Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	34.00	1 MG Undrained	1 MG Undrained
2	26.00	2 London Clay	2 London Clay

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	MG Undrai..	19.00	20000	0.530	NC	1.000	1.000	30.00u
	(34.00)				(0.490)	(2.389)	(2.390)	(2.000)
2	London Clay	20.00	24000	1.000	OC	1.000	1.000	60.00u
	(26.00)		(2000)		(0.490)	(2.389)	(2.390)	(5.300)
3	MG Drained	19.00	14000	0.530	NC	0.301	4.339	1.000d
					(0.200)	(1.315)	(6.280)	
4	LC Drained	20.00	19200	1.000	OC	0.329	3.814	5.000d
	(26.00)		(1600)		(0.200)	(1.376)	(5.769)	

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	MG Undrained	0.00	0.500	0.00	0.00	0.500	0.00
2	London Clay	0.00	0.500	0.00	0.00	0.500	0.00
3	MG Drained	28.00	0.885	0.00	28.00	0.874	0.00
4	LC Drained	26.00	0.865	0.00	26.00	0.866	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	19.00	19.00

Automatic water pressure balancing at toe of wall : No

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 5.00
Maximum finite element length = 0.50 m
Youngs modulus of wall E = 2.3800E+08 kN/m2
Moment of inertia of wall I = 0.051900 m4/m run
E.I = 1.2352E+07 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre-stress /strut kN	Tension allowed
1	31.00	5.00	0.050000	2.000E+08	5.00	0.00	0	Yes
2	28.00	1.00	0.300000	2.800E+07	5.00	0.00	0	Yes
3	24.00	1.00	0.300000	2.800E+07	5.00	0.00	0	Yes
4	34.00	1.00	0.400000	2.800E+07	5.00	0.00	0	Yes

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Excavate to elevation 34.00 on ACTIVE side Toe of berm at elevation 32.00 Width of top of berm = 2.60 Width of toe of berm = 2.70
2	Excavate to elevation 30.50 on PASSIVE side
3	Install strut or anchor no.1 at elevation 31.00
4	Excavate to elevation 27.50 on PASSIVE side
5	Install strut or anchor no.2 at elevation 28.00
6	Excavate to elevation 23.70 on PASSIVE side
7	Install strut or anchor no.3 at elevation 24.00
8	Install strut or anchor no.4 at elevation 34.00
9	Remove strut or anchor no.1 at elevation 31.00
10	Change properties of soil type 1 to soil type 3 No analysis at this stage Ko pressures will not be reset
11	Change properties of soil type 2 to soil type 4 Ko pressures will not be reset
12	Change EI of wall to 882019 kN.m2/m run Yield moment not defined Allow wall to relax with new modulus value

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: Serviceability Limit State
All loads and soil strengths are unfactored

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 0 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 1000.00 m

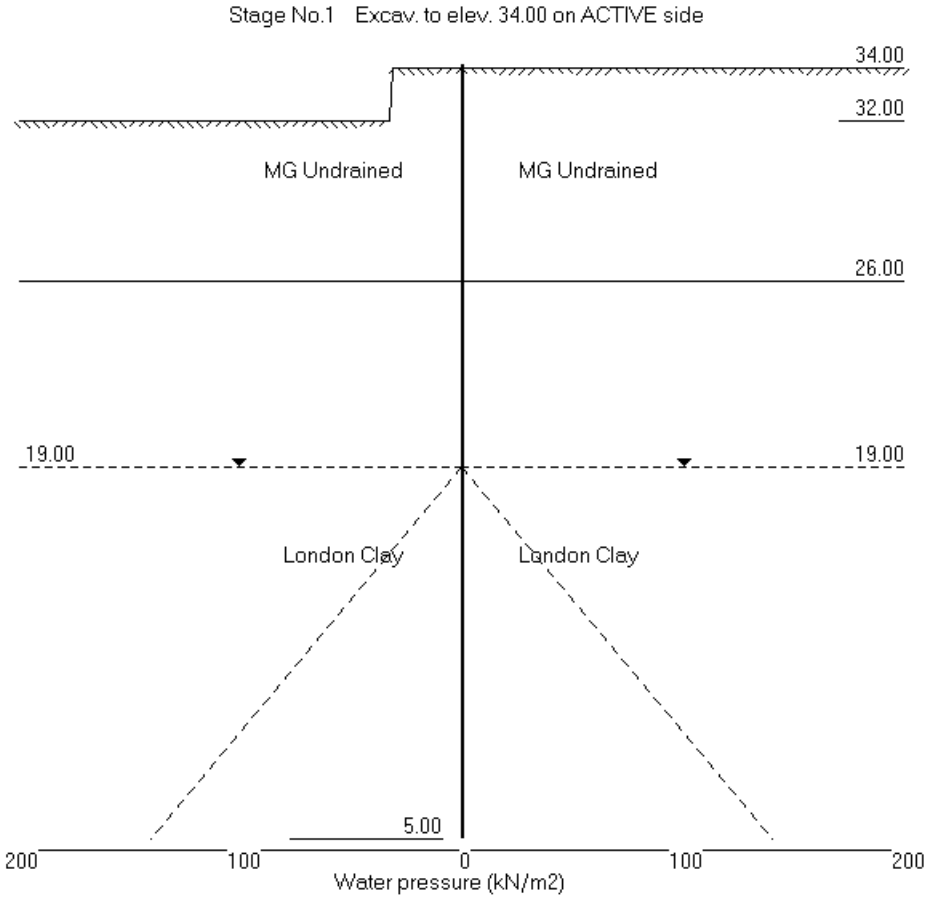
Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 50.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 50.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Excav. to elev. 34.00 on ACTIVE side	No	No	No
2	Excav. to elev. 30.50 on PASSIVE side	Yes	Yes	Yes
3	Install strut no.1 at elev. 31.00	No	No	No
4	Excav. to elev. 27.50 on PASSIVE side	No	No	No
5	Install strut no.2 at elev. 28.00	No	No	No
6	Excav. to elev. 23.70 on PASSIVE side	No	No	No
7	Install strut no.3 at elev. 24.00	No	No	No
8	Install strut no.4 at elev. 34.00	No	No	No
9	Remove strut no.1 at elev. 31.00	No	No	No
10	Change soil type 1 to soil type 3	No	No	No
11	Change soil type 2 to soil type 4	No	No	No
12	Change EI of wall to 882019kN.m2/m run	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m


