

Job No.	Sheet No.	Rev.
14-944		
Drg. Ref.		
Made by CB	Date	Checked

General Parameters

Direction of slip: DOWNHILL
Minimum slip weight [kN/m] : 0.00000
Type of analysis : STATIC

Analysis Options

Partial Factor Analysis
Minimum number of slices: 25
Method: Bishop (Variably inclined interslice forces)
Maximum number of iterations: 300
Reinforcement: NOT ACTIVE

Method Partial Factors

Current selection: BS EN 1997-1:2011 DA1-2
Factor on FAVOURABLE PERMANENT LOAD: 1.00000
Factor on UNFAVOURABLE PERMANENT LOAD: 1.00000
Factor on FAVOURABLE VARIABLE LOAD: 0.00000
Factor on UNFAVOURABLE VARIABLE LOAD: 1.30000
Factor on SOIL UNIT WEIGHT: 1.00000
Factor on DRAINED SOIL COHESION: 1.25000
Factor on UNDRAINED SOIL COHESION: 1.40000
Factor on SOIL FRICTION ANGLE: 1.25000
Factor on reinforcement pullout: 1.50000
Economic ramification of failure: 1.00000
Sliding along reinforcement: 1.50000

Material properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c or
		Above GWL	Below GWL		
c0'				Condition	Phi0 [°]
		[kN/m ³]	[kN/m ³]		
1	Made Ground: Gravelly Clay	16.000	16.000	Drained - linear strength	20.000
2	Stiff Clay	20.000	20.000	Drained - linear strength	20.000
3	Dense Sand	18.000	18.000	Drained - linear strength	40.000

Coordinates of top of soil strata

The units of the following coordinates are in m

Stratum X -->							
	3.9390	6.3220	10.112	10.232	10.462	10.496	11.519
1	20.100	20.100	.	.	.	.	20.100
2	9.1000	9.1000	.	9.1000	.	.	.
3	5.6000	5.6000	5.6000	.	.	.	.
GW	12.600	12.600	.	.	12.600	12.590	.
Stratum X -->							
	11.804	12.034	12.182	12.398	12.761	13.142	13.539
1	20.018	.	.	.	.	.	19.899
2	.	.	.	8.9514	.	8.8471	.
3	.	5.4681	5.4474	.	.	.	.
GW	.	.	.	.	12.435	.	.
Stratum X -->							
	13.903	13.972	14.183	14.461	15.472	15.516	15.784
1	.	.	.	.	19.628	19.625	.
2	.	8.5923	.	8.1285	.	.	.
3	.	.	3.3584	.	.	.	.
GW	12.275	.	.	.	.	.	11.697
Stratum X -->							
	16.467	16.484	16.930	18.405	18.752	18.965	19.668
1	.	.	.	.	.	.	18.350
2	6.0332	.	.	4.6887	.	.	.
3	.	1.7614	.	.	.	0.22454	.
GW	.	.	10.610	.	8.7081	.	.
Stratum X -->							
	20.325	20.529	22.093	22.222	23.241	23.647	24.441
1	.	.	.	15.928	.	14.440	13.889

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Stratum X -->							
2	20.325	20.520	22.003	22.222	22.241	22.647	24.441
3	.	3.3727	.	.	-1.4225	.	.
GW	7.6161	.	6.5209	.	.	.	.
Stratum X -->							
1	24.474	25.445	25.707	26.360	26.908	27.456	28.348
2	1.8534	13.267	.	.	0.95891	.	12.149
3	.	.	.	-2.5685	.	.	.
GW	.	.	5.1293	.	.	4.4863	.
Stratum X -->							
1	28.631	28.996	29.261	29.384	29.508	30.178	30.407
2	12.045	12.061	.	1.0674	.	.	1.0948
3	.	.	.	.	-2.4305	-2.4125	.
GW	.	.	4.5654	.	.	.	.
Stratum X -->							
1	30.635	31.125	37.939	38.452	38.965	39.681	39.991
2	.	12.118	.	.	.	.	.
3	.	.	.	-0.17793	.	.	.
GW	4.6022	.	.	.	.	-3.8807	.
Stratum X -->							
1	40.063	40.300	40.776	40.845	40.915	40.962	41.063
2	10.704	.	.	.	.	.	10.576
3	.	.	.	-0.42400	.	.	.
GW	.	3.1004	.	.	3.0760	.	.
Stratum X -->							
1	41.083	41.096	41.109	41.138	42.464	42.491	42.518
2	.	.	.	10.576	.	.	.
3	.	.	.	.	-0.43468	.	.
GW	.	.	3.0760	.	-3.9346	.	.
Stratum X -->							
1	42.575	.	.	.	.	.	.
2	10.565	.	.	.	.	.	.
3	.	.	.	.	.	.	.
GW	3.0652	.	.	.	.	.	3.0652

Piezometers

Stratum-linked data

No.	Material	Water table	Piezo Set/ Ru value
1	Made Ground: Gravelly Clay	GW	-
2	Stiff Clay	GW	-
3	Dense Sand	GW	-

