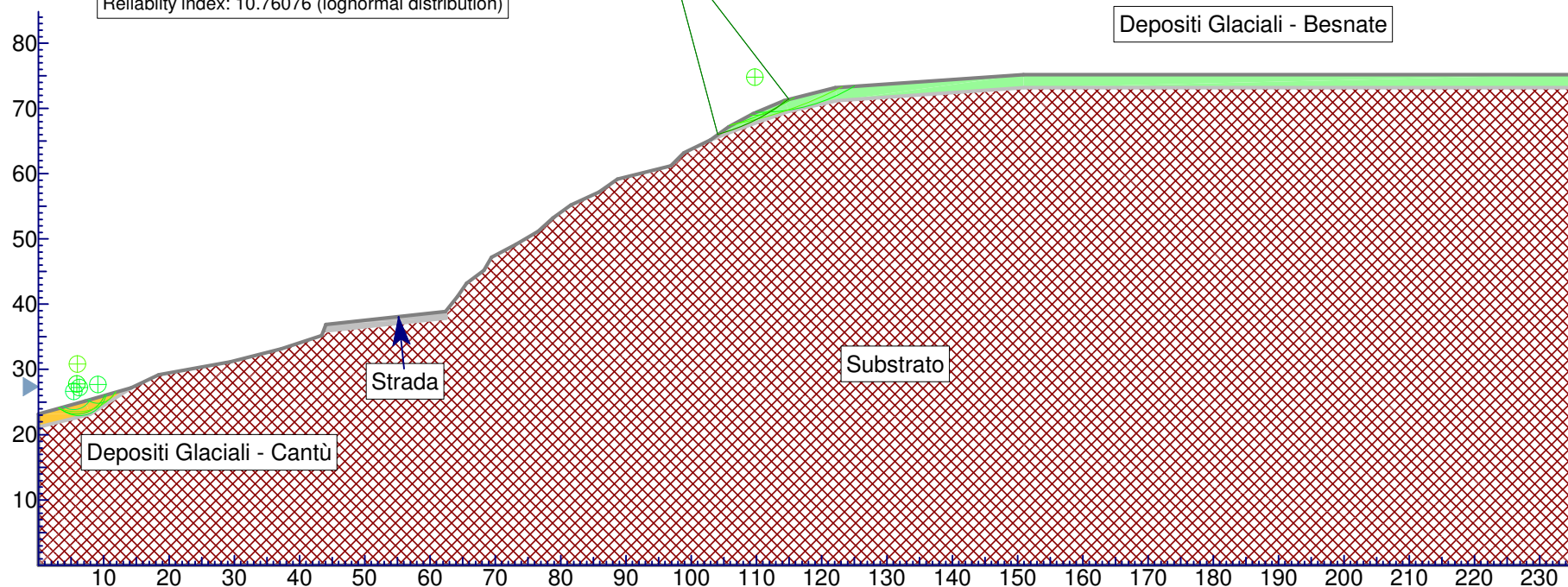
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m³

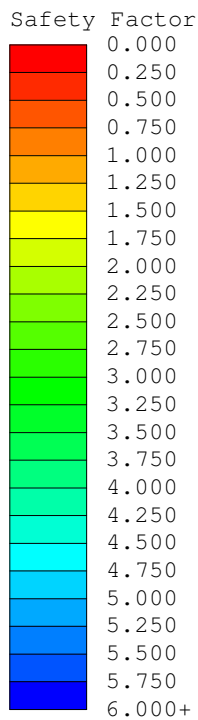
Material: Strada
Strength Type: Infinite strength
Unit Weight: 22 kN/m³

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m³
Cohesion: 5 kPa Friction Angle: 30 degrees

Material: Depositi Glaciali - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m³
Cohesion: 2.5 kPa Friction Angle: 27 degrees

FS (deterministic) = 2.063
FS (mean) = 2.068
PF = 0.00 %





Global Minimums

Method: janbu corrected FS: 1.919410
Center: 155.171, 129.859 Radius: 30.997

Method: spencer FS: 1.891740
Center: 155.171, 129.859 Radius: 30.997

Method: gle/morgenstern-price FS: 1.893220
Center: 155.171, 129.859 Radius: 30.997

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.922916
Factor of Safety, standard deviation: 0.105086
Probability of Failure: 0.000%
Reliability index: 8.78249 (normal distribution)
Reliability index: 11.94598 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.899579
Factor of Safety, standard deviation: 0.104101
Probability of Failure: 0.000%
Reliability index: 8.64139 (normal distribution)
Reliability index: 11.68954 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.898283
Factor of Safety, standard deviation: 0.104129
Probability of Failure: 0.000%
Reliability index: 8.62659 (normal distribution)
Reliability index: 11.66590 (lognormal distribution)

Comerio - PGT

Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 2

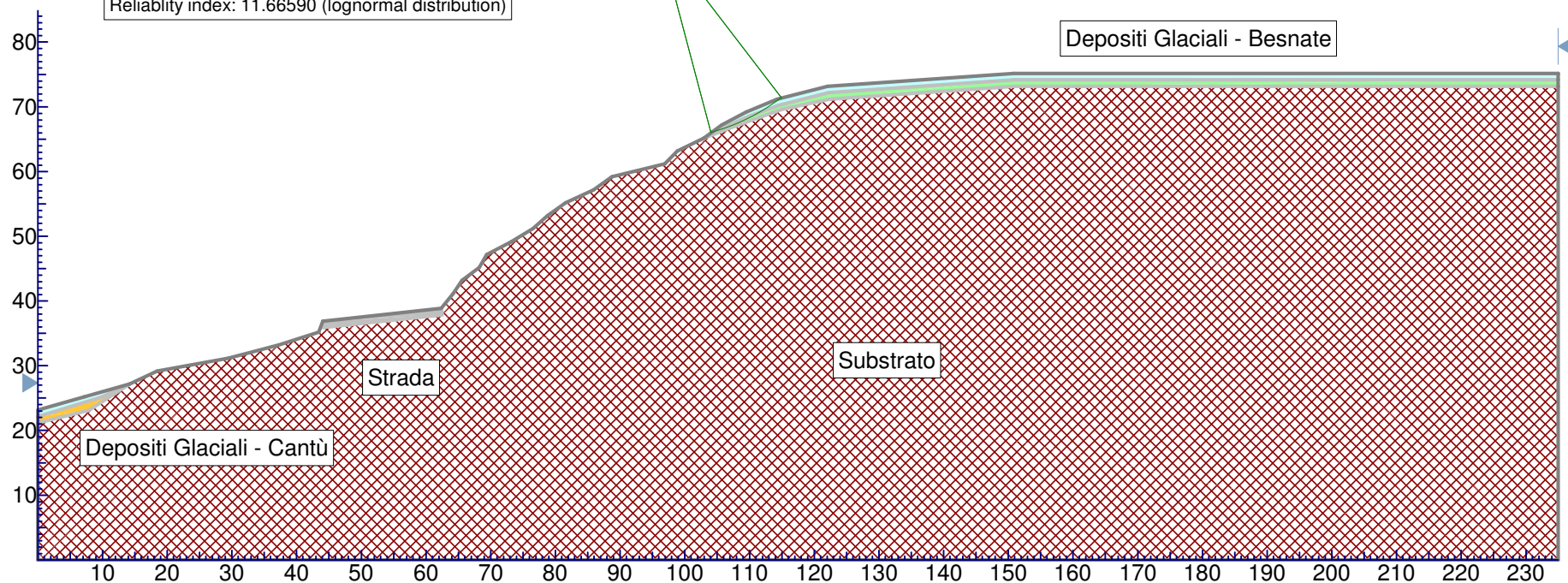
Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

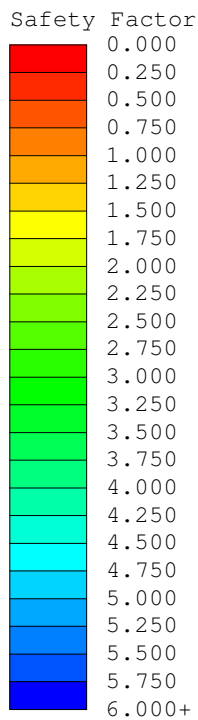
Material: Strada
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees
Ru Coefficient = 0.497

Material: Depositi Glaciali - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 2.5 kPa Friction Angle: 27 degrees
Ru Coefficient = 0.46



Scale 1:1000.0



Global Minimums

Method: janbu corrected FS: 1.982570
Center: 155.171, 129.859 Radius: 30.997

Method: spencer FS: 1.945260
Center: 155.171, 129.859 Radius: 30.997

Method: gle/morgenstern-price FS: 1.946690
Center: 155.171, 129.859 Radius: 30.997

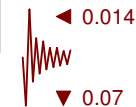
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.987082
Factor of Safety, standard deviation: 0.131360
Probability of Failure: 0.000%
Reliability index: 7.51432 (normal distribution)
Reliability index: 10.36552 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.951613
Factor of Safety, standard deviation: 0.128862
Probability of Failure: 0.000%
Reliability index: 7.38472 (normal distribution)
Reliability index: 10.10481 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.952169
Factor of Safety, standard deviation: 0.128864
Probability of Failure: 0.000%
Reliability index: 7.38896 (normal distribution)
Reliability index: 10.11190 (lognormal distribution)

Comerio - PGT Analisi di Stabilità - Condizioni Sismiche Sezione 2



Material Properties

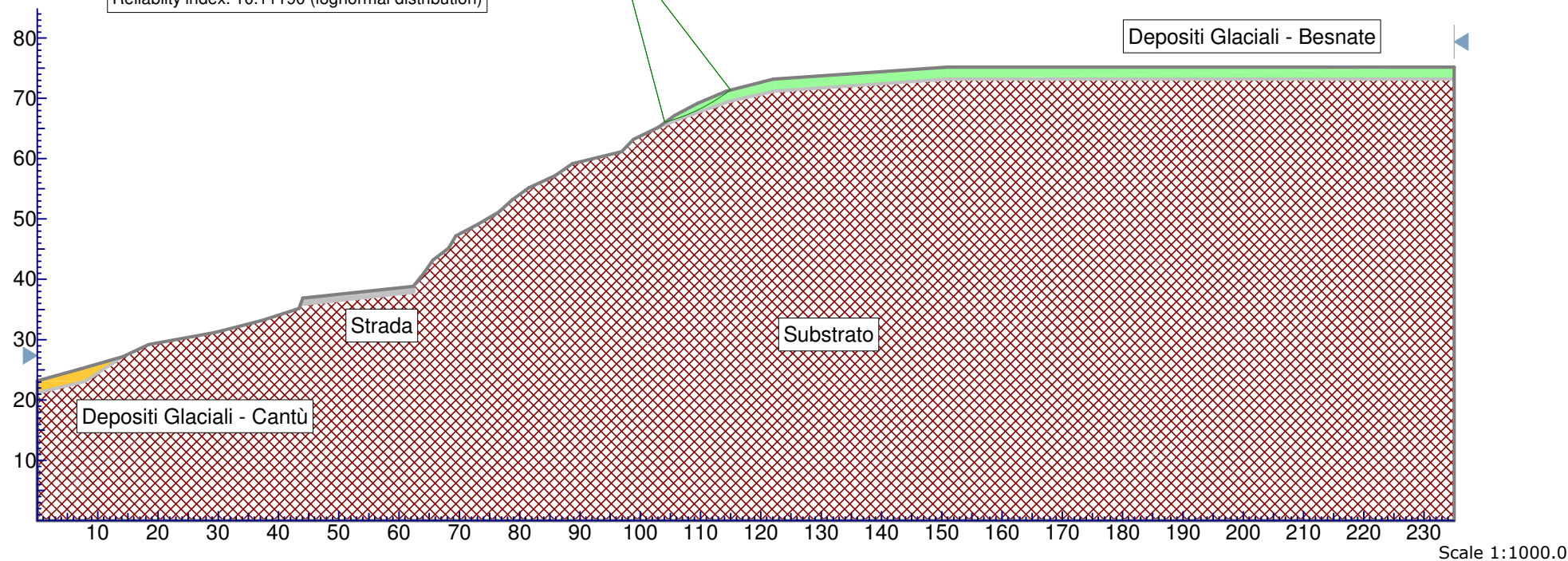
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

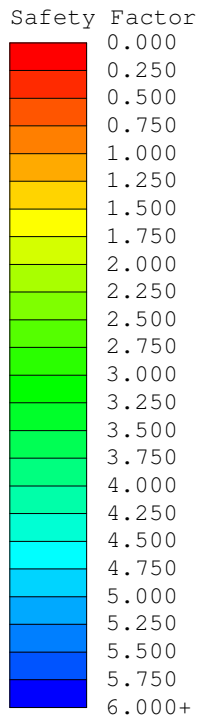
Material: Strada
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Material: Depositi Glaciali - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 2.5 kPa Friction Angle: 27 degrees

FS (deterministic) = 1.947
FS (mean) = 1.952
PF = 0.00 %





Global Minimums

Method: janbu corrected FS: 1.365270
Center: 192.428, 141.078 Radius: 38.669

Method: spencer FS: 1.346440
Center: 192.428, 141.078 Radius: 38.669

Method: gle/morgenstern-price FS: 1.345280
Center: 192.428, 141.078 Radius: 38.669

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.366069
Factor of Safety, standard deviation: 0.063171
Probability of Failure: 0.000%
Reliability index: 5.79486 (normal distribution)
Reliability index: 6.72609 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.347844
Factor of Safety, standard deviation: 0.062422
Probability of Failure: 0.000%
Reliability index: 5.57249 (normal distribution)
Reliability index: 6.42583 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.346569
Factor of Safety, standard deviation: 0.062230
Probability of Failure: 0.000%
Reliability index: 5.56913 (normal distribution)
Reliability index: 6.41908 (lognormal distribution)

