

ALLEGATO 8
VERIFICHE DI STABILITÀ INTERFERENZA 16 - Nord-Ovest
SEZIONE A-A' - RELAZIONI DI CALCOLO

VERIFICA DI STABILITÀ PRE-OPERAM IN ASSENZA DI FALDA ACQUIFERA

Analisi di stabilità dei pendii con BISHOP

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

Maglia dei Centri

Ascissa vertice sinistro inferiore xi	-58.16 m
Ordinata vertice sinistro inferiore yi	285.1 m
Ascissa vertice destro superiore xs	48.22 m
Ordinata vertice destro superiore ys	359.43 m
Passo di ricerca	10.0
Numero di celle lungo x	10.0
Numero di celle lungo y	10.0

Coefficienti sismici [N.T.C.] 2018

Dati generali

Descrizione:	
Latitudine:	41.85
Longitudine:	14.91
Tipo di costruzione:	2 - Opere ordinarie
Classe d'uso:	Classe IV
Vita nominale:	50.0 [anni]
Vita di riferimento:	100.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T2

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s ²]	F0 [-]	TC* [sec]
S.L.O.	60.0	0.71	2.47	0.32
S.L.D.	101.0	0.9	2.51	0.32
S.L.V.	949.0	2.27	2.48	0.36
S.L.C.	1950.0	2.95	2.47	0.36

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii

S.L. Stato limite	amax [m/s ²]	beta [-]	kh [-]	kv [sec]
S.L.O.	1.278	0.2	0.0261	0.013
S.L.D.	1.62	0.2	0.033	0.0165
S.L.V.	3.6925	0.28	0.1054	0.0527
S.L.C.	4.4397	0.28	0.1268	0.0634

Coefficiente azione sismica orizzontale 0.1054
 Coefficiente azione sismica verticale 0.0527

Vertici profilo

N	X m	y m
1	0.0	104.8
2	6.12	105.0
3	20.25	110.0
4	35.41	115.0
5	46.48	120.0
6	61.0	125.0
7	81.33	130.0
8	103.25	135.0
9	126.08	140.0
10	141.58	145.0
11	147.81	146.0
12	165.29	150.0
13	177.91	151.0
14	251.1	151.0

Vertici strato1

N	X m	y m
1	0.0	104.8
2	6.12	105.0
3	6.12	105.0
4	10.32	105.2
5	13.6	105.91
6	20.79	107.97
7	34.54	113.0
8	47.88	117.82
9	61.22	122.33
10	81.33	127.6
11	105.66	133.62
12	127.21	138.96
13	141.68	143.27
14	145.27	144.5
15	147.81	146.0
16	165.29	150.0
17	177.91	151.0
18	251.1	151.0

Vertici strato2

N	X m	y m
1	0.0	104.8
2	6.12	105.0
3	6.12	105.0
4	10.32	105.2
5	13.6	105.91
6	20.79	107.97
7	34.54	113.0
8	47.88	117.82
9	61.22	122.33
10	81.33	127.6
11	105.66	133.62

12	127.21	138.96
13	141.68	143.27
14	145.27	144.5
15	145.27	144.5
16	167.53	145.87
17	184.81	146.14
18	251.1	146.0

Stratigrafia

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

Strato	c (kg/cm ²)	Fi (°)	G (Kg/m ³)	Gs (Kg/m ³)	Litologia
1	0.10	24.3	2029	2039	
2	0	24	1850	1930	
3	0.42	15.7	2009	2060	

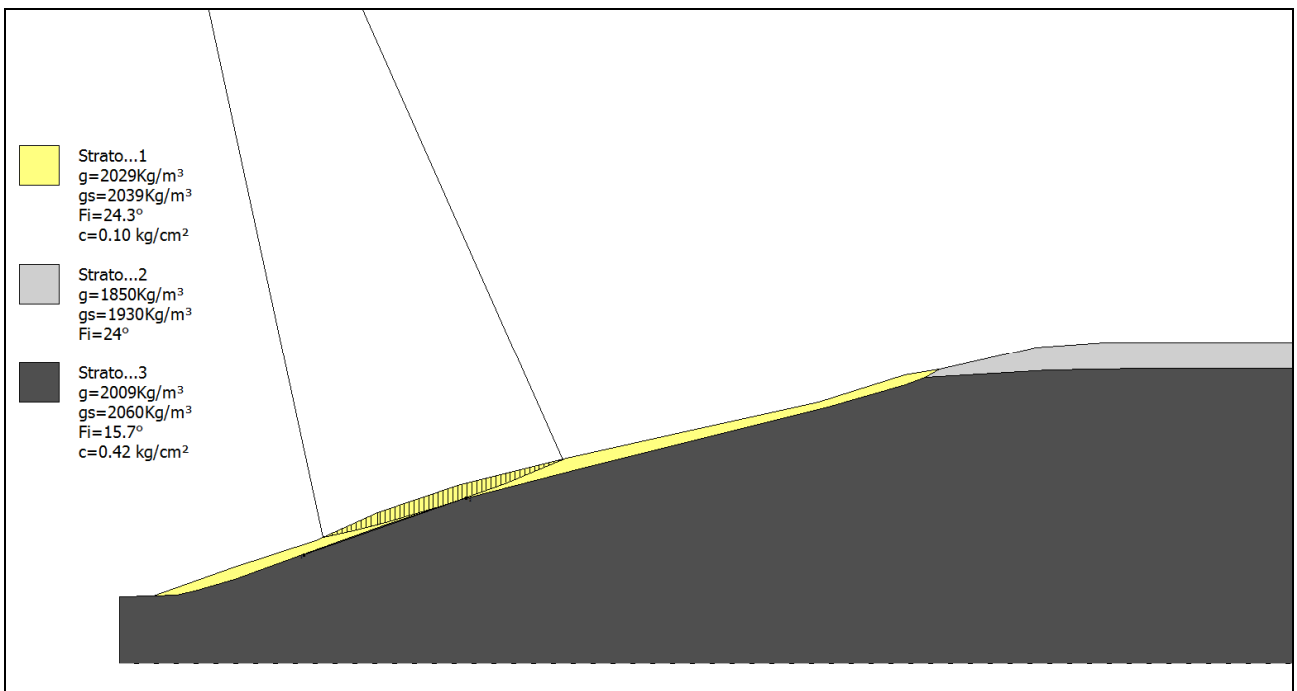
Risultati analisi pendio [A2+M2+R2]