Surface Loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / UnFavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m ²]	[kN/m ²]	
1	3.0000	8.0000	20.000	0.0 Permanent	UnFavourable No

Slip Surface Specification

Circle centre specification: GRID
Bottom left of grid: x = 15.00000 m y = 24.00000 m
Inclination of grid: -13.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 30 in x direction at 0.80000m spacing
10 in y direction at 0.80000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (29.211m,21.540m) Radius 9.0000m

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No. Limits of loaded area Distributed load Permanent / Favourable / Use in
Iterations: 5 Horiz acceleration [%g]: 0.0
Net vertical force [kN/m]: Slip weight [kN/m] 1.6660
-9.7729E-6
Net horiz force [kN/m]: -9.4665E-6 Disturbing moment [kN/m]: 10.756
Restoring moment [kNm/m]: 3.0509
Reinf.Rest.Moment [kNm/m]: 0.0
Over-Design Factor: 0.28364

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.

Slip surface coordinates			Pore Pressure		Interslice forces [kN/m]		
Point	x [m]	y [m]	L	R	T	E	E (u)
			[kN/m ²]	[kN/m ²]			
1	22.043	16.098	-	-95.459	0.0	0.0	0.0
2	22.078	16.052	-95.216	-95.216	239.44E-6	401.78E-6	0.0
3	22.114	16.006	-94.929	-94.929	0.0013587	0.0014902	0.0
4	22.149	15.960	-94.611	-94.611	0.0032247	0.0031791	0.0
5	22.186	15.915	-94.295	-94.295	0.0057099	0.0053827	0.0
6	22.222	15.870	-93.984	-93.984	0.0086900	0.0080142	0.0
7	22.259	15.824	-93.674	-93.674	0.011965	0.010922	0.0
8	22.296	15.779	-93.367	-93.367	0.015323	0.013938	0.0
9	22.334	15.735	-93.064	-93.064	0.018684	0.016995	0.0
10	22.371	15.690	-92.765	-92.765	0.021974	0.020032	0.0
11	22.410	15.646	-92.469	-92.469	0.025122	0.022987	0.0
12	22.448	15.602	-92.177	-92.177	0.028067	0.025802	0.0
13	22.487	15.558	-91.889	-91.889	0.030753	0.028427	0.0
14	22.526	15.515	-91.604	-91.604	0.033135	0.030812	0.0
15	22.565	15.471	-91.322	-91.322	0.035169	0.032912	0.0
16	22.604	15.429	-91.045	-91.045	0.036822	0.034689	0.0
17	22.644	15.386	-90.771	-90.771	0.038067	0.036109	0.0
18	22.684	15.343	-90.500	-90.500	0.038885	0.037143	0.0
19	22.724	15.301	-90.233	-90.233	0.039264	0.037771	0.0
20	22.765	15.259	-89.970	-89.970	0.039197	0.037974	0.0
21	22.806	15.217	-89.711	-89.711	0.038688	0.037747	0.0
22	22.847	15.176	-89.455	-89.455	0.037748	0.037087	0.0
23	22.889	15.135	-89.203	-89.203	0.036393	0.035998	0.0
24	22.930	15.094	-88.955	-88.955	0.034648	0.034498	0.0
25	22.972	15.053	-88.711	-88.711	0.032544	0.032607	0.0
26	23.014	15.013	-88.470	-88.470	0.030121	0.030355	0.0
27	23.057	14.973	-88.233	-88.233	0.027425	0.027784	0.0
28	23.100	14.933	-88.000	-88.000	0.024510	0.024943	0.0
29	23.143	14.894	-87.770	-87.770	0.021437	0.021891	0.0
30	23.186	14.855	-87.544	-87.544	0.018273	0.018697	0.0
31	23.229	14.816	-87.322	-87.322	0.015092	0.015442	0.0
32	23.273	14.777	-87.104	-87.104	0.011976	0.012216	0.0
33	23.317	14.739	-86.890	-86.890	0.0090124	0.0091207	0.0
34	23.361	14.700	-86.679	-86.679	0.0062951	0.0062693	0.0
35	23.406	14.663	-86.473	-86.473	0.0039247	0.0037871	0.0
36	23.450	14.625	-86.270	-86.270	0.0020080	0.0018114	0.0
37	23.495	14.588	-86.071	-86.071	657.01E-6	491.71E-6	0.0
38	23.541	14.551	-85.876	-	-9.7729E-6	-9.4665E-6	0.0