Material Properties

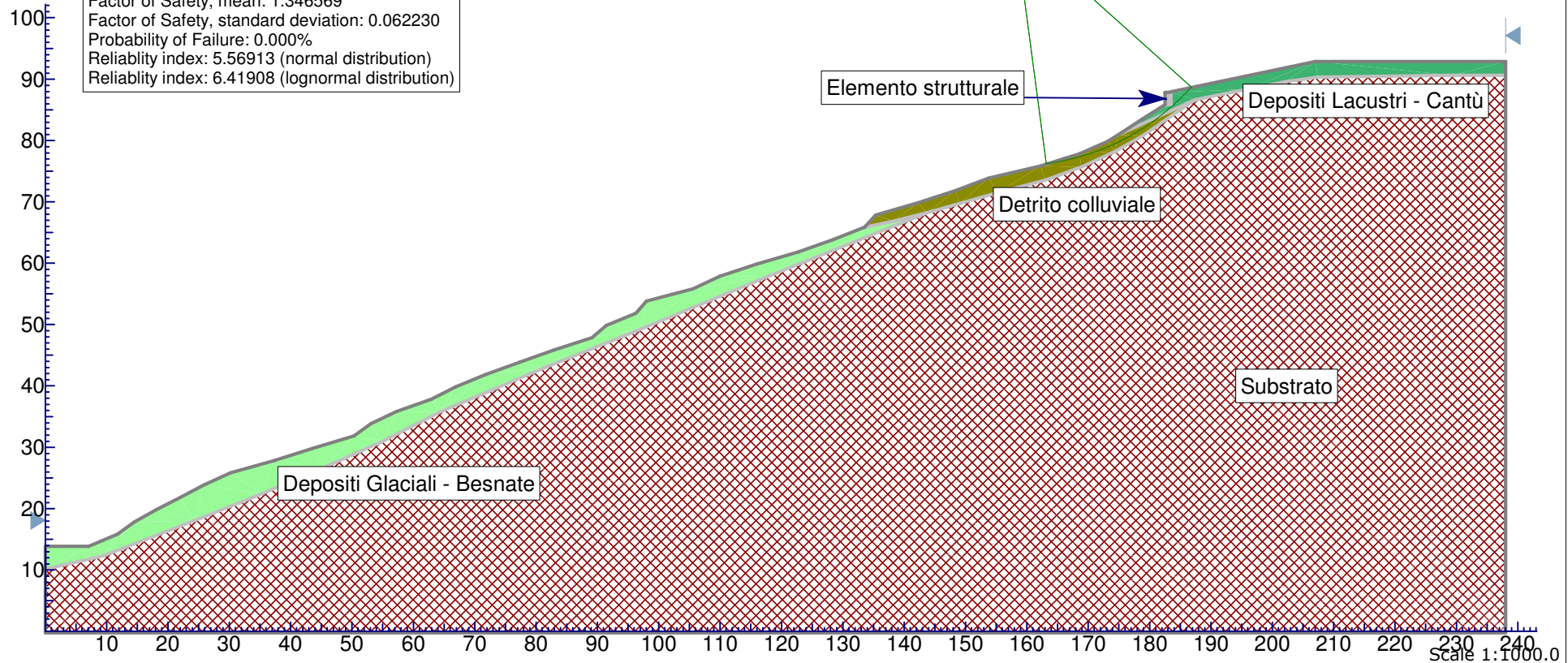
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

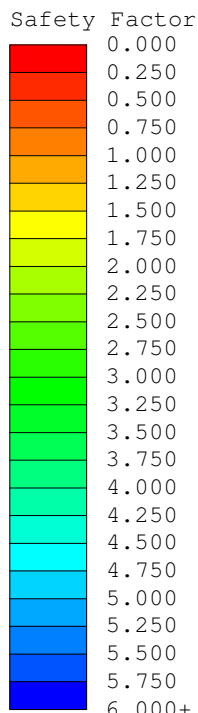
Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Material: Depositi Lacustri - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 10 kPa Friction Angle: 25 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 3





Global Minimums

Method: janbu corrected FS: 1.158530
Center: 166.485, 95.770 Radius: 3.972

Method: spencer FS: 1.168490
Center: 161.163, 114.026 Radius: 22.677

Method: gle/morgenstern-price FS: 1.168110
Center: 161.163, 114.026 Radius: 22.677

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.159579
Factor of Safety, standard deviation: 0.095408
Probability of Failure: 5.500%
Reliability index: 1.67260 (normal distribution)
Reliability index: 1.76144 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.173089
Factor of Safety, standard deviation: 0.085244
Probability of Failure: 1.900%
Reliability index: 2.03050 (normal distribution)
Reliability index: 2.16349 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.171109
Factor of Safety, standard deviation: 0.085441
Probability of Failure: 2.000%
Reliability index: 2.00267 (normal distribution)
Reliability index: 2.13144 (lognormal distribution)

Material Properties

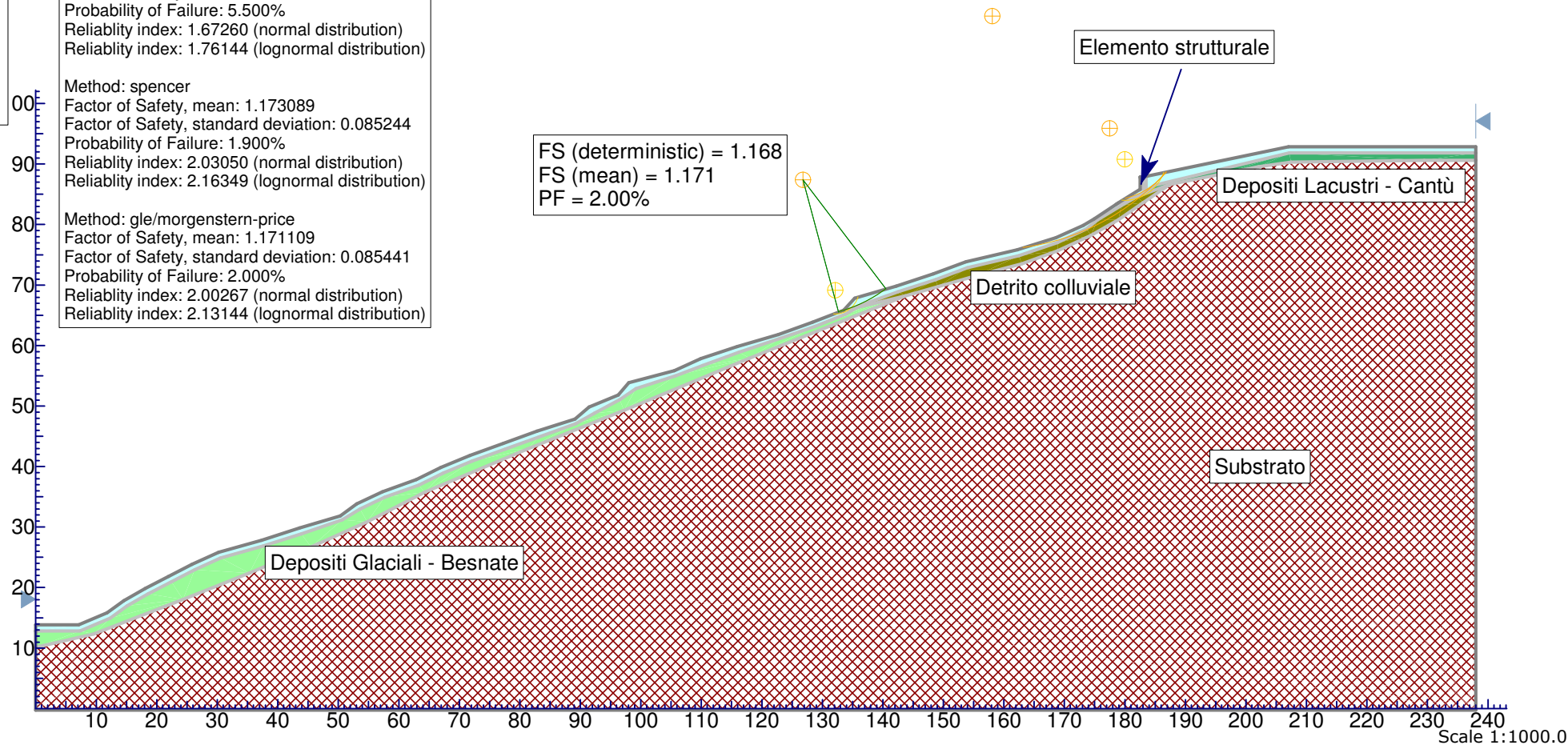
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

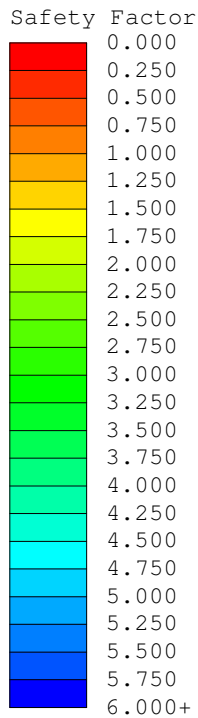
Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees
Ru Coefficient = 0.43

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees
Ru Coefficient = 0.43

Material: Depositi Lacustri - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 10 kPa Friction Angle: 25 degrees
Ru Coefficient = 0.496

Comerio - PGT Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 3





Global Minimums

Method: janbu corrected FS: 1.303760
Center: 192.428, 141.078 Radius: 38.669

Method: spencer FS: 1.286250
Center: 192.428, 141.078 Radius: 38.669

Method: gle/morgenstern-price FS: 1.279990
Center: 192.428, 141.078 Radius: 38.669

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.304609
Factor of Safety, standard deviation: 0.060339
Probability of Failure: 0.000%
Reliability index: 5.04834 (normal distribution)
Reliability index: 5.72919 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.288144
Factor of Safety, standard deviation: 0.059814
Probability of Failure: 0.000%
Reliability index: 4.81733 (normal distribution)
Reliability index: 5.43265 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.287064
Factor of Safety, standard deviation: 0.059617
Probability of Failure: 0.000%
Reliability index: 4.81513 (normal distribution)
Reliability index: 5.42801 (lognormal distribution)

Material Properties

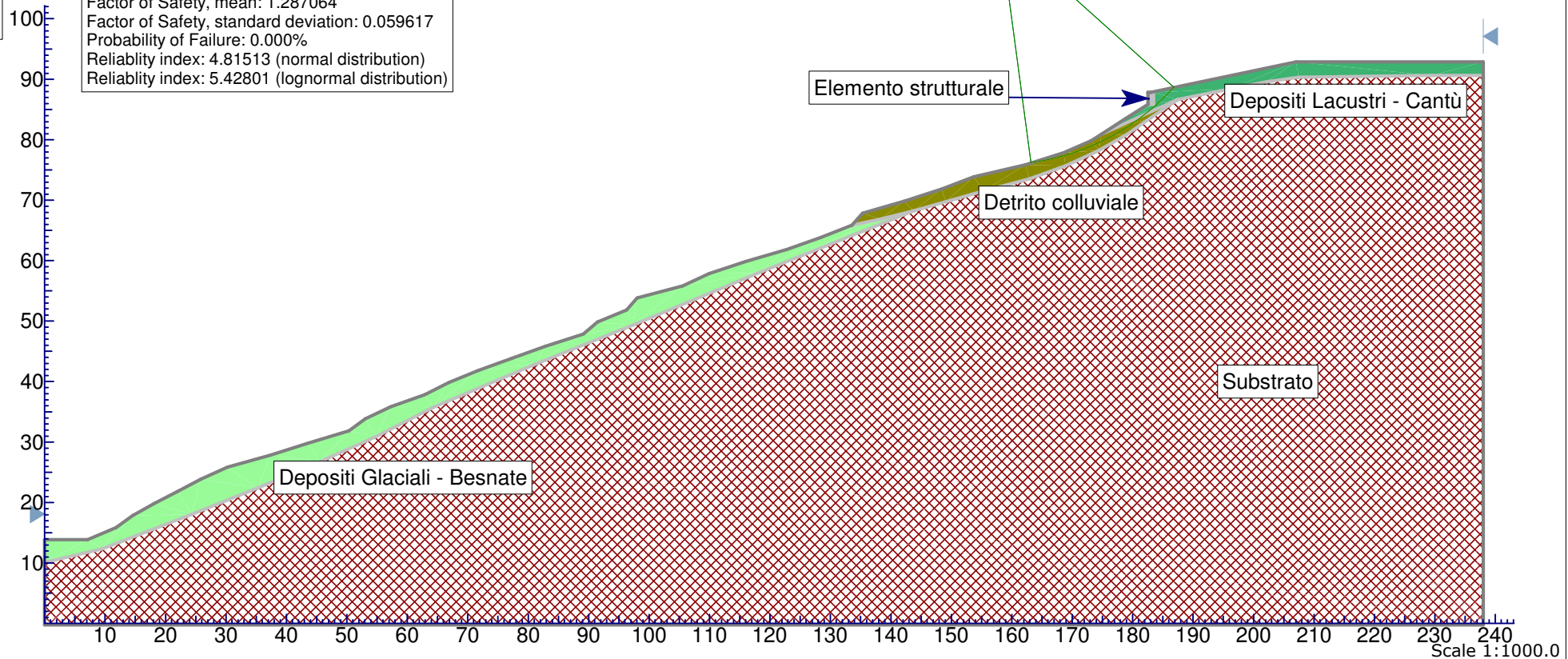
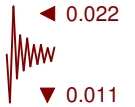
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

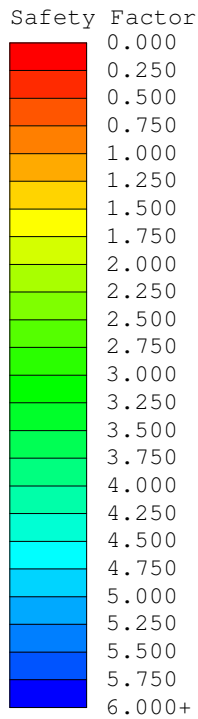
Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Material: Depositi Glaciali - Besnate
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Material: Depositi Lacustri - Cantù
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 10 kPa Friction Angle: 25 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Sismiche Sezione 3