Stage No.1 Excav. to elev. 34.00 on ACTIVE side
34.00
32.00
MG Undrained
MG Undrained
26.00
19.00
19.00
London Clay
London Clay
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 1 Excavate to elevation 34.00 on ACTIVE side
Toe of berm at elevation 32.00
Width of top of berm = 2.60
Width of toe of berm = 2.70

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	34.00	34.00	Cant.	Conditions not suitable for FoS calc.			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	0.00	0.000	0	0.0	0.0		12352200
2	33.50	0.00	0.000	0	0.0	0.0		12352200
3	33.00	0.00	0.000	0	0.0	0.0		12352200
4	32.50	0.00	0.000	0	0.0	0.0		12352200
5	32.00	0.00	0.000	0	0.0	0.0		12352200
6	31.50	0.00	0.000	0	0.0	0.0		12352200
7	31.00	0.00	0.000	0	0.0	0.0		12352200
8	30.50	0.00	0.000	0	0.0	0.0		12352200
9	30.00	0.00	0.000	0	0.0	0.0		12352200
10	29.50	0.00	0.000	0	0.0	0.0		12352200
11	29.00	0.00	0.000	0	0.0	0.0		12352200
12	28.50	0.00	0.000	0	0.0	0.0		12352200
13	28.00	0.00	0.000	0	0.0	0.0		12352200
14	27.50	0.00	0.000	0	0.0	0.0		12352200
15	27.00	0.00	0.000	0	0.0	0.0		12352200
16	26.50	0.00	0.000	0	0.0	0.0		12352200
17	26.00	0.00	0.000	0	0.0	0.0		12352200
18	25.50	0.00	0.000	0	0.0	0.0		12352200
19	25.00	0.00	0.000	0	0.0	0.0		12352200
20	24.50	0.00	0.000	0	0.0	0.0		12352200
21	24.00	0.00	0.000	0	0.0	0.0		12352200
22	23.70	0.00	0.000	0	0.0	0.0		12352200
23	23.35	0.00	0.000	0	0.0	0.0		12352200
24	23.00	0.00	0.000	0	0.0	0.0		12352200
25	22.50	0.00	0.000	0	0.0	0.0		12352200
26	22.00	0.00	0.000	0	0.0	0.0		12352200
27	21.50	0.00	0.000	0	0.0	0.0		12352200

(continued)

Stage No.1 Excavate to elevation 34.00 on ACTIVE side
Toe of berm at elevation 32.00
Width of top of berm = 2.60
Width of toe of berm = 2.70