Fs minimo individuato	1.35
Ascissa centro superficie	-10.29 m
Ordinata centro superficie	333.41 m
Raggio superficie	222.86 m

Analisi dei conci. Superficie...xc = -10.286 yc = 333.415 Rc = 222.857 Fs=1.3454

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm ²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	0.87	12.3	0.89	179.87	18.96	9.48	0.08	19.9	0.0	65.4	545.9
2	0.87	12.5	0.89	534.88	56.38	28.19	0.08	19.9	0.0	406.5	638.0
3	0.87	12.7	0.89	883.44	93.11	46.56	0.08	19.9	0.0	741.2	728.3
4	0.87	13.0	0.89	1225.61	129.18	64.59	0.08	19.9	0.0	1069.7	817.0
5	0.87	13.2	0.89	1561.33	164.56	82.28	0.08	19.9	0.0	1391.9	903.9
6	0.87	13.4	0.89	1890.59	199.27	99.63	0.08	19.9	0.0	1707.7	989.2
7	0.87	13.6	0.89	2213.38	233.29	116.65	0.08	19.9	0.0	2017.3	1072.9
8	0.87	13.9	0.89	2529.68	266.63	133.31	0.08	19.9	0.0	2320.5	1154.8
9	0.87	14.1	0.9	2839.48	299.28	149.64	0.08	19.9	0.0	2617.5	1235.1
10	0.87	14.3	0.9	3142.72	331.24	165.62	0.08	19.9	0.0	2908.1	1313.6
11	1.17	14.6	1.21	4703.85	495.79	247.89	0.08	19.9	0.0	4368.0	1891.7
12	0.57	14.8	0.59	2430.39	256.16	128.08	0.08	19.9	0.0	2261.2	955.4
13	0.87	15.0	0.9	3824.18	403.07	201.53	0.08	19.9	0.0	3559.6	1490.2
14	0.87	15.3	0.9	3937.17	414.98	207.49	0.08	19.9	0.0	3666.6	1519.5
15	0.87	15.5	0.9	4043.53	426.19	213.09	0.08	19.9	0.0	3767.2	1547.1
16	0.87	15.7	0.9	4143.21	436.69	218.35	0.08	19.9	0.0	3861.5	1573.0
17	0.87	15.9	0.9	4236.24	446.5	223.25	0.08	19.9	0.0	3949.4	1597.3
18	0.87	16.2	0.9	4322.53	455.59	227.8	0.08	19.9	0.0	4030.8	1619.8
19	0.87	16.4	0.91	4402.1	463.98	231.99	0.08	19.9	0.0	4105.9	1640.5
20	0.87	16.6	0.91	4474.98	471.66	235.83	0.08	19.9	0.0	4174.5	1659.6
21	0.87	16.9	0.91	4541.0	478.62	239.31	0.08	19.9	0.0	4236.6	1677.0
22	0.87	17.1	0.91	4600.25	484.87	242.43	0.08	19.9	0.0	4292.2	1692.6
23	0.87	17.3	0.91	4652.67	490.39	245.2	0.08	19.9	0.0	4341.3	1706.4
24	0.87	17.6	0.91	4698.24	495.19	247.6	0.08	19.9	0.0	4383.9	1718.6
25	0.87	17.8	0.91	4736.92	499.27	249.64	0.08	19.9	0.0	4419.9	1728.9
26	0.87	18.0	0.91	4768.68	502.62	251.31	0.08	19.9	0.0	4449.3	1737.5
27	0.87	18.3	0.91	4793.56	505.24	252.62	0.08	19.9	0.0	4472.1	1744.4
28	0.93	18.5	0.98	5136.79	541.42	270.71	0.08	19.9	0.0	4791.6	1867.7
29	0.81	18.8	0.86	4431.43	467.07	233.54	0.08	19.9	0.0	4130.7	1617.4
30	0.87	19.0	0.92	4610.35	485.93	242.97	0.08	19.9	0.0	4291.3	1698.1

31	0.87	19.2	0.92	4456.54	469.72	234.86	0.08	19.9	0.0	4141.3	1658.6
32	0.87	19.5	0.92	4295.61	452.76	226.38	0.08	19.9	0.0	3984.4	1617.3
33	0.87	19.7	0.92	4127.56	435.05	217.52	0.08	19.9	0.0	3820.5	1574.1
34	0.87	19.9	0.92	3952.39	416.58	208.29	0.08	19.9	0.0	3649.7	1529.1
35	0.87	20.2	0.93	3770.05	397.36	198.68	0.08	19.9	0.0	3471.9	1482.2
36	0.87	20.4	0.93	3580.48	377.38	188.69	0.08	19.9	0.0	3287.0	1433.4
37	0.87	20.7	0.93	3383.69	356.64	178.32	0.08	19.9	0.0	3094.9	1382.7
38	0.87	20.9	0.93	3179.62	335.13	167.57	0.08	19.9	0.0	2895.7	1330.0
39	0.87	21.1	0.93	2968.24	312.85	156.43	0.08	19.9	0.0	2689.2	1275.5
40	0.87	21.4	0.93	2749.53	289.8	144.9	0.08	19.9	0.0	2475.5	1219.0
41	0.87	21.6	0.93	2523.41	265.97	132.98	0.08	19.9	0.0	2254.4	1160.6
42	0.87	21.9	0.94	2289.87	241.35	120.68	0.08	19.9	0.0	2025.9	1100.2
43	0.87	22.1	0.94	2048.91	215.96	107.98	0.08	19.9	0.0	1790.0	1037.8
44	0.87	22.3	0.94	1800.43	189.77	94.88	0.08	19.9	0.0	1546.6	973.4
45	0.87	22.6	0.94	1544.44	162.78	81.39	0.08	19.9	0.0	1295.5	907.0
46	0.87	22.8	0.94	1280.85	135.0	67.5	0.08	19.9	0.0	1036.8	838.5
47	0.87	23.1	0.94	1009.68	106.42	53.21	0.08	19.9	0.0	770.4	768.0
48	0.87	23.3	0.95	730.81	77.03	38.51	0.08	19.9	0.0	496.2	695.4
49	0.87	23.5	0.95	444.29	46.83	23.41	0.08	19.9	0.0	214.2	620.7
50	0.87	23.8	0.95	150.03	15.81	7.91	0.08	19.9	0.0	-75.8	543.9