Global Minimums

Method: janbu corrected FS: 0.935782
Center: 60.933, 96.431 Radius: 56.104

Method: spencer FS: 0.934116
Center: 47.317, 118.040 Radius: 80.990

Method: gle/morgenstern-price FS: 0.931196
Center: 60.933, 96.431 Radius: 56.104

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.939595
Factor of Safety, standard deviation: 0.050227
Probability of Failure: 87.500%
Reliability index: -1.20265 (normal distribution)
Reliability index: -1.19311 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.939461
Factor of Safety, standard deviation: 0.048738
Probability of Failure: 88.200%
Reliability index: -1.24213 (normal distribution)
Reliability index: -1.23048 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.937476
Factor of Safety, standard deviation: 0.049386
Probability of Failure: 88.300%
Reliability index: -1.26602 (normal distribution)
Reliability index: -1.25276 (lognormal distribution)

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 4

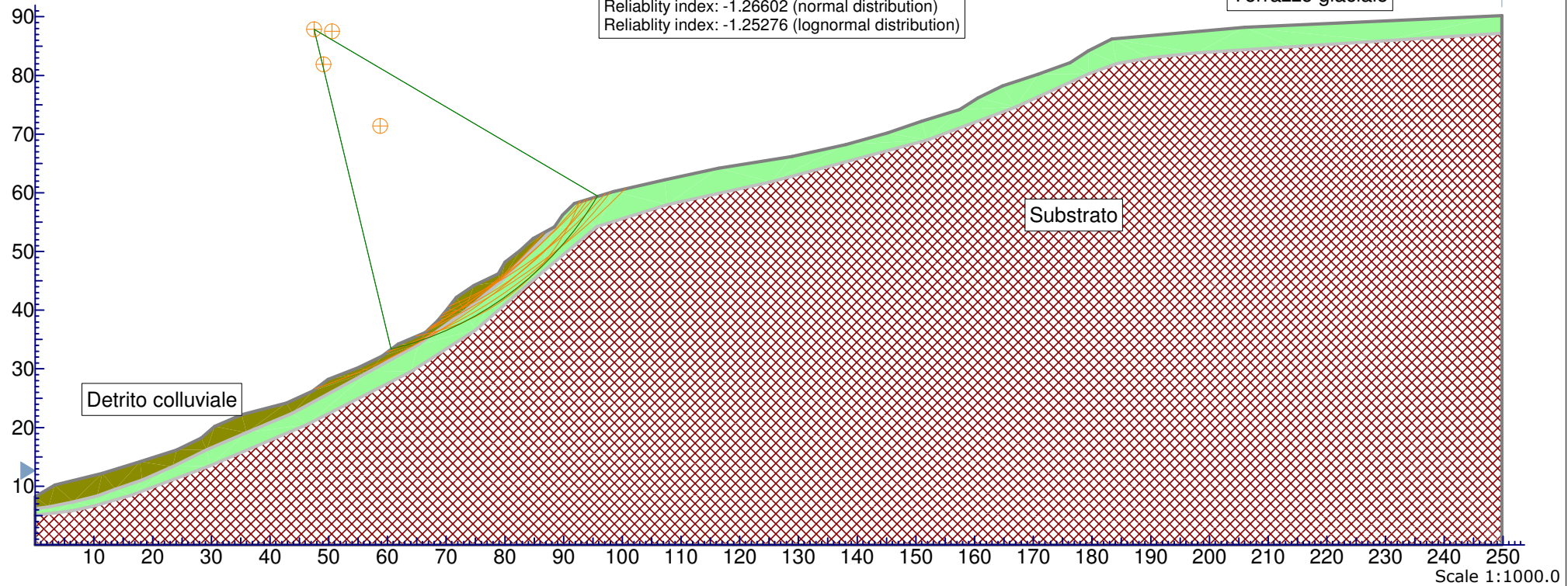
Material Properties

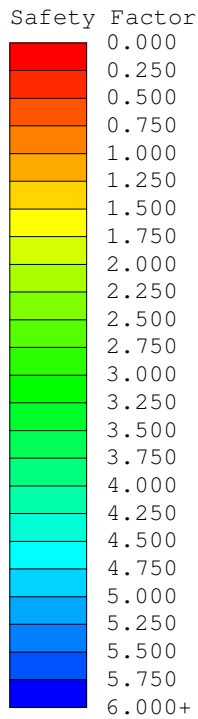
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Material: Terrazzo glaciale
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

FS (deterministic) = 0.931
FS (mean) = 0.937
PF = 88.30 %





FS (deterministic) = 0.702
FS (mean) = 0.705
PF = 100.00 %

Global Minimums

Method: janbu corrected FS: 0.658311
Center: 83.534, 49.830 Radius: 1.782

Method: spencer FS: 0.702226
Center: -43.610, 241.371 Radius: 230.823

Method: gle/morgenstern-price FS: 0.702236
Center: -43.610, 241.371 Radius: 230.823

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.661615
Factor of Safety, standard deviation: 0.079639
Probability of Failure: 100.000%
Reliability index: -4.24901 (normal distribution)
Reliability index: -3.50403 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.705247
Factor of Safety, standard deviation: 0.078308
Probability of Failure: 100.000%
Reliability index: -3.76402 (normal distribution)
Reliability index: -3.20998 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.705409
Factor of Safety, standard deviation: 0.078426
Probability of Failure: 100.000%
Reliability index: -3.75630 (normal distribution)
Reliability index: -3.20399 (lognormal distribution)

Comerio - PGT

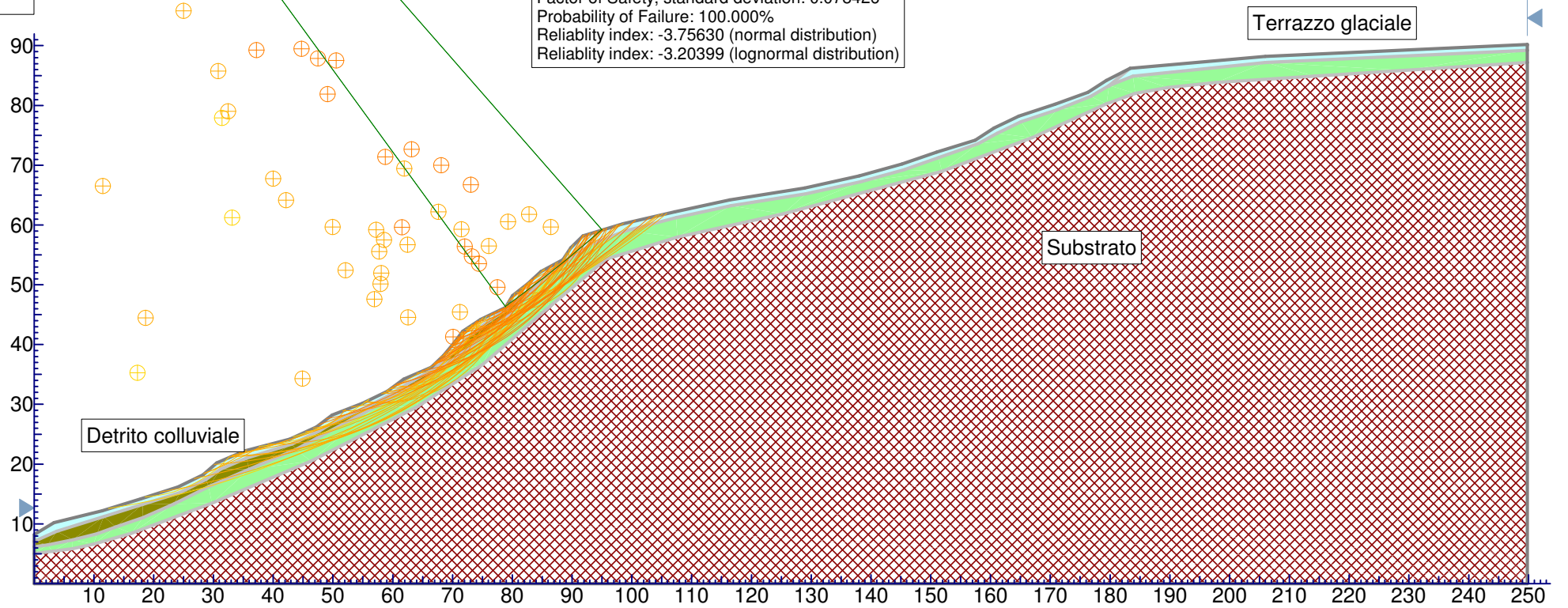
Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 4

Material Properties

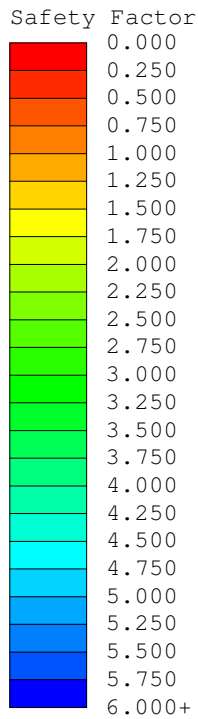
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees
Ru Coefficient = 0.33

Material: Terrazzo glaciale
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees
Ru Coefficient = 0.498 - 0.46



Scale 1:1000.0



Global Minimums

Method: janbu corrected FS: 0.896529
Center: 60.933, 96.431 Radius: 56.104

Method: spencer FS: 0.892069
Center: 60.933, 96.431 Radius: 56.104

Method: gle/morgenstern-price FS: 0.893169
Center: 60.933, 96.431 Radius: 56.104

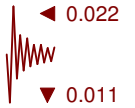
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.900167
Factor of Safety, standard deviation: 0.048068
Probability of Failure: 98.100%
Reliability index: -2.07692 (normal distribution)
Reliability index: -1.99770 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.899110
Factor of Safety, standard deviation: 0.046946
Probability of Failure: 98.400%
Reliability index: -2.14903 (normal distribution)
Reliability index: -2.06426 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.899354
Factor of Safety, standard deviation: 0.047305
Probability of Failure: 98.400%
Reliability index: -2.12760 (normal distribution)
Reliability index: -2.04442 (lognormal distribution)

Comerio - PGT Analisi di Stabilità - Condizioni Sismiche Sezione 4

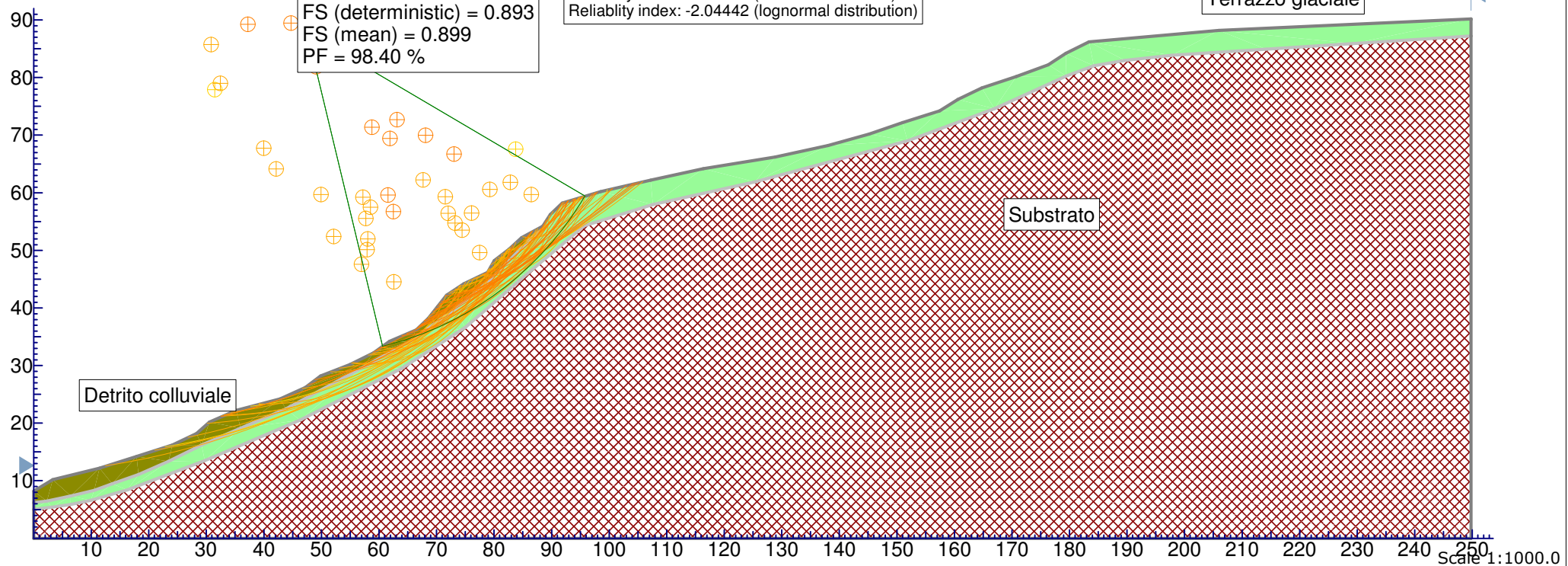


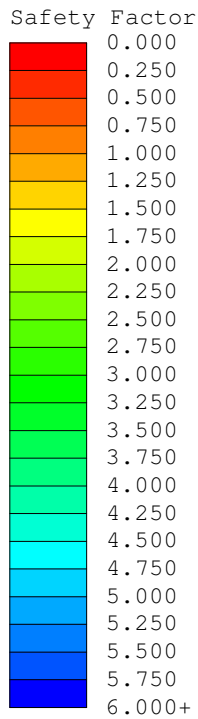
Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Material: Terrazzo glaciale
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees





Global Minimums

Method: janbu corrected FS: 0.761044
Center: 247.260, 142.042 Radius: 99.178

Method: spencer FS: 0.749706
Center: 247.260, 142.042 Radius: 99.178

Method: gle/morgenstern-price FS: 0.749871
Center: 247.260, 142.042 Radius: 99.178