Slice Strength Parameters			Average Pore Pressure	Slice Weight	Forces on base [kN/m]		
No.	c' [kN/m ²]	Tan phi	[kN/m ²]	[kN/m]	Normal	Shear (capacity)	Shear (mobilised)
1	0.0	0.29118	0.0	0.0035809	0.0023484	683.79E-6	0.0024108
2	0.0	0.29118	0.0	0.010689	0.0067209	0.0019570	0.0068995
3	0.0	0.29118	0.0	0.017622	0.011057	0.0032196	0.011351
4	0.0	0.29118	0.0	0.024374	0.015351	0.0044697	0.015759
5	0.0	0.29118	0.0	0.030930	0.019589	0.0057039	0.020110
6	0.0	0.29118	0.0	0.036459	0.023244	0.0067681	0.023862
7	0.0	0.29118	0.0	0.040547	0.026034	0.0075806	0.026726
8	0.0	0.29118	0.0	0.044362	0.028689	0.0083536	0.029451
9	0.0	0.29118	0.0	0.047910	0.031207	0.0090866	0.032036
10	0.0	0.29118	0.0	0.051160	0.033565	0.0097732	0.034457
11	0.0	0.29118	0.0	0.054116	0.035760	0.010412	0.036710
12	0.0	0.29118	0.0	0.056775	0.037786	0.011002	0.038790

**E3P**

Vine Street, Gorton
Slope Stability Assessment
Section 2

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Slice Strength Parameters			Average	Slice	Forces on base [kN/m]		
No.	Vert	Horiz	None	Weight	Normal	Shear	Water
13	0.0	0.29118	0.0	0.059124	0.039628	0.011539	0.040681
14	0.0	0.29118	0.0	0.061152	0.041277	0.012019	0.042374
15	0.0	0.29118	0.0	0.062856	0.042724	0.012440	0.043859
16	0.0	0.29118	0.0	0.064224	0.043956	0.012799	0.045124
17	0.0	0.29118	0.0	0.065254	0.044968	0.013094	0.046163
18	0.0	0.29118	0.0	0.065938	0.045748	0.013321	0.046964
19	0.0	0.29118	0.0	0.066261	0.046282	0.013476	0.047512
20	0.0	0.29118	0.0	0.066227	0.046567	0.013559	0.047804
21	0.0	0.29118	0.0	0.065820	0.046586	0.013565	0.047824
22	0.0	0.29118	0.0	0.065039	0.046335	0.013492	0.047566
23	0.0	0.29118	0.0	0.063872	0.045798	0.013335	0.047015
24	0.0	0.29118	0.0	0.062314	0.044968	0.013094	0.046163
25	0.0	0.29118	0.0	0.060362	0.043838	0.012765	0.045003
26	0.0	0.29118	0.0	0.058006	0.042395	0.012344	0.043521
27	0.0	0.29118	0.0	0.055238	0.040626	0.011829	0.041706
28	0.0	0.29118	0.0	0.052057	0.038528	0.011218	0.039551
29	0.0	0.29118	0.0	0.048456	0.036088	0.010508	0.037047
30	0.0	0.29118	0.0	0.044422	0.033294	0.0096943	0.034178
31	0.0	0.29118	0.0	0.039955	0.030138	0.0087756	0.030939
32	0.0	0.29118	0.0	0.035048	0.026611	0.0077485	0.027318
33	0.0	0.29118	0.0	0.029699	0.022706	0.0066115	0.023310
34	0.0	0.29118	0.0	0.023894	0.018408	0.0053600	0.018897
35	0.0	0.29118	0.0	0.017634	0.013711	0.0039925	0.014076
36	0.0	0.29118	0.0	0.010913	0.0086066	0.0025060	0.0088353
37	0.0	0.29118	0.0	0.0037225	0.0030826	897.59E-6	0.0031645

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on	
No.				ground surface [kN/m_hor/m]	
	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0
2	0.0		0.0	0.0	0.0
3	0.0		0.0	0.0	0.0
4	0.0		0.0	0.0	0.0
5	0.0		0.0	0.0	0.0
6	0.0		0.0	0.0	0.0
7	0.0		0.0	0.0	0.0
8	0.0		0.0	0.0	0.0
9	0.0		0.0	0.0	0.0
10	0.0		0.0	0.0	0.0
11	0.0		0.0	0.0	0.0
12	0.0		0.0	0.0	0.0
13	0.0		0.0	0.0	0.0
14	0.0		0.0	0.0	0.0
15	0.0		0.0	0.0	0.0
16	0.0		0.0	0.0	0.0
17	0.0		0.0	0.0	0.0
18	0.0		0.0	0.0	0.0
19	0.0		0.0	0.0	0.0
20	0.0		0.0	0.0	0.0
21	0.0		0.0	0.0	0.0
22	0.0		0.0	0.0	0.0
23	0.0		0.0	0.0	0.0
24	0.0		0.0	0.0	0.0
25	0.0		0.0	0.0	0.0
26	0.0		0.0	0.0	0.0
27	0.0		0.0	0.0	0.0
28	0.0		0.0	0.0	0.0
29	0.0		0.0	0.0	0.0
30	0.0		0.0	0.0	0.0
31	0.0		0.0	0.0	0.0
32	0.0		0.0	0.0	0.0
33	0.0		0.0	0.0	0.0
34	0.0		0.0	0.0	0.0
35	0.0		0.0	0.0	0.0
36	0.0		0.0	0.0	0.0
37	0.0		0.0	0.0	0.0