VERIFICA DI STABILITÀ PRE-OPERAM IN PRESENZA DI FALDA ACQUIFERA

Analisi di stabilità dei pendii con BISHOP

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

Maglia dei Centri

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Ordinata vertice sinistro inferiore yi	285.1 m
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Ordinata vertice destro superiore ys	359.43 m
Passo di ricerca	10.0
Numero di celle lungo x	10.0
Numero di celle lungo y	10.0

Coefficienti sismici [N.T.C.] 2018

Dati generali

Descrizione:	
Latitudine:	41.85
Longitudine:	14.91
Tipo di costruzione:	2 - Opere ordinarie
Classe d'uso:	Classe IV
Vita nominale:	50.0 [anni]
Vita di riferimento:	100.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T2

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s ²]	F0 [-]	TC* [sec]
S.L.O.	60.0	0.71	2.47	0.32
S.L.D.	101.0	0.9	2.51	0.32
S.L.V.	949.0	2.27	2.48	0.36
S.L.C.	1950.0	2.95	2.47	0.36

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii

S.L. Stato limite	amax [m/s ²]	beta [-]	kh [-]	kv [sec]
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S.L.V.	3.6925	0.28	0.1054	0.0527
S.L.C.	4.4397	0.28	0.1268	0.0634

Coefficiente azione sismica orizzontale	0.1054
Coefficiente azione sismica verticale	0.0527

Vertici profilo

N	X m	y m
1	0.0	104.8
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8	103.25	135.0
9	126.08	140.0
10	141.58	145.0
11	147.81	146.0
12	165.29	150.0
13	177.91	151.0
14	251.1	151.0

Falda

Nr.	X m	y m
1	0.0	104.8
2	6.12	105.0
3	20.25	110.0
4	35.41	115.0
5	46.48	120.0
6	61.0	125.0
7	81.33	130.0
8	103.25	135.0
9	126.08	140.0
10	141.58	145.0
11	147.81	146.0
12	165.29	150.0
13	177.91	151.0
14	251.1	151.0

Vertici strato1

N	X m	y m
1	0.0	104.8
2	6.12	105.0
3	6.12	105.0
4	10.32	105.2
5	13.6	105.91
6	20.79	107.97
7	34.54	113.0
8	47.88	117.82
9	61.22	122.33
10	81.33	127.6
11	105.66	133.62
12	127.21	138.96
13	141.68	143.27
14	145.27	144.5
15	147.81	146.0
16	165.29	150.0
17	177.91	151.0
18	251.1	151.0

Vertici strato2

N	X m	y m
1	0.0	104.8
2	6.12	105.0
3	6.12	105.0
4	10.32	105.2
5	13.6	105.91
6	20.79	107.97
7	34.54	113.0
8	47.88	117.82
9	61.22	122.33
10	81.33	127.6
11	105.66	133.62
12	127.21	138.96
13	141.68	143.27
14	145.27	144.5
15	145.27	144.5
16	167.53	145.87
17	184.81	146.14
18	251.1	146.0

Stratigrafia

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

Strato	c (kg/cm ²)	Fi (°)	G (Kg/m ³)	Gs (Kg/m ³)	Litologia
1	0.10	24.3	2029	2039	
2	0	24	1850	1930	
3	0.42	15.7	2009	2060	

Risultati analisi pendio [A2+M2+R2]

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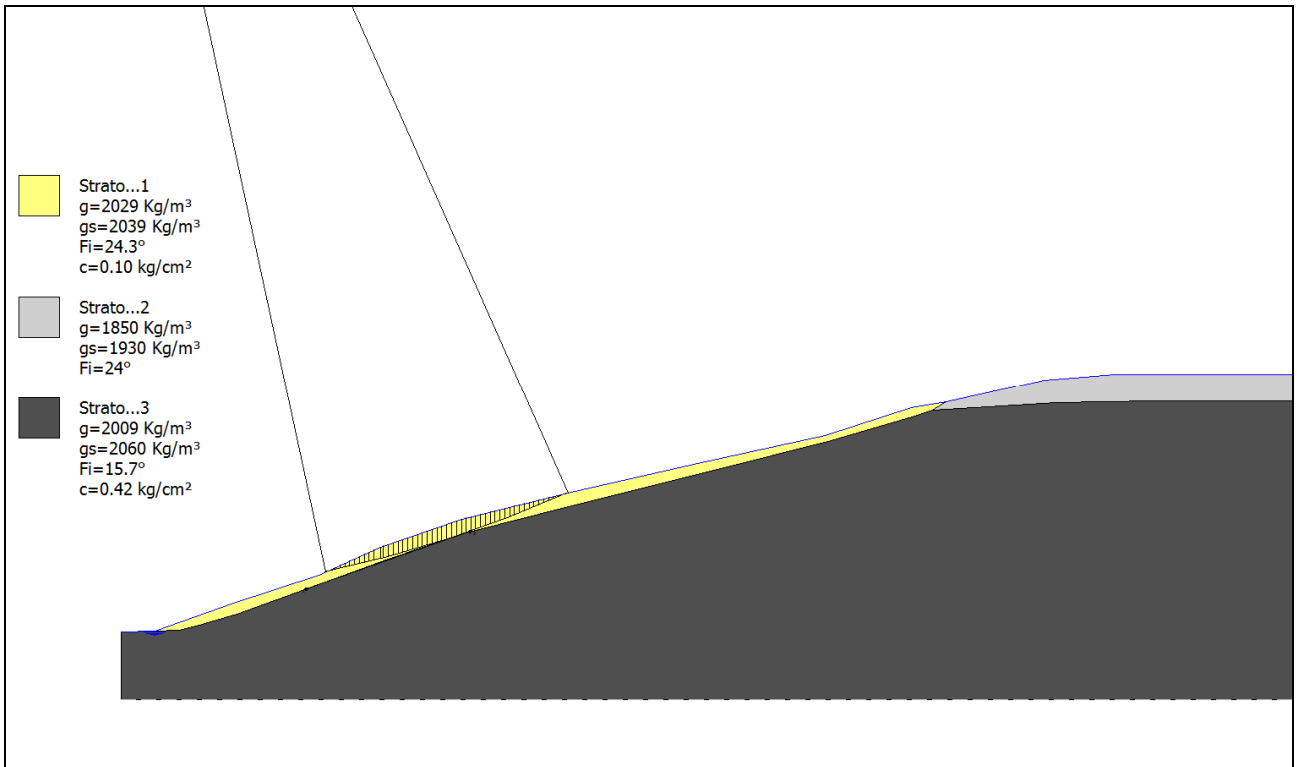
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Fs minimo individuato                0.91
Ascissa centro superficie              -10.29 m
Ordinata centro superficie             333.41 m
Raggio superficie                      222.86 m
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B: Larghezza del concio; Alfa: Angolo di inclinazione della base del concio; Li: Lunghezza della base del concio; Wi: Peso del concio ; Ui: Forze derivanti dalle pressioni neutre; Ni: forze agenti normalmente alla direzione di scivolamento; Ti: forze agenti parallelamente alla superficie di scivolamento; Fi: Angolo di attrito; c: coesione.