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.764420
Factor of Safety, standard deviation: 0.037764
Probability of Failure: 100.000%
Reliability index: -6.23821 (normal distribution)
Reliability index: -5.46577 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.754183
Factor of Safety, standard deviation: 0.036276
Probability of Failure: 100.000%
Reliability index: -6.77627 (normal distribution)
Reliability index: -5.89272 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.754232
Factor of Safety, standard deviation: 0.036415
Probability of Failure: 100.000%
Reliability index: -6.74899 (normal distribution)
Reliability index: -5.86941 (lognormal distribution)

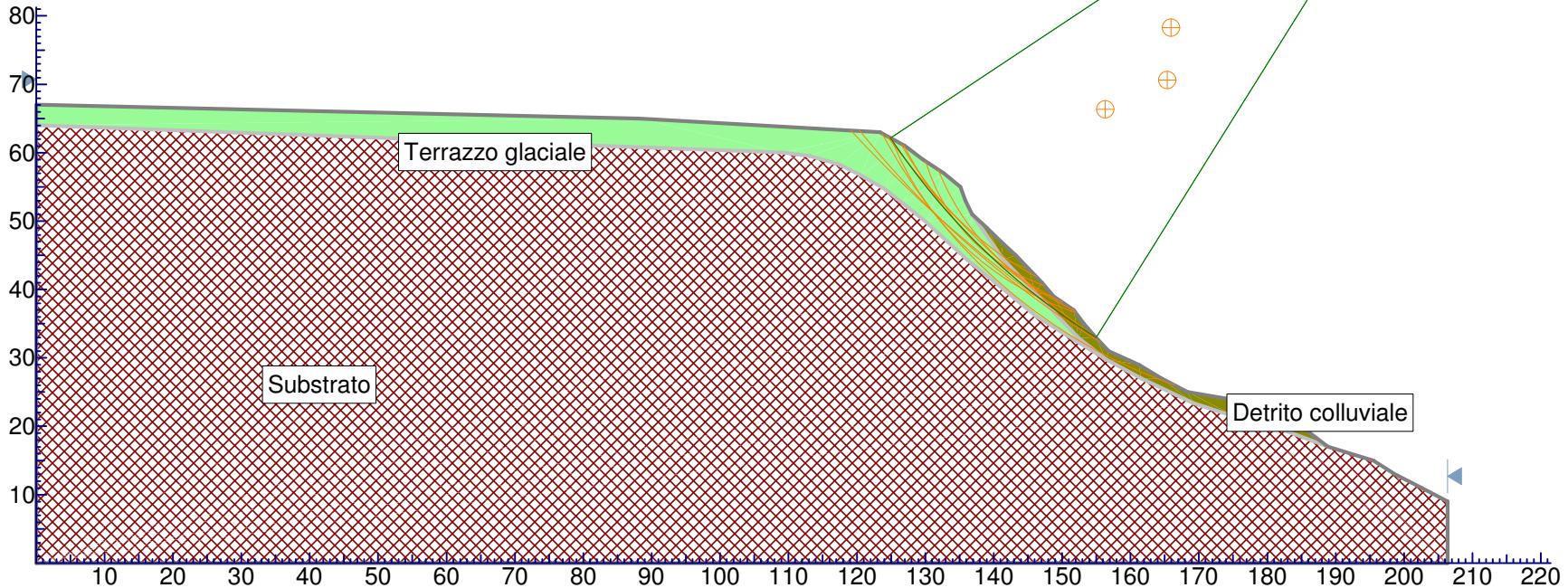
Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

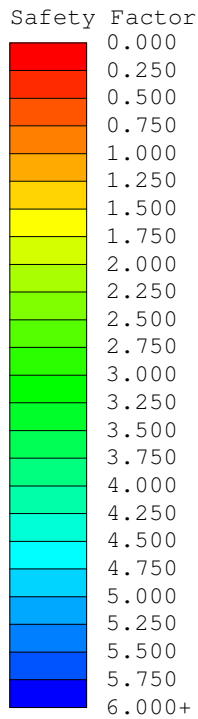
Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Material: Terrazzo glaciale
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 5



FS (deterministic) = 0.750
FS (mean) = 0.754
PF = 100.00 %



Global Minimums

Method: janbu corrected FS: 0.558547
Center: 233.398, 110.912 Radius: 65.728

Method: spencer FS: 0.548747
Center: 233.398, 110.912 Radius: 65.728

Method: gle/morgenstern-price FS: 0.548807
Center: 233.398, 110.912 Radius: 65.728

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.560508
Factor of Safety, standard deviation: 0.063909
Probability of Failure: 100.000%
Reliability index: -6.87679 (normal distribution)
Reliability index: -5.15052 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.554192
Factor of Safety, standard deviation: 0.062180
Probability of Failure: 100.000%
Reliability index: -7.16961 (normal distribution)
Reliability index: -5.33307 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.555027
Factor of Safety, standard deviation: 0.062404
Probability of Failure: 100.000%
Reliability index: -7.13048 (normal distribution)
Reliability index: -5.30879 (lognormal distribution)

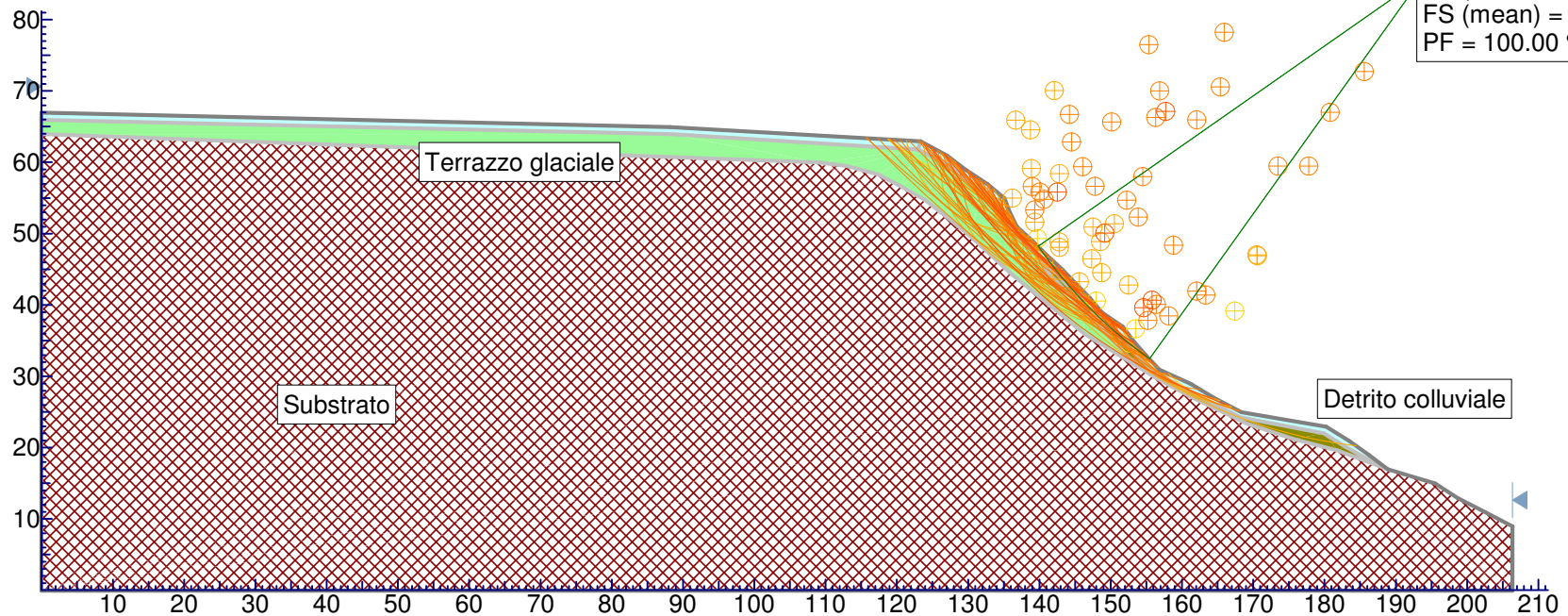
Material Properties

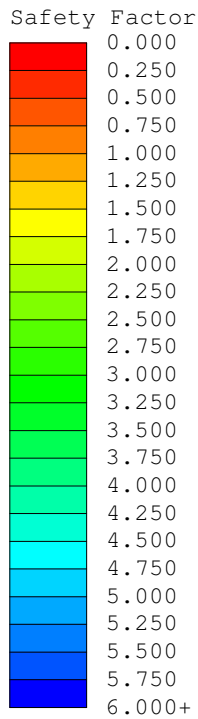
Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m³

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m³
Cohesion: 3 kPa Friction Angle: 28 degrees
Ru Coefficient = 0.33

Material: Terrazzo glaciale
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m³
Cohesion: 5 kPa Friction Angle: 30 degrees
Ru Coefficient = 0.499 - 0.27

Comerio - PGT Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 5





Global Minimums

Method: janbu corrected FS: 0.730712
Center: 247.260, 142.042 Radius: 99.178

Method: spencer FS: 0.720785
Center: 247.260, 142.042 Radius: 99.178

Method: gle/morgenstern-price FS: 0.720900
Center: 247.260, 142.042 Radius: 99.178

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.733847
Factor of Safety, standard deviation: 0.036277
Probability of Failure: 100.000%
Reliability index: -7.33676 (normal distribution)
Reliability index: -6.28854 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.724671
Factor of Safety, standard deviation: 0.034752
Probability of Failure: 100.000%
Reliability index: -7.92274 (normal distribution)
Reliability index: -6.74321 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.725043
Factor of Safety, standard deviation: 0.034866
Probability of Failure: 100.000%
Reliability index: -7.88618 (normal distribution)
Reliability index: -6.71409 (lognormal distribution)

Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

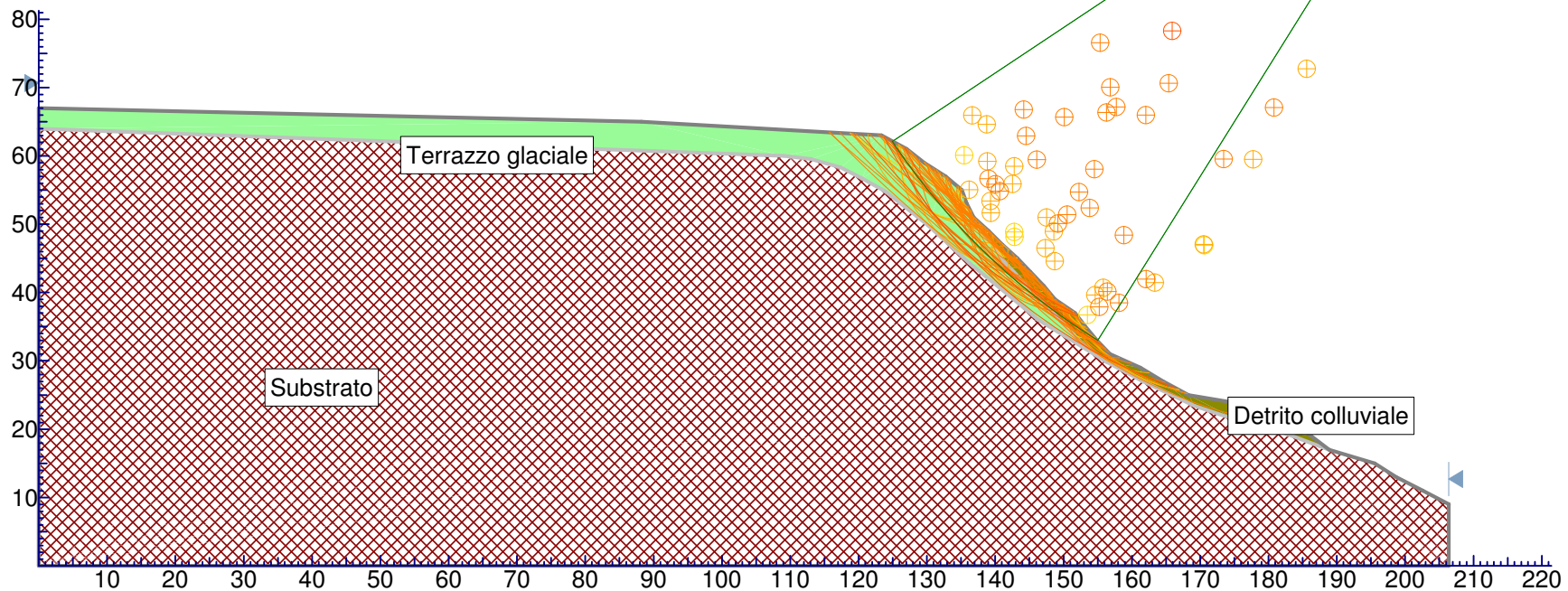
Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

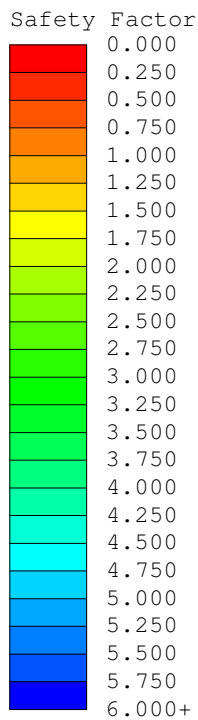
Material: Terrazzo glaciale
Strength Type: Mohr-Coulomb Unit Weight: 19 kN/m3
Cohesion: 5 kPa Friction Angle: 30 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Sismiche Sezione 5

0.022
0.011

FS (deterministic) = 0.721
FS (mean) = 0.725
PF = 100.00 %





Global Minimums

Method: janbu corrected FS: 1.398200
Center: 436.867, 302.214 Radius: 70.843

Method: spencer FS: 1.373590
Center: 436.867, 302.214 Radius: 70.843

Method: gle/morgenstern-price FS: 1.372140
Center: 436.867, 302.214 Radius: 70.843