Analisi dei concii. Superficie...xc = -10.286 yc = 333.415 Rc = 222.857 Fs=0.9053

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm ²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	0.87	12.3	0.89	180.76	19.05	9.53	0.08	19.9	102.1	-70.4	757.2
2	0.87	12.5	0.89	537.51	56.65	28.33	0.08	19.9	303.6	97.7	824.9
3	0.87	12.7	0.89	887.79	93.57	46.79	0.08	19.9	501.4	262.5	891.4
4	0.87	13.0	0.89	1231.65	129.82	64.91	0.08	19.9	695.7	424.0	956.5
5	0.87	13.2	0.89	1569.03	165.38	82.69	0.08	19.9	886.2	582.2	1020.4
6	0.87	13.4	0.89	968.12	102.04	51.02	0.08	19.9	1073.1	737.1	1082.9
7	0.87	13.6	0.89	2224.29	234.44	117.22	0.08	19.9	1256.3	888.7	1144.1
8	0.87	13.9	0.89	2542.15	267.94	133.97	0.08	19.9	1435.9	1037.0	1204.1
9	0.87	14.1	0.9	2853.48	300.76	150.38	0.08	19.9	1611.7	1182.0	1262.8
10	0.87	14.3	0.9	3158.21	332.88	166.44	0.08	19.9	1783.8	1323.8	1320.1
11	1.17	14.6	1.21	4727.03	498.23	249.11	0.08	19.9	1981.1	2002.6	1867.6

12	0.57	14.8	0.59	2442.37	257.43	128.71	0.08	19.9	2114.8	1040.4	932.9
13	0.87	15.0	0.9	3843.03	405.06	202.53	0.08	19.9	2170.6	1638.9	1448.4
14	0.87	15.3	0.9	3956.57	417.02	208.51	0.08	19.9	2234.7	1689.1	1469.3
15	0.87	15.5	0.9	4063.46	428.29	214.14	0.08	19.9	2295.1	1736.1	1488.9
16	0.87	15.7	0.9	4163.63	438.85	219.42	0.08	19.9	2351.7	1779.9	1507.3
17	0.87	15.9	0.9	4257.12	448.7	224.35	0.08	19.9	2404.5	1820.5	1524.4
18	0.87	16.2	0.9	4343.84	457.84	228.92	0.08	19.9	2453.5	1857.8	1540.2
19	0.87	16.4	0.91	4423.8	466.27	233.13	0.08	19.9	2498.6	1892.0	1554.8
20	0.87	16.6	0.91	4497.03	473.99	236.99	0.08	19.9	2540.0	1922.9	1568.1
21	0.87	16.9	0.91	4563.38	480.98	240.49	0.08	19.9	2577.5	1950.6	1580.1
22	0.87	17.1	0.91	4622.92	487.26	243.63	0.08	19.9	2611.1	1975.0	1590.9
23	0.87	17.3	0.91	4675.6	492.81	246.4	0.08	19.9	2640.9	1996.2	1600.3
24	0.87	17.6	0.91	4721.4	497.64	248.82	0.08	19.9	2666.7	2014.1	1608.5
25	0.87	17.8	0.91	4760.26	501.73	250.87	0.08	19.9	2688.7	2028.7	1615.4
26	0.87	18.0	0.91	4792.18	505.1	252.55	0.08	19.9	2706.7	2040.1	1621.0
27	0.87	18.3	0.91	4817.18	507.73	253.87	0.08	19.9	2720.8	2048.1	1625.3
28	0.93	18.5	0.98	5162.11	544.09	272.04	0.08	19.9	2731.2	2191.6	1738.3
29	0.81	18.8	0.86	4453.27	469.38	234.69	0.08	19.9	2697.4	1884.5	1507.5
30	0.87	19.0	0.92	4633.08	488.33	244.16	0.08	19.9	2616.8	1949.7	1589.4
31	0.87	19.2	0.92	4478.5	472.03	236.02	0.08	19.9	2529.5	1872.8	1559.9
32	0.87	19.5	0.92	4316.79	454.99	227.49	0.08	19.9	2438.2	1792.6	1529.1
33	0.87	19.7	0.92	4147.91	437.19	218.59	0.08	19.9	2342.8	1709.0	1496.9
34	0.87	19.9	0.92	3971.87	418.64	209.32	0.08	19.9	2243.4	1622.1	1463.4
35	0.87	20.2	0.93	3788.63	399.32	199.66	0.08	19.9	2139.9	1531.8	1428.6
36	0.87	20.4	0.93	3598.13	379.24	189.62	0.08	19.9	2032.3	1438.1	1392.5
37	0.87	20.7	0.93	3400.36	358.4	179.2	0.08	19.9	1920.6	1341.0	1355.0
38	0.87	20.9	0.93	3195.29	336.78	168.39	0.08	19.9	1804.8	1240.4	1316.2
39	0.87	21.1	0.93	2982.87	314.39	157.2	0.08	19.9	1684.8	1136.4	1276.0
40	0.87	21.4	0.93	2763.08	291.23	145.61	0.08	19.9	1560.6	1028.9	1234.5
41	0.87	21.6	0.93	2535.84	267.28	133.64	0.08	19.9	1432.3	917.9	1191.5
42	0.87	21.9	0.94	2301.16	242.54	121.27	0.08	19.9	1299.7	803.3	1147.2
43	0.87	22.1	0.94	2059.01	217.02	108.51	0.08	19.9	1162.9	685.3	1101.5
44	0.87	22.3	0.94	1809.3	190.7	95.35	0.08	19.9	1021.9	563.6	1054.4
45	0.87	22.6	0.94	1552.05	163.59	81.79	0.08	19.9	876.6	438.3	1005.9
46	0.87	22.8	0.94	1287.16	135.67	67.83	0.08	19.9	727.0	309.4	955.9
47	0.87	23.1	0.94	1014.65	106.94	53.47	0.08	19.9	573.1	176.9	904.5
48	0.87	23.3	0.95	734.41	77.41	38.7	0.08	19.9	414.8	40.7	851.7
49	0.87	23.5	0.95	446.48	47.06	23.53	0.08	19.9	252.2	-99.3	797.4
50	0.87	23.8	0.95	150.77	15.89	7.95	0.08	19.9	85.2	-242.9	741.6



VERIFICHE DI STABILITÀ INTERFERENZA 16 - Sud-Est SEZIONE A-A" - RELAZIONE DI CALCOLO

VERIFICA DI STABILITÀ PRE-OPERAM IN ASSENZA DI FALDA ACQUIFERA

Analisi di stabilità dei pendii con BISHOP

Numero di strati	2.0
Numero dei conci	50.0
Coefficiente di sicurezza [R2]	1.1
Superficie di forma circolare	

Maglia dei Centri

Ascissa vertice sinistro inferiore xi	-41.46 m
Ordinata vertice sinistro inferiore yi	248.33 m
Ascissa vertice destro superiore xs	64.92 m
Ordinata vertice destro superiore ys	322.67 m
Passo di ricerca	10.0
Numero di celle lungo x	10.0
Numero di celle lungo y	10.0

Coefficienti sismici [N.T.C.] 2018

Dati generali

Descrizione:	
Latitudine:	41.85
Longitudine:	14.91
Tipo di costruzione:	2 - Opere ordinarie
Classe d'uso:	Classe IV
Vita nominale:	50.0 [anni]
Vita di riferimento:	100.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T2

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s ²]	F0 [-]	TC* [sec]
S.L.O.	60.0	0.71	2.47	0.32
S.L.D.	101.0	0.9	2.51	0.32
S.L.V.	949.0	2.28	2.48	0.35
S.L.C.	1950.0	2.95	2.46	0.36

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii

S.L. Stato limite	amax [m/s ²]	beta [-]	kh [-]	kv [sec]
S.L.O.	1.278	0.2	0.0261	0.013
S.L.D.	1.62	0.2	0.033	0.0165
S.L.V.	3.7046	0.28	0.1058	0.0529
S.L.C.	4.4461	0.28	0.127	0.0635

Coefficiente azione sismica orizzontale	0.1058
Coefficiente azione sismica verticale	0.0529

Vertici profilo

N	X m	y m
1	0.0	104.0
2	16.11	105.0
3	35.15	110.0
4	50.93	115.0
5	63.86	120.0
6	75.15	125.0
7	83.19	130.0
8	94.13	135.0
9	103.41	139.0
10	105.04	140.0
11	163.68	145.0

Vertici strato1

N	X m	y m
1	0.0	104.0
2	4.4	103.68
3	9.29	103.65
4	14.06	104.0
5	16.71	104.34
6	26.37	106.0
7	35.15	108.0
8	43.08	110.24
9	50.93	113.0
10	58.07	115.49
11	63.86	118.0
12	75.15	123.0
13	84.98	128.13
14	94.13	133.0
15	103.41	139.0
16	105.04	140.0
17	163.68	145.0

Stratigrafia

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

Strato	c (kg/cm ²)	Fi (°)	G (Kg/m ³)	Gs (Kg/m ³)	Litologia
1	0.10	24.3	2029	2039	
2	0.42	15.7	2009	2060	

Risultati analisi pendio [A2+M2+R2]