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.401193
Factor of Safety, standard deviation: 0.092353
Probability of Failure: 0.000%
Reliability index: 4.34412 (normal distribution)
Reliability index: 5.09055 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.376381
Factor of Safety, standard deviation: 0.090480
Probability of Failure: 0.000%
Reliability index: 4.15982 (normal distribution)
Reliability index: 4.83199 (lognormal distribution)

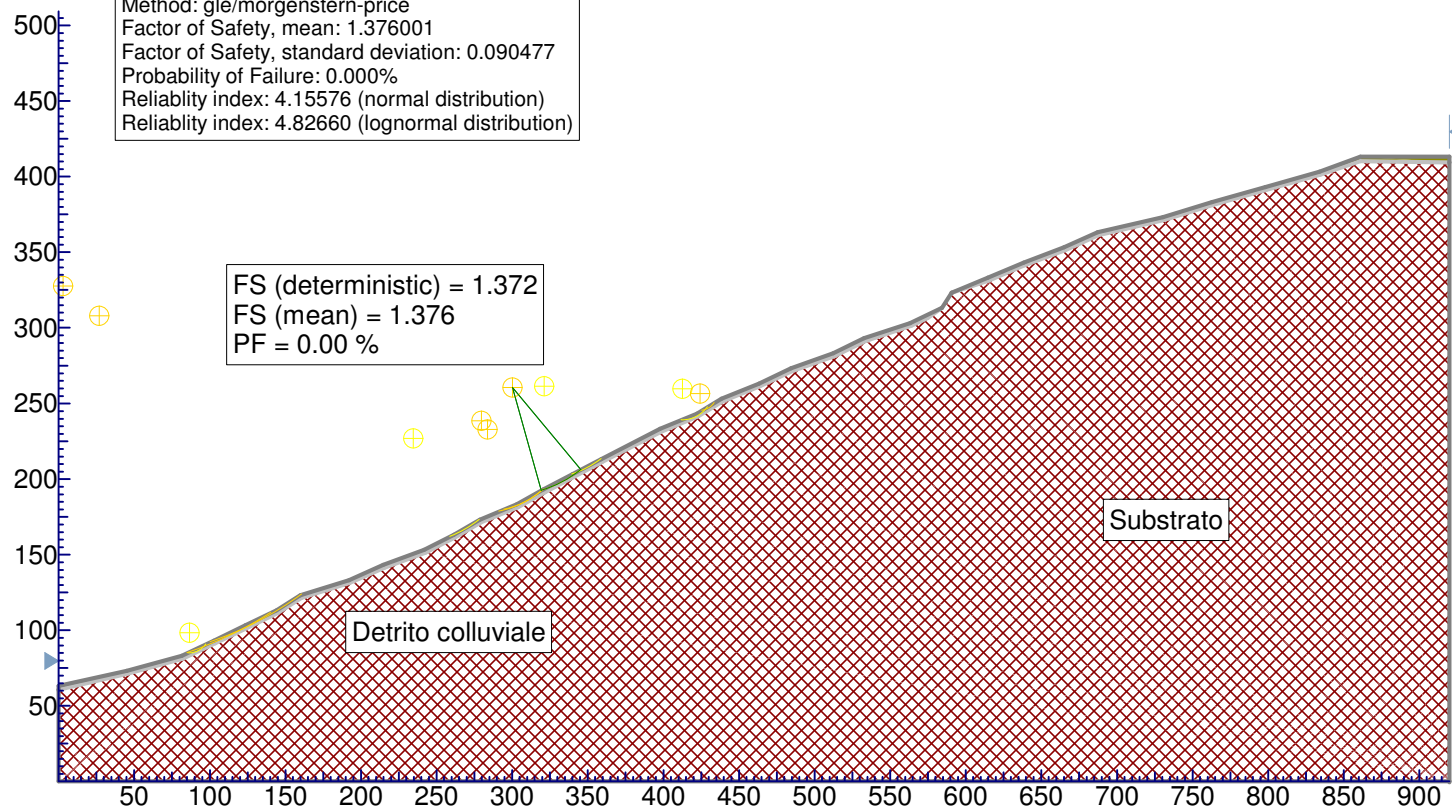
Method: gle/morgenstern-price
Factor of Safety, mean: 1.376001
Factor of Safety, standard deviation: 0.090477
Probability of Failure: 0.000%
Reliability index: 4.15576 (normal distribution)
Reliability index: 4.82660 (lognormal distribution)

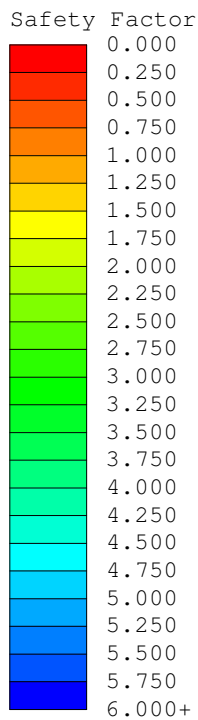
Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 6

Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees





Global Minimums

Method: janbu corrected FS: 1.398190
Center: 436.867, 302.214 Radius: 70.843

Method: spencer FS: 1.373470
Center: 436.867, 302.214 Radius: 70.843

Method: gle/morgenstern-price FS: 1.371780
Center: 436.867, 302.214 Radius: 70.843

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.402984
Factor of Safety, standard deviation: 0.068443
Probability of Failure: 0.000%
Reliability index: 5.88791 (normal distribution)
Reliability index: 6.92063 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.379706
Factor of Safety, standard deviation: 0.066943
Probability of Failure: 0.000%
Reliability index: 5.67210 (normal distribution)
Reliability index: 6.61348 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.379636
Factor of Safety, standard deviation: 0.066984
Probability of Failure: 0.000%
Reliability index: 5.66753 (normal distribution)
Reliability index: 6.60797 (lognormal distribution)

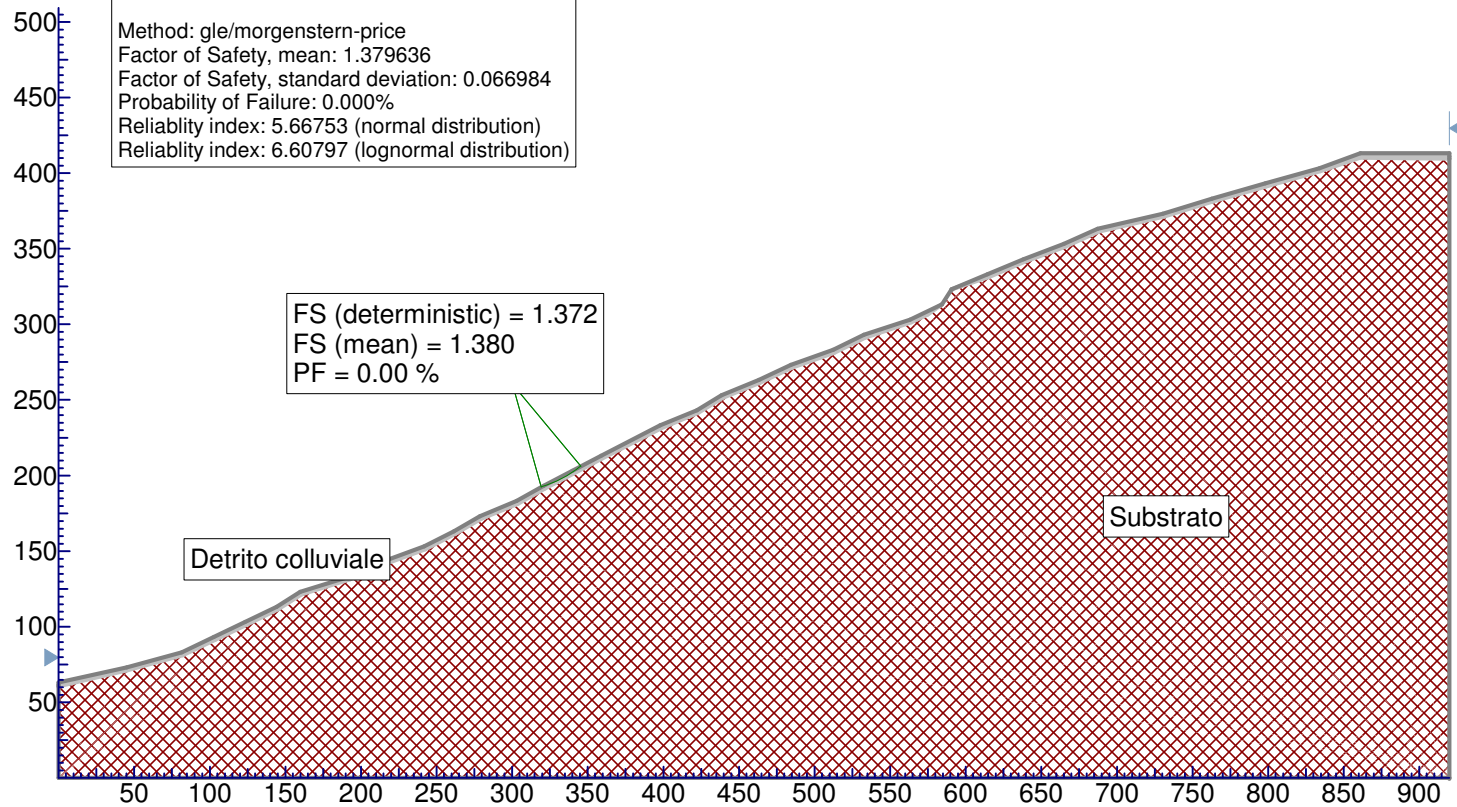
Comerio - PGT

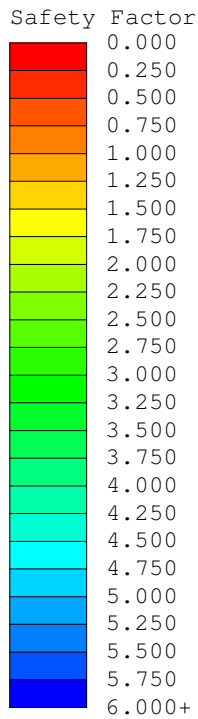
Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 6

Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees
Ru Coefficient = 0.42 - 0.47





Global Minimums

Method: janbu corrected FS: 1.334820
Center: 436.867, 302.214 Radius: 70.843

Method: spencer FS: 1.311190
Center: 436.867, 302.214 Radius: 70.843

Method: gle/morgenstern-price FS: 1.309840
Center: 436.867, 302.214 Radius: 70.843

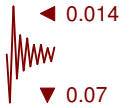
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.337583
Factor of Safety, standard deviation: 0.085384
Probability of Failure: 0.000%
Reliability index: 3.95372 (normal distribution)
Reliability index: 4.52930 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.314194
Factor of Safety, standard deviation: 0.083634
Probability of Failure: 0.000%
Reliability index: 3.75679 (normal distribution)
Reliability index: 4.26590 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.313843
Factor of Safety, standard deviation: 0.083630
Probability of Failure: 0.000%
Reliability index: 3.75274 (normal distribution)
Reliability index: 4.26072 (lognormal distribution)

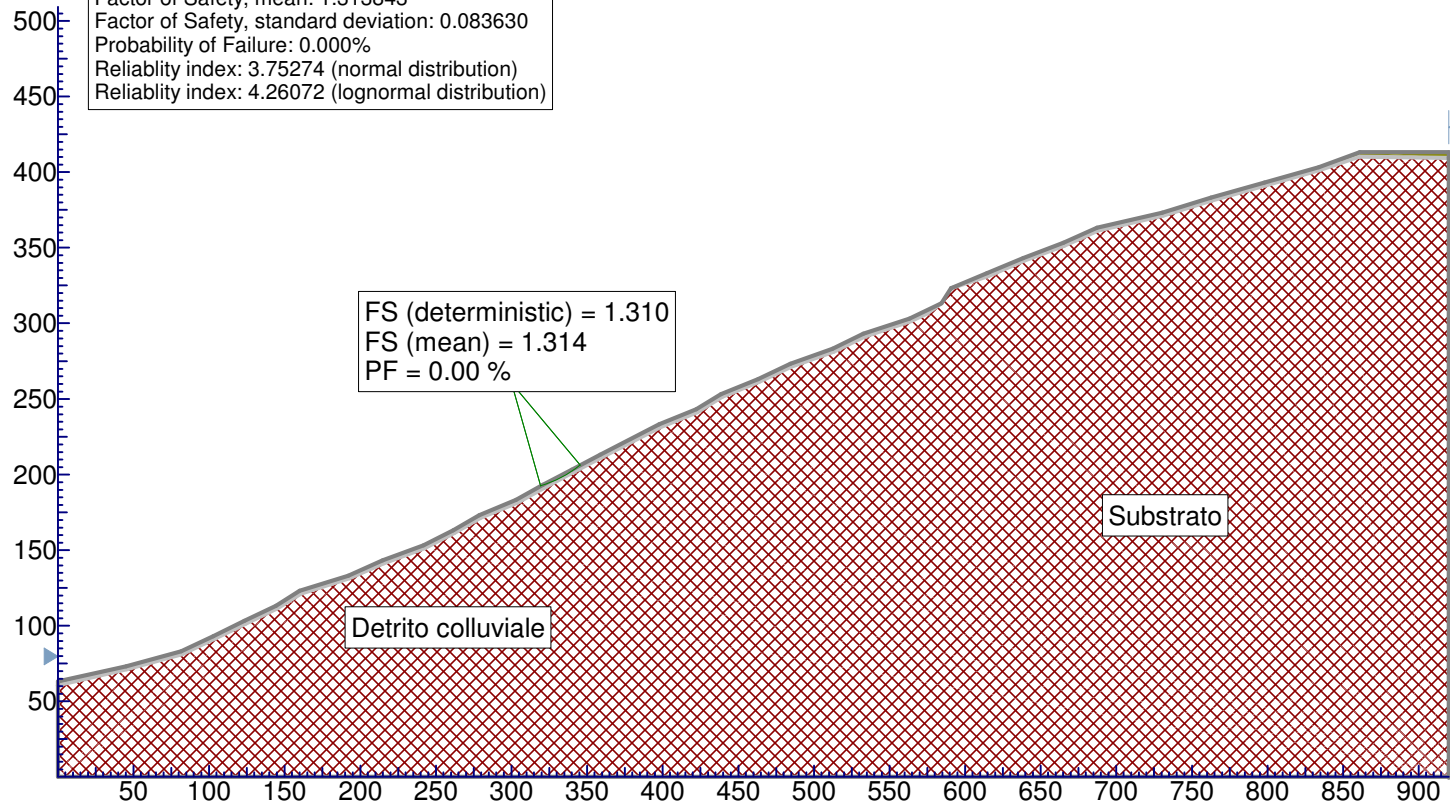
Comerio - PGT Analisi di Stabilità - Condizioni Sismiche Sezione 6