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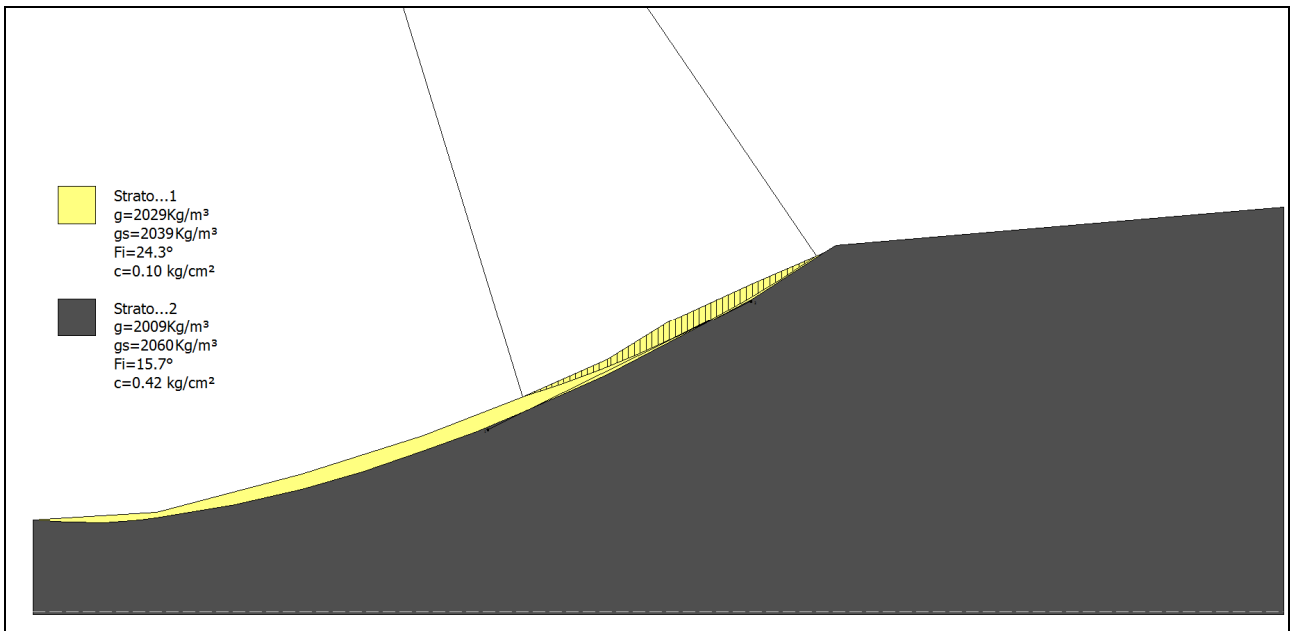
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Fs minimo individuato                1.12
Ascissa centro superficie              22.36 m
Ordinata centro superficie            255.76 m
Raggio superficie                     141.94 m
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B: Larghezza del concio; Alfa: Angolo di inclinazione della base del concio; Li: Lunghezza della base del concio; Wi: Peso del concio ; Ui: Forze derivanti dalle pressioni neutre; Ni: forze agenti normalmente alla direzione di scivolamento; Ti: forze agenti parallelamente alla superficie di scivolamento; Fi: Angolo di attrito; c: coesione.

Analisi dei concii. Superficie...xc = 22.364 yc = 255.765 Rc = 141.942 Fs=1.1183

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm ²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	0.77	17.2	0.81	80.5	8.52	4.26	0.08	19.9	0.0	-85.9	548.5
2	0.77	17.6	0.81	235.88	24.96	12.48	0.08	19.9	0.0	58.7	596.2
3	0.77	17.9	0.81	383.74	40.6	20.3	0.08	19.9	0.0	196.1	641.6
4	0.77	18.2	0.81	524.06	55.45	27.72	0.08	19.9	0.0	326.4	684.8
5	0.77	18.5	0.81	656.8	69.49	34.74	0.08	19.9	0.0	449.4	725.6
6	0.77	18.9	0.81	781.9	82.72	41.36	0.08	19.9	0.0	565.1	764.1
7	0.77	19.2	0.81	899.3	95.15	47.57	0.08	19.9	0.0	673.6	800.3
8	0.77	19.5	0.82	1009.0	106.75	53.38	0.08	19.9	0.0	774.7	834.2
9	0.77	19.9	0.82	1110.92	117.54	58.77	0.08	19.9	0.0	868.5	865.7
10	0.77	20.2	0.82	1205.01	127.49	63.74	0.08	19.9	0.0	954.9	894.8
11	0.77	20.5	0.82	1291.23	136.61	68.31	0.08	19.9	0.0	1033.8	921.5
12	0.77	20.9	0.82	1369.53	144.9	72.45	0.08	19.9	0.0	1105.2	945.9
13	0.77	21.2	0.83	1439.87	152.34	76.17	0.08	19.9	0.0	1169.1	967.9
14	1.11	21.6	1.2	2190.0	231.7	115.85	0.08	19.9	0.0	1788.1	1433.2
15	0.43	21.9	0.46	902.07	95.44	47.72	0.08	19.9	0.0	743.4	569.0
16	0.77	22.2	0.83	1829.78	193.59	96.8	0.08	19.9	0.0	1531.9	1089.2
17	0.77	22.5	0.83	2083.29	220.41	110.21	0.08	19.9	0.0	1771.0	1167.8
18	0.77	22.9	0.83	2328.49	246.35	123.18	0.08	19.9	0.0	2002.5	1244.1
19	0.77	23.2	0.84	2565.43	271.42	135.71	0.08	19.9	0.0	2226.3	1317.9
20	0.77	23.5	0.84	2793.93	295.6	147.8	0.08	19.9	0.0	2442.4	1389.2
21	0.77	23.9	0.84	3014.05	318.89	159.44	0.08	19.9	0.0	2650.7	1458.0
22	0.77	24.2	0.84	3225.63	341.27	170.64	0.08	19.9	0.0	2851.2	1524.4
23	0.77	24.6	0.85	3428.58	362.74	181.37	0.08	19.9	0.0	3043.8	1588.2
24	0.77	24.9	0.85	3622.98	383.31	191.66	0.08	19.9	0.0	3228.6	1649.6
25	0.68	25.2	0.76	3378.38	357.43	178.72	0.08	19.9	0.0	3020.1	1516.6
26	0.85	25.6	0.95	4293.11	454.21	227.11	0.08	19.9	0.0	3841.4	1918.3
27	0.77	25.9	0.86	3833.37	405.57	202.79	0.08	19.9	0.0	3426.8	1718.8
28	0.77	26.3	0.86	3793.73	401.38	200.69	0.08	19.9	0.0	3387.6	1708.0
29	0.77	26.6	0.86	3745.01	396.22	198.11	0.08	19.9	0.0	3339.8	1694.4
30	0.77	27.0	0.86	3687.22	390.11	195.05	0.08	19.9	0.0	3283.3	1678.0
31	0.77	27.3	0.87	3620.21	383.02	191.51	0.08	19.9	0.0	3217.8	1658.8
32	0.77	27.7	0.87	3543.96	374.95	187.48	0.08	19.9	0.0	3143.4	1636.7
33	0.77	28.0	0.87	3458.31	365.89	182.94	0.08	19.9	0.0	3059.8	1611.8
34	0.77	28.4	0.87	3363.25	355.83	177.92	0.08	19.9	0.0	2967.0	1583.8
35	0.77	28.7	0.88	3258.54	344.75	172.38	0.08	19.9	0.0	2864.7	1552.9
36	0.77	29.1	0.88	3144.28	332.66	166.33	0.08	19.9	0.0	2753.1	1519.0
37	0.77	29.4	0.88	3020.21	319.54	159.77	0.08	19.9	0.0	2631.6	1482.0
38	0.77	29.8	0.89	2886.34	305.38	152.69	0.08	19.9	0.0	2500.4	1441.8
39	0.86	30.2	0.99	3051.05	322.8	161.4	0.08	19.9	0.0	2623.5	1557.9
40	0.68	30.5	0.79	2267.98	239.95	119.98	0.08	19.9	0.0	1931.9	1188.8
41	0.77	30.9	0.9	2381.89	252.0	126.0	0.08	19.9	0.0	2004.7	1288.7
42	0.77	31.2	0.9	2176.8	230.31	115.15	0.08	19.9	0.0	1802.4	1225.8
43	0.77	31.6	0.9	1961.26	207.5	103.75	0.08	19.9	0.0	1589.4	1159.5
44	0.77	32.0	0.91	1735.18	183.58	91.79	0.08	19.9	0.0	1365.3	1089.7
45	0.77	32.3	0.91	1498.46	158.54	79.27	0.08	19.9	0.0	1130.1	1016.3
46	0.77	32.7	0.91	1250.93	132.35	66.17	0.08	19.9	0.0	883.5	939.3
47	0.77	33.1	0.92	992.5	105.01	52.5	0.08	19.9	0.0	625.3	858.7
48	0.77	33.4	0.92	723.01	76.49	38.25	0.08	19.9	0.0	355.2	774.2
49	0.77	33.8	0.93	442.34	46.8	23.4	0.08	19.9	0.0	73.0	685.9
50	0.77	34.2	0.93	150.3	15.9	7.95	0.08	19.9	0.0	-221.6	593.7



VERIFICA DI STABILITÀ PRE-OPERAM IN PRESENZA DI FALDA ACQUIFERA

Analisi di stabilità dei pendii con BISHOP

Numero di strati	2.0
Numero dei conci	50.0
Coefficiente di sicurezza [R2]	1.1

Superficie di forma circolare

Maglia dei Centri

Ascissa vertice sinistro inferiore xi	-41.46 m
Ordinata vertice sinistro inferiore yi	248.33 m
Ascissa vertice destro superiore xs	64.92 m
Ordinata vertice destro superiore ys	322.67 m
Passo di ricerca	10.0
Numero di celle lungo x	10.0
Numero di celle lungo y	10.0

Coefficienti sismici [N.T.C.] 2018

Dati generali

Descrizione:	
Latitudine:	41.85
Longitudine:	14.91
Tipo di costruzione:	2 - Opere ordinarie
Classe d'uso:	Classe IV
Vita nominale:	50.0 [anni]
Vita di riferimento:	100.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T2

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s ²]	F0 [-]	TC* [sec]
S.L.O.	60.0	0.71	2.47	0.32
S.L.D.	101.0	0.9	2.51	0.32
S.L.V.	949.0	2.28	2.48	0.35
S.L.C.	1950.0	2.95	2.46	0.36

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii

S.L. Stato limite	amax [m/s ²]	beta [-]	kh [-]	kv [sec]
S.L.O.	1.278	0.2	0.0261	0.013
S.L.D.	1.62	0.2	0.033	0.0165
S.L.V.	3.7046	0.28	0.1058	0.0529
S.L.C.	4.4461	0.28	0.127	0.0635

Coefficiente azione sismica orizzontale	0.1058
Coefficiente azione sismica verticale	0.0529

Vertici profilo

N	X m	y m
1	0.0	104.0
2	16.11	105.0
3	35.15	110.0
4	50.93	115.0
5	63.86	120.0
6	75.15	125.0
7	83.19	130.0
8	94.13	135.0
9	103.41	139.0
10	105.04	140.0
11	163.68	145.0

Falda

Nr.	X m	y m
1	0.0	104.0
2	16.11	105.0
3	35.15	110.0
4	50.93	115.0
5	63.86	120.0
6	75.15	125.0
7	83.19	130.0
8	94.13	135.0
9	103.41	139.0
10	105.04	140.0
11	163.68	145.0

Vertici strato1

N	X m	y m
1	0.0	104.0
2	4.4	103.68
3	9.29	103.65
4	14.06	104.0
5	16.71	104.34
6	26.37	106.0
7	35.15	108.0
8	43.08	110.24
9	50.93	113.0
10	58.07	115.49
11	63.86	118.0
12	75.15	123.0
13	84.98	128.13
14	94.13	133.0
15	103.41	139.0
16	105.04	140.0
17	163.68	145.0

Stratigrafia

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

Strato	c (kg/cm ²)	Fi (°)	G (Kg/m ³)	Gs (Kg/m ³)	Litologia
1	0.10	24.3	2029	2039	
2	0.42	15.7	2009	2060	

Risultati analisi pendio [A2+M2+R2]

Fs minimo individuato	0.75
Ascissa centro superficie	22.36 m
Ordinata centro superficie	255.76 m
Raggio superficie	142.02 m