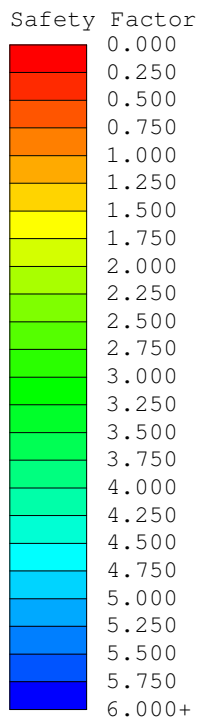


Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees





Material Properties

Material: Substrato

Strength Type: Infinite strength

Unit Weight: 22 kN/m³

Material: Detrito colluviale

Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m³

Cohesion: 3 kPa Friction Angle: 28 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 7

Global Minimums

Method: janbu corrected FS: 1.177860
Center: 404.641, 183.718 Radius: 30.641

Method: spencer FS: 1.161080
Center: 404.641, 183.718 Radius: 30.641

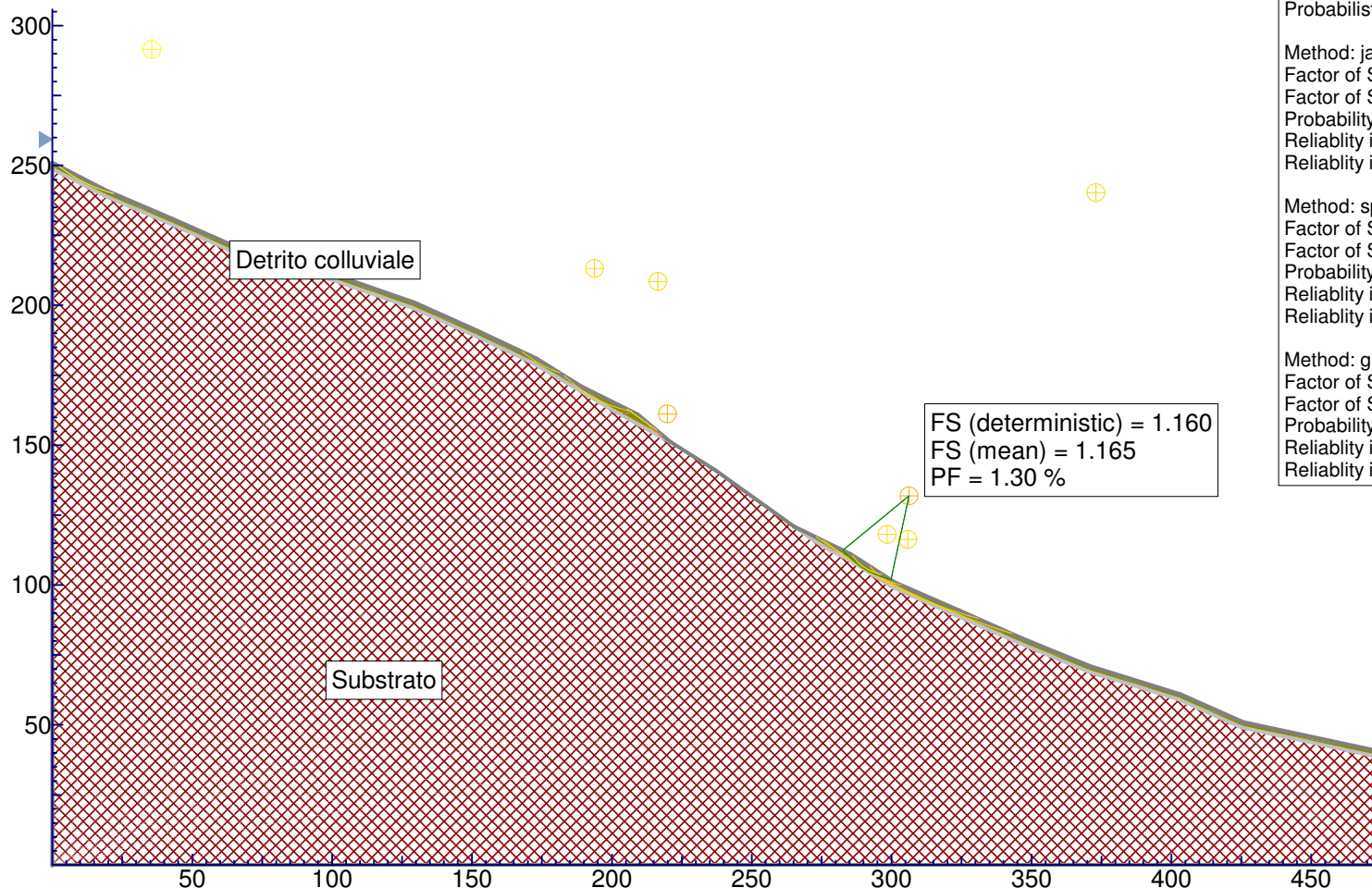
Method: gle/morgenstern-price FS: 1.160330
Center: 404.641, 183.718 Radius: 30.641

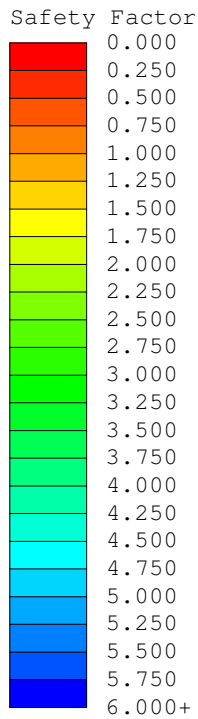
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.180150
Factor of Safety, standard deviation: 0.072031
Probability of Failure: 1.000%
Reliability index: 2.50102 (normal distribution)
Reliability index: 2.68590 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.165954
Factor of Safety, standard deviation: 0.070692
Probability of Failure: 1.200%
Reliability index: 2.34757 (normal distribution)
Reliability index: 2.50444 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.164859
Factor of Safety, standard deviation: 0.070574
Probability of Failure: 1.300%
Reliability index: 2.33598 (normal distribution)
Reliability index: 2.49079 (lognormal distribution)





Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees
Ru Coefficient = 0.42 - 0.43

Comerio - PGT Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 7

Global Minimums

Method: janbu corrected FS: 0.870228
Center: 318.191, 213.021 Radius: 7.807

Method: spencer FS: 0.886653
Center: 318.191, 213.021 Radius: 7.807

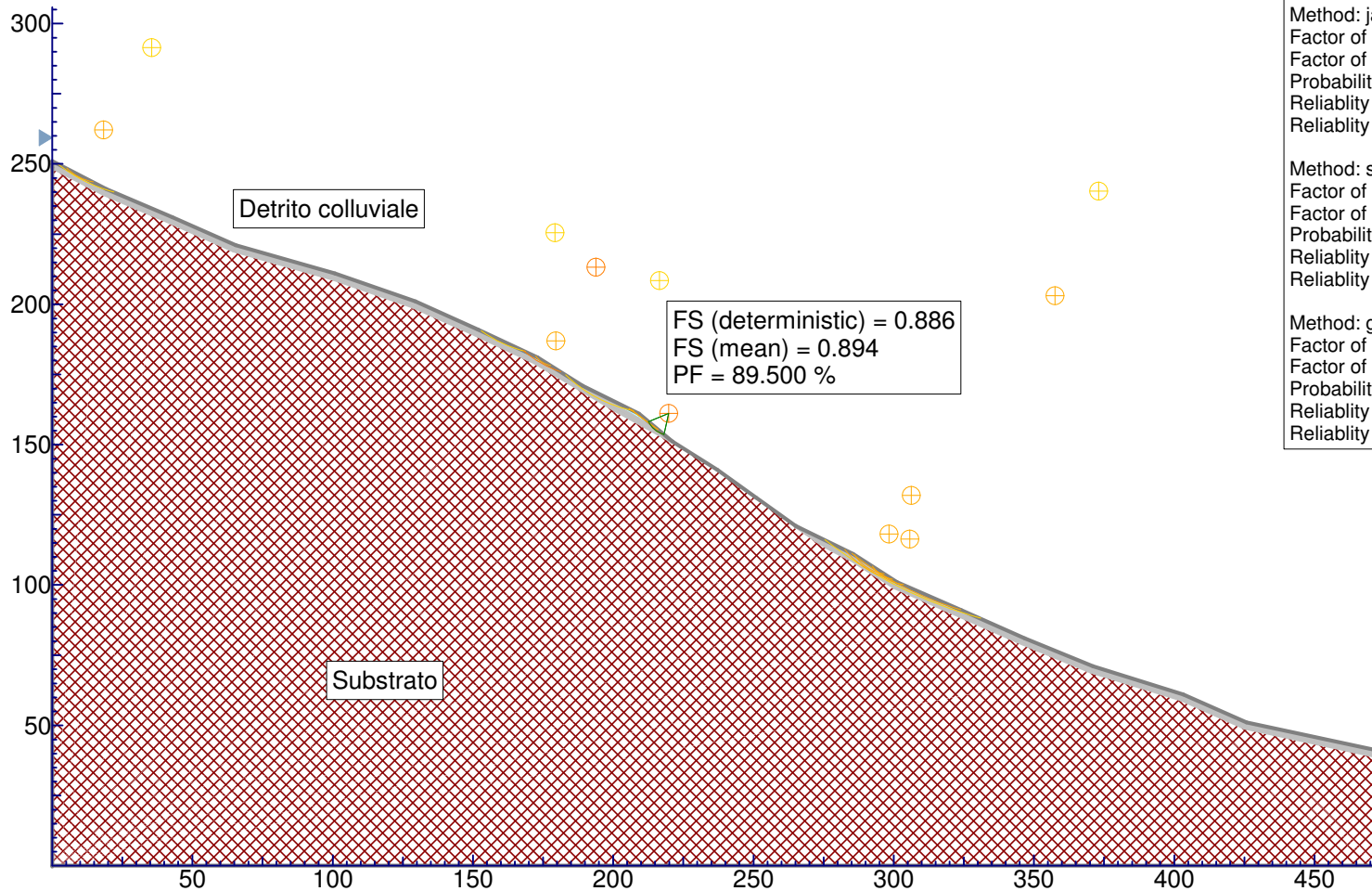
Method: gle/morgenstern-price FS: 0.885663
Center: 318.191, 213.021 Radius: 7.807

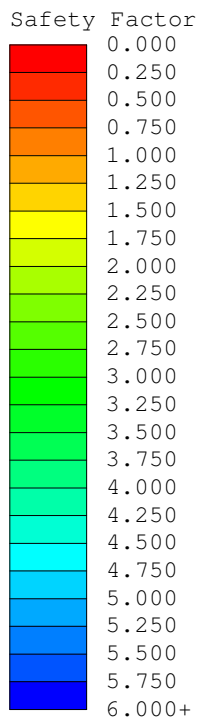
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.879355
Factor of Safety, standard deviation: 0.090753
Probability of Failure: 91.000%
Reliability index: -1.32937 (normal distribution)
Reliability index: -1.30052 (lognormal distribution)

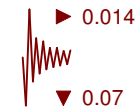
Method: spencer
Factor of Safety, mean: 0.895323
Factor of Safety, standard deviation: 0.083535
Probability of Failure: 89.400%
Reliability index: -1.25310 (normal distribution)
Reliability index: -1.23422 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.894442
Factor of Safety, standard deviation: 0.083551
Probability of Failure: 89.500%
Reliability index: -1.26339 (normal distribution)
Reliability index: -1.24343 (lognormal distribution)