Analisi dei conchi. Superficie...xc = 22.364 yc = 255.765 Rc = 142.019 Fs=0.7477

Nr.	B m	Alfa (°)	Li m	Wi (Kg)	Kh•Wi (Kg)	Kv•Wi (Kg)	c (kg/cm ²)	Fi (°)	Ui (Kg)	N'i (Kg)	Ti (Kg)
1	0.67	16.8	0.7	39.33	4.16	2.08	0.08	19.9	28.7	-180.4	665.0
2	0.91	17.2	0.96	220.66	23.35	11.67	0.08	19.9	118.3	-173.1	940.5
3	0.79	17.5	0.83	371.34	39.29	19.64	0.08	19.9	229.5	-72.1	855.7
4	0.79	17.9	0.83	529.88	56.06	28.03	0.08	19.9	327.4	-3.6	890.5
5	0.79	18.2	0.84	680.1	71.95	35.98	0.08	19.9	420.3	61.0	923.4
6	0.79	18.6	0.84	821.93	86.96	43.48	0.08	19.9	507.9	121.4	954.4
7	0.79	18.9	0.84	955.32	101.07	50.54	0.08	19.9	590.3	178.0	983.5
8	0.79	19.2	0.84	1080.25	114.29	57.15	0.08	19.9	667.5	230.4	1010.6
9	0.79	19.6	0.84	1196.66	126.61	63.3	0.08	19.9	739.5	278.9	1035.9
10	0.79	19.9	0.84	1304.49	138.02	69.01	0.08	19.9	806.1	323.3	1059.3
11	0.79	20.3	0.85	1403.67	148.51	74.25	0.08	19.9	867.4	363.6	1080.8
12	0.79	20.6	0.85	1494.17	158.08	79.04	0.08	19.9	923.3	399.9	1100.3
13	0.79	20.9	0.85	1575.94	166.73	83.37	0.08	19.9	973.8	432.1	1117.9
14	0.79	21.3	0.85	1648.84	174.45	87.22	0.08	19.9	1018.9	460.2	1133.6
15	0.85	21.6	0.92	1844.32	195.13	97.56	0.08	19.9	1059.8	521.5	1234.2
16	0.73	22.0	0.79	1735.26	183.59	91.79	0.08	19.9	1159.6	511.9	1094.0
17	0.79	22.3	0.86	2142.74	226.7	113.35	0.08	19.9	1324.1	670.6	1241.8
18	0.79	22.7	0.86	2410.43	255.02	127.51	0.08	19.9	1489.5	787.9	1300.8
19	0.79	23.0	0.86	2669.0	282.38	141.19	0.08	19.9	1649.3	901.0	1357.8
20	0.79	23.4	0.86	2918.38	308.76	154.38	0.08	19.9	1803.4	1009.8	1412.7
21	0.79	23.7	0.87	3158.44	334.16	167.08	0.08	19.9	1951.7	1114.2	1465.6
22	0.79	24.1	0.87	3389.16	358.57	179.29	0.08	19.9	2094.3	1214.3	1516.5
23	0.79	24.4	0.87	3610.5	381.99	191.0	0.08	19.9	2231.0	1310.1	1565.3
24	0.79	24.8	0.87	3822.26	404.4	202.2	0.08	19.9	2361.9	1401.4	1612.1
25	0.95	25.1	1.05	4844.14	512.51	256.25	0.08	19.9	2498.9	1792.8	1989.7
26	0.64	25.5	0.71	3329.12	352.22	176.11	0.08	19.9	2564.6	1235.0	1351.2
27	0.79	25.8	0.88	4123.05	436.22	218.11	0.08	19.9	2547.8	1521.8	1678.5
28	0.79	26.2	0.88	4083.42	432.03	216.01	0.08	19.9	2523.3	1497.8	1669.7
29	0.79	26.5	0.89	4033.95	426.79	213.4	0.08	19.9	2492.7	1469.2	1658.9
30	0.79	26.9	0.89	3974.35	420.49	210.24	0.08	19.9	2455.9	1436.0	1645.8
31	0.79	27.3	0.89	3904.69	413.12	206.56	0.08	19.9	2412.8	1398.2	1630.6
32	0.79	27.6	0.9	3824.81	404.66	202.33	0.08	19.9	2363.5	1355.7	1613.2
33	0.79	28.0	0.9	3734.61	395.12	197.56	0.08	19.9	2307.7	1308.4	1593.5
34	0.79	28.3	0.9	3633.98	384.47	192.24	0.08	19.9	2245.6	1256.3	1571.6
35	0.79	28.7	0.9	3522.81	372.71	186.36	0.08	19.9	2176.9	1199.3	1547.4
36	0.79	29.1	0.91	3401.05	359.83	179.92	0.08	19.9	2101.6	1137.4	1520.9
37	0.79	29.4	0.91	3268.47	345.8	172.9	0.08	19.9	2019.7	1070.4	1492.1
38	0.79	29.8	0.91	3125.07	330.63	165.32	0.08	19.9	1931.1	998.4	1460.9

39	0.78	30.2	0.91	2932.88	310.3	155.15	0.08	19.9	1836.3	909.7	1408.8
40	0.8	30.5	0.93	2826.14	299.01	149.5	0.08	19.9	1723.8	842.6	1405.9
41	0.79	30.9	0.93	2578.66	272.82	136.41	0.08	19.9	1593.4	728.2	1341.5
42	0.79	31.3	0.93	2357.71	249.45	124.72	0.08	19.9	1456.9	619.9	1293.2
43	0.79	31.7	0.93	2125.17	224.84	112.42	0.08	19.9	1313.2	506.2	1242.2
44	0.79	32.0	0.94	1881.06	199.02	99.51	0.08	19.9	1162.4	386.8	1188.6
45	0.79	32.4	0.94	1625.13	171.94	85.97	0.08	19.9	1004.2	261.8	1132.4
46	0.79	32.8	0.94	1357.26	143.6	71.8	0.08	19.9	838.7	130.9	1073.5
47	0.79	33.2	0.95	1077.32	113.98	56.99	0.08	19.9	665.7	-5.8	1011.8
48	0.79	33.6	0.95	785.13	83.07	41.53	0.08	19.9	485.2	-148.5	947.4
49	0.79	34.0	0.96	480.53	50.84	25.42	0.08	19.9	296.9	-297.3	880.0
50	0.79	34.3	0.96	163.37	17.28	8.64	0.08	19.9	101.0	-452.4	809.8