Comerio - PGT
Analisi di Stabilità - Condizioni Sismiche
Sezione 7



Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Global Minimums

Method: janbu corrected FS: 1.129530
Center: 404.641, 183.718 Radius: 30.641

Method: spencer FS: 1.114200
Center: 404.641, 183.718 Radius: 30.641

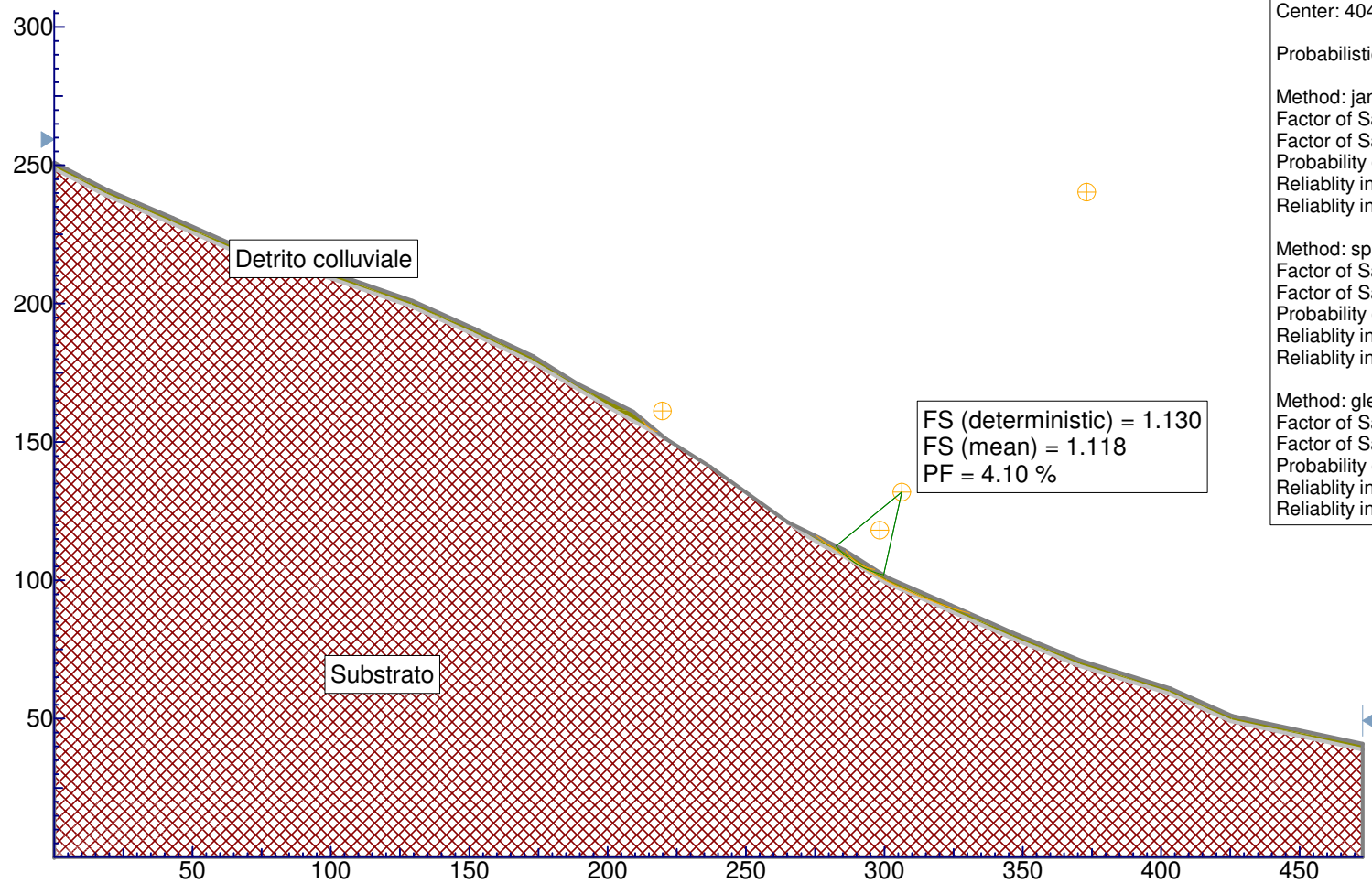
Method: gle/morgenstern-price FS: 1.113490
Center: 404.641, 183.718 Radius: 30.641

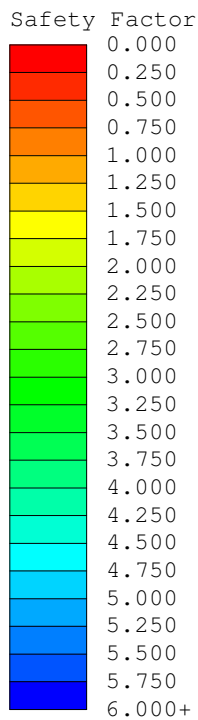
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 1.131618
Factor of Safety, standard deviation: 0.066990
Probability of Failure: 3.300%
Reliability index: 1.96473 (normal distribution)
Reliability index: 2.06096 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 1.120517
Factor of Safety, standard deviation: 0.065802
Probability of Failure: 4.100%
Reliability index: 1.83152 (normal distribution)
Reliability index: 1.91003 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 1.117523
Factor of Safety, standard deviation: 0.065680
Probability of Failure: 4.100%
Reliability index: 1.78934 (normal distribution)
Reliability index: 1.86287 (lognormal distribution)





Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Drenate Sezione 8

Global Minimums

Method: janbu corrected FS: 0.995050
Center: 348.898, 73.867 Radius: 17.426

Method: spencer FS: 0.992776
Center: 348.898, 73.867 Radius: 17.426

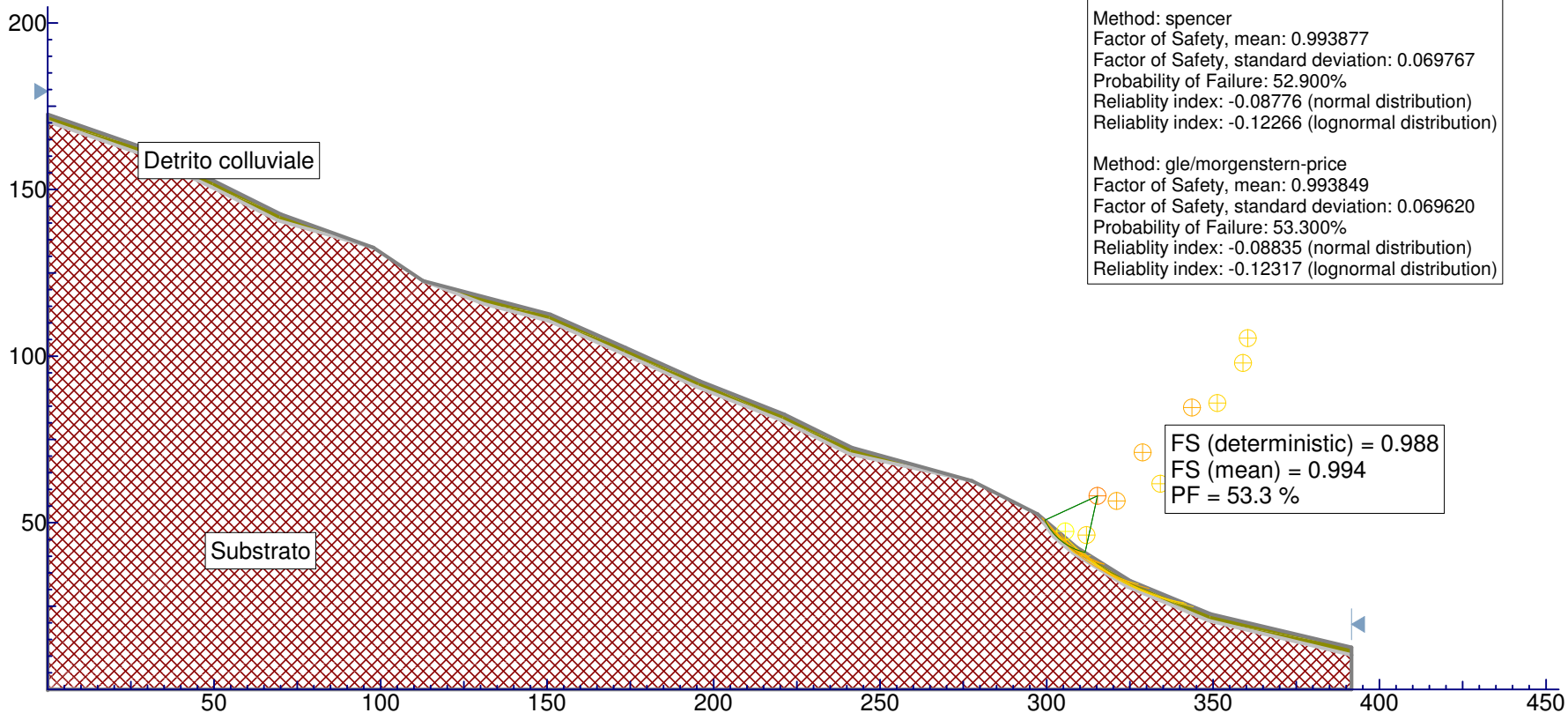
Method: gle/morgenstern-price FS: 0.988191
Center: 348.898, 73.867 Radius: 17.426

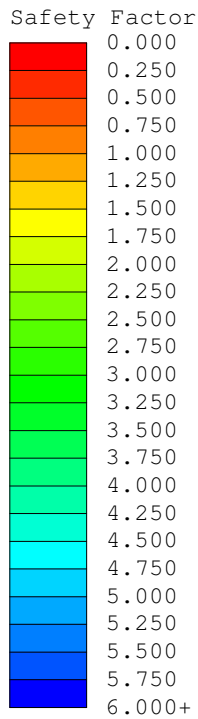
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.997638
Factor of Safety, standard deviation: 0.072298
Probability of Failure: 50.600%
Reliability index: -0.03267 (normal distribution)
Reliability index: -0.06886 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.993877
Factor of Safety, standard deviation: 0.069767
Probability of Failure: 52.900%
Reliability index: -0.08776 (normal distribution)
Reliability index: -0.12266 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.993849
Factor of Safety, standard deviation: 0.069620
Probability of Failure: 53.300%
Reliability index: -0.08835 (normal distribution)
Reliability index: -0.12317 (lognormal distribution)





Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m3

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m3
Cohesion: 3 kPa Friction Angle: 28 degrees
Ru Coefficient = 0.42 - 0.44

Comerio - PGT Analisi di Stabilità - Condizioni di Parziale Saturazione Sezione 8

Global Minimums

Method: janbu corrected FS: 0.952929
Center: 348.898, 73.867 Radius: 17.426

Method: spencer FS: 0.945646
Center: 348.898, 73.867 Radius: 17.426

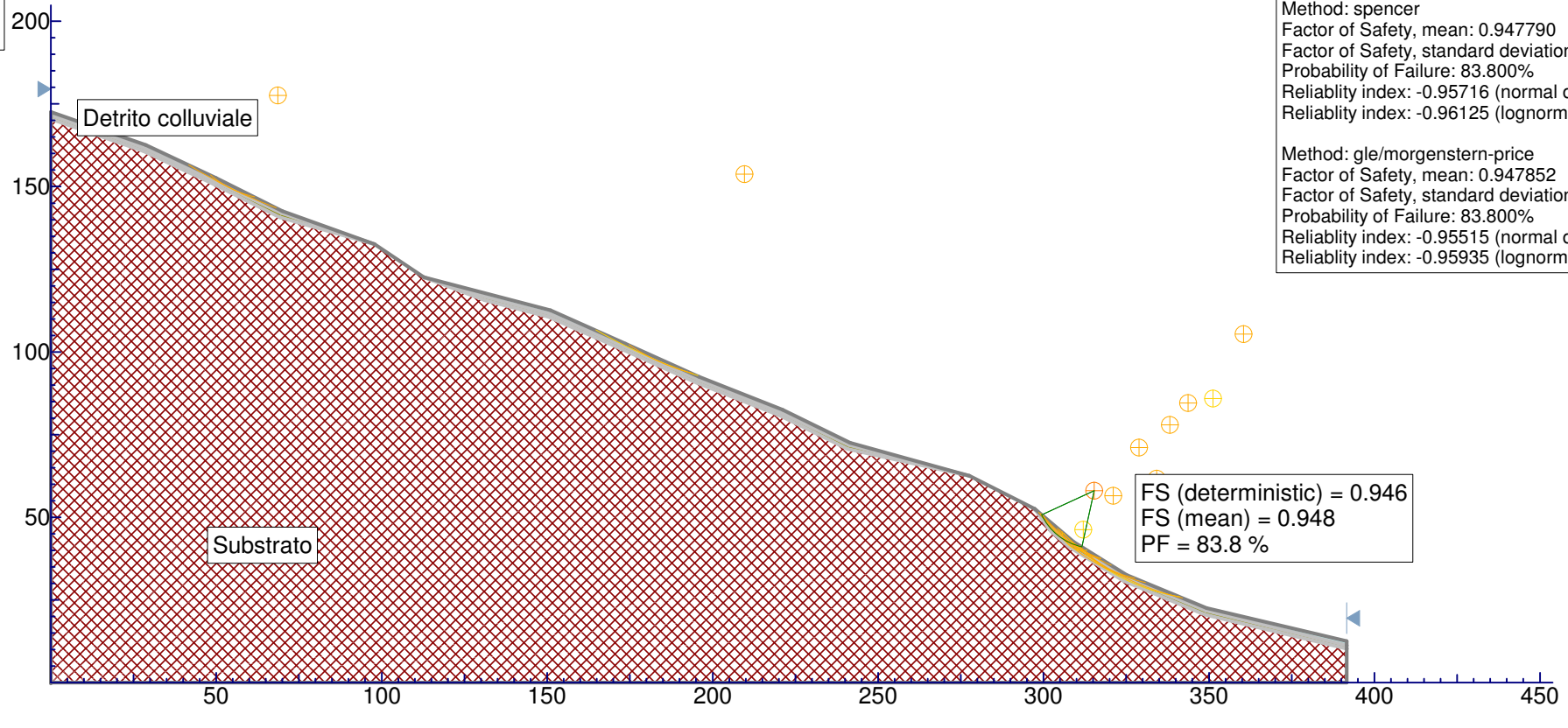
Method: gle/morgenstern-price FS: 0.945795
Center: 348.898, 73.867 Radius: 17.426

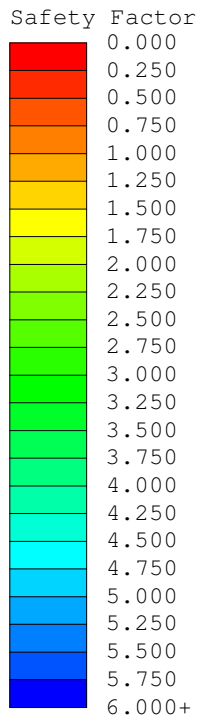
Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.955166
Factor of Safety, standard deviation: 0.058047
Probability of Failure: 78.500%
Reliability index: -0.77237 (normal distribution)
Reliability index: -0.78585 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.947790
Factor of Safety, standard deviation: 0.054546
Probability of Failure: 83.800%
Reliability index: -0.95716 (normal distribution)
Reliability index: -0.96125 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.947852
Factor of Safety, standard deviation: 0.054597
Probability of Failure: 83.800%
Reliability index: -0.95515 (normal distribution)
Reliability index: -0.95935 (lognormal distribution)



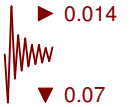


Material Properties

Material: Substrato
Strength Type: Infinite strength
Unit Weight: 22 kN/m³

Material: Detrito colluviale
Strength Type: Mohr-Coulomb Unit Weight: 18 kN/m³
Cohesion: 3 kPa Friction Angle: 28 degrees

Comerio - PGT Analisi di Stabilità - Condizioni Sismiche Sezione 8



Global Minimums

Method: janbu corrected FS: 0.954082
Center: 348.898, 73.867 Radius: 17.426

Method: spencer FS: 0.953742
Center: 348.898, 73.867 Radius: 17.426

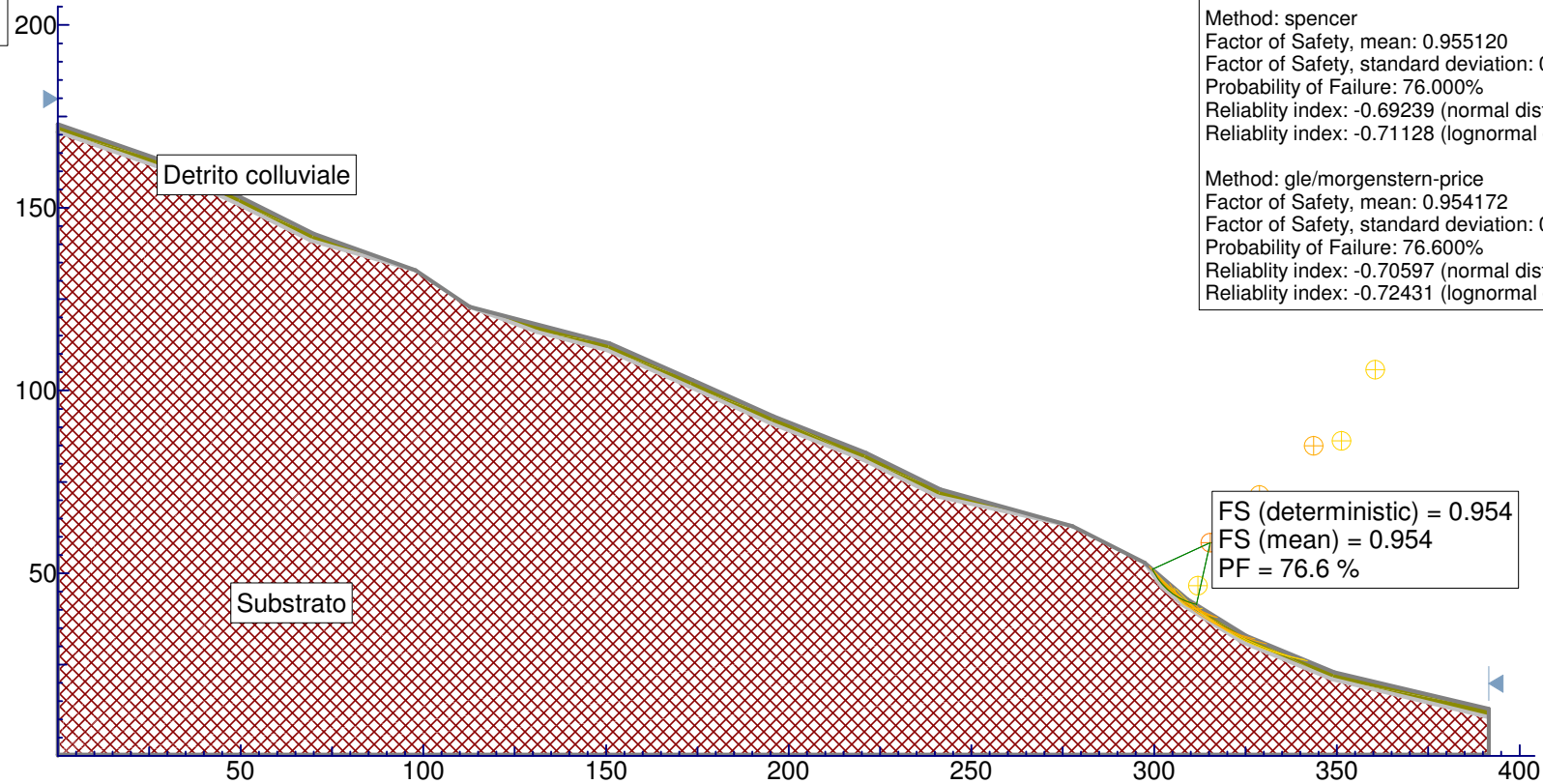
Method: gle/morgenstern-price FS: 0.953605
Center: 348.898, 73.867 Radius: 17.426

Probabilistic Analysis Results (Global Minimum)

Method: janbu corrected
Factor of Safety, mean: 0.956438
Factor of Safety, standard deviation: 0.067072
Probability of Failure: 74.900%
Reliability index: -0.64947 (normal distribution)
Reliability index: -0.67091 (lognormal distribution)

Method: spencer
Factor of Safety, mean: 0.955120
Factor of Safety, standard deviation: 0.064820
Probability of Failure: 76.000%
Reliability index: -0.69239 (normal distribution)
Reliability index: -0.71128 (lognormal distribution)

Method: gle/morgenstern-price
Factor of Safety, mean: 0.954172
Factor of Safety, standard deviation: 0.064916
Probability of Failure: 76.600%
Reliability index: -0.70597 (normal distribution)
Reliability index: -0.72431 (lognormal distribution)



Slide Analysis Information

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left or Left to Right
Units of Measurement: SI Units
Pore Fluid Unit Weight: 9.81 kN/m³
Groundwater Method: Ru Coefficient
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
GLE/Morgenstern-Price with interslice force function: Half Sine
Janbu corrected
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

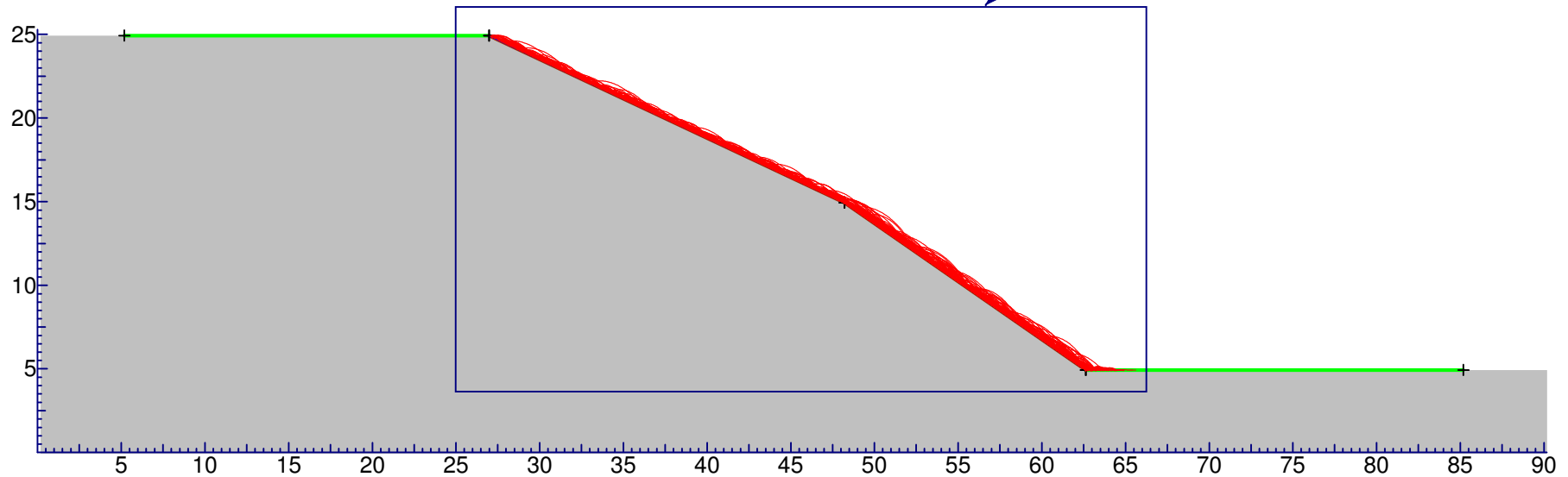
Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material name: Roccia
Coefficient of Normal Restitution (RN): mean=0.6 std dev=0.09
Coefficient of Tangential Restitution (RT): mean=0.75 std dev=0.09
Friction Angle: mean=44 std dev=2
Roughness: std dev=0

Material name: Detrito
Coefficient of Normal Restitution (RN): mean=0.45 std dev=0.03
Coefficient of Tangential Restitution (RT): mean=0.66 std dev=0.03
Friction Angle: mean=40 std dev=0
Roughness: std dev=0

Comerio - PGT
Analisi di stabilità - Crolli in roccia
Sezione 9

Area in rosso soggetta al transito e arresto
dei blocchi staccatisi dalla parete

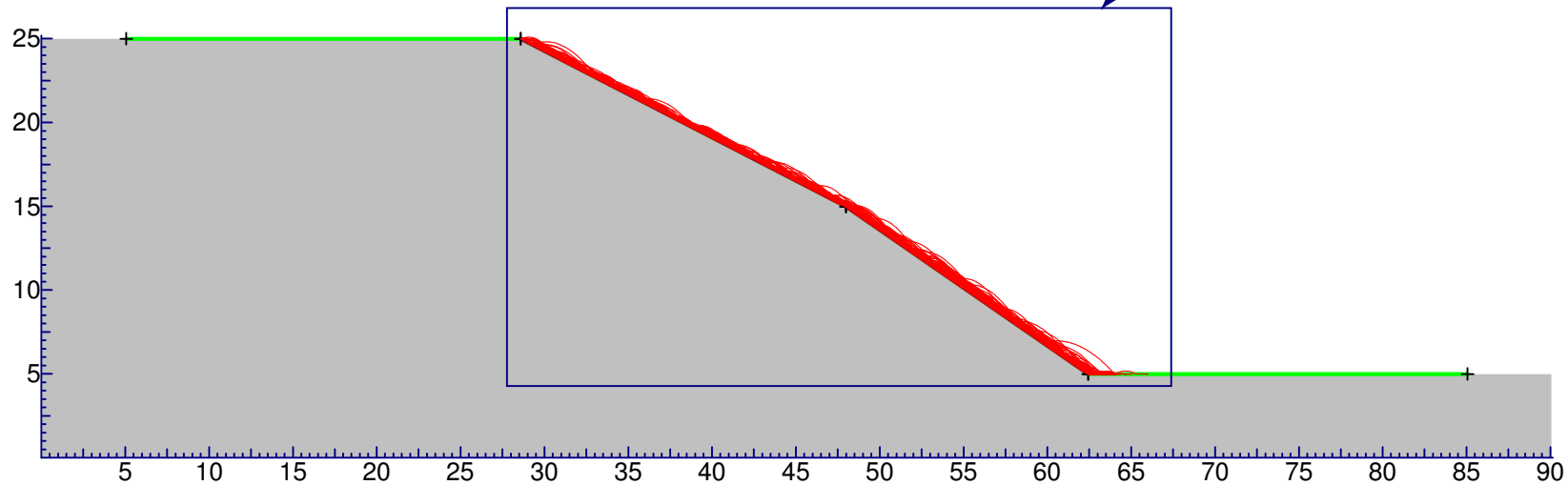


Comerio - PGT
Analisi di stabilità - Crolli in roccia
Sezione 10

Material name: Roccia
Coefficient of Normal Restitution (RN): mean=0.6 std dev=0.09
Coefficient of Tangential Restitution (RT): mean=0.75 std dev=0.09
Friction Angle: mean=44 std dev=2
Roughness: std dev=0

Material name: Detrito
Coefficient of Normal Restitution (RN): mean=0.45 std dev=0.03
Coefficient of Tangential Restitution (RT): mean=0.66 std dev=0.03
Friction Angle: mean=40 std dev=0
Roughness: std dev=0

Area in rosso soggetta a transito e arresto
dei blocchi staccatisi dalla parete



RocFall Analysis Information

Project Settings

Units: Metric

Friction angle: Use friction angle specified in material editor

Coefficient of Normal Restitution (RN) scaled based on rock velocity, According to:

$Rn(scaled) = Rn / (1 + (V_{rock}/K)^2)$, where $K=9.144$

Minimum Velocity=0.1

Angular Velocity of the rocks CONSIDERED

Standard Deviations NOT USED when generating slope vertices

Random-number generation: Pseudo-random with seed=190274

Slope

Segment 1, Material: Detrito2

Start Point: X mean=30 std dev=0 Y mean=20 std dev=0

End Point: X mean=51.7923 std dev=0 Y mean=20 std dev=0

Segment 2, Material: Roccia

Start Point: X mean=51.7923 std dev=0 Y mean=20 std dev=0

End Point: X mean=73.0228 std dev=0 Y mean=10 std dev=0

Segment 3, Material: Roccia

Start Point: X mean=73.0228 std dev=0 Y mean=10 std dev=0

End Point: X mean=87.4402 std dev=0 Y mean=0 std dev=0

Segment 4, Material: Detrito2

Start Point: X mean=87.4402 std dev=0 Y mean=0 std dev=0

End Point: X mean=110 std dev=0 Y mean=0 std dev=0

Materials

Material name: Roccia

Coefficient of Normal Restitution (RN): mean=0.6 std dev=0.09

Coefficient of Tangential Restitution (RT): mean=0.75 std dev=0.09

Friction Angle: mean=44 std dev=2

Roughness: std dev=0

Material name: Detrito2

Coefficient of Normal Restitution (RN): mean=0.45 std dev=0.03

Coefficient of Tangential Restitution (RT): mean=0.66 std dev=0.03

Friction Angle: mean=40 std dev=0

Roughness: std dev=0

Seeders

Line Seeder

Horizontal Velocity: mean=2, std dev=1

Vertical Velocity: mean=1, std dev=0.3

Mass: mean=100, std dev=0

Angular Velocity: mean=0, std dev=0

Location (Vertex 1): 51.7923, 20

Location (Vertex 2): 73.0228, 10

Location (Vertex 3): 87.4402, 2.57319e-006