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
28	21.00	0.00	0.000	0	0.0	0.0		12352200
29	20.50	0.00	0.000	0	0.0	0.0		12352200
30	20.00	0.00	0.000	0	0.0	0.0		12352200
31	19.50	0.00	0.000	0	0.0	0.0		12352200
32	19.00	0.00	0.000	0	0.0	0.0		12352200
33	18.50	0.00	0.000	0	0.0	0.0		12352200
34	18.00	0.00	0.000	0	0.0	0.0		12352200
35	17.50	0.00	0.000	0	0.0	0.0		12352200
36	17.00	0.00	0.000	0	0.0	0.0		12352200
37	16.50	0.00	0.000	0	0.0	0.0		12352200
38	16.00	0.00	0.000	0	0.0	0.0		12352200
39	15.50	0.00	0.000	0	0.0	0.0		12352200
40	15.00	0.00	0.000	0	0.0	0.0		12352200
41	14.50	0.00	0.000	0	0.0	0.0		12352200
42	14.00	0.00	0.000	0	0.0	0.0		12352200
43	13.50	0.00	0.000	0	0.0	0.0		12352200
44	13.00	0.00	0.000	0	0.0	0.0		12352200
45	12.50	0.00	0.000	0	0.0	0.0		12352200
46	12.00	0.00	0.000	0	0.0	0.0		12352200
47	11.50	0.00	0.000	0	0.0	0.0		12352200
48	11.00	0.00	0.000	0	0.0	0.0		12352200
49	10.50	0.00	0.000	0	0.0	0.0		12352200
50	10.00	0.00	0.000	0	0.0	0.0		12352200
51	9.50	0.00	0.000	0	0.0	0.0		12352200
52	9.00	0.00	0.000	0	0.0	0.0		12352200
53	8.50	0.00	0.000	0	0.0	0.0		12352200
54	8.00	0.00	0.000	0	0.0	0.0		12352200
55	7.50	0.00	0.000	0	0.0	0.0		12352200
56	7.00	0.00	0.000	0	0.0	0.0		12352200
57	6.50	0.00	0.000	0	0.0	0.0		12352200
58	6.00	0.00	0.000	0	0.0	0.0		12352200
59	5.50	0.00	0.000	0	0.0	0.0		12352200
60	5.00	0.00	0.000	0	0.0	0.0		---

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	34.00	Total>	0.00	0.00	33.95b	0.00	0.00a	2591
2	33.50	Total>	9.50	2.50m	39.58b	5.03	5.03	2591
		Total>	9.50	2.50m	83.59	5.03	5.03	2591
3	33.00	Total>	19.00	5.00m	95.48	10.07	10.07	2591
		Total>	19.00	5.00m	26.60b	10.07	10.07	2591
4	32.50	Total>	28.50	7.50m	29.92b	15.10	15.10	2591
		Total>	28.50	7.50m	27.52b	15.10	15.10	2591
5	32.00	Total>	38.00	10.00m	30.57b	20.14	20.14	2591
		Total>	38.00	10.00m	88.21b	20.14	20.14	2591
6	31.50	Total>	47.50	12.50m	97.00b	25.17	25.17	2591
		Total>	47.50	12.50m	99.96b	25.17	25.17	2591
7	31.00	Total>	57.00	15.00m	109.02b	30.21	30.21	2591
		Total>	57.00	15.00m	111.74b	30.21	30.21	2591
8	30.50	Total>	66.50	17.50m	121.03b	35.24	35.24	2591
		Total>	66.50	17.50m	123.53b	35.24	35.24	2591

(continued)

Stage No.1 Excavate to elevation 34.00 on ACTIVE side
Toe of berm at elevation 32.00
Width of top of berm = 2.60
Width of toe of berm = 2.70

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
9	30.00	Total>	76.00	20.00m	133.01b	40.28	40.28	2591
		Total>	76.00	20.00m	135.34b	40.28	40.28	2591
10	29.50	Total>	85.50	22.50m	144.99b	45.32	45.32	2591
		Total>	85.50	22.50m	147.16b	45.32	45.32	2591
11	29.00	Total>	95.00	25.00m	156.95b	50.35	50.35	2591
		Total>	95.00	25.00m	158.98b	50.35	50.35	2591
12	28.50	Total>	104.50	27.50m	168.90b	55.38	55.38	2591
		Total>	104.50	27.50m	170.82b	55.38	55.38	2591
13	28.00	Total>	114.00	30.00m	180.85b	60.42	60.42	2591
		Total>	114.00	30.00m	182.66b	60.42	60.42	2591
14	27.50	Total>	123.50	32.50m	192.79b	65.45	65.45	2591
		Total>	123.50	32.50m	194.50b	65.45	65.45	2591
15	27.00	Total>	133.00	35.00m	204.72b	70.49	70.49	2591
		Total>	133.00	35.00m	206.35b	70.49	70.49	2591
16	26.50	Total>	142.50	37.50m	216.65b	75.52	75.52	2591
		Total>	142.50	37.50m	218.20b	75.52	75.52	2591
17	26.00	Total>	152.00	42.09	228.58b	80.56	80.56	2591
		Total>	152.00	40.00m	295.40	152.00	152.00	3110
18	25.50	Total>	162.00	42.50m	311.73	162.00	162.00	3239
19	25.00	Total>	172.00	45.00m	328.07	172.00	172.00	3369
20	24.50	Total>	182.00	47.50m	344.40	182.00	182.00	3498
		Total>	182.00	47.50m	325.68b	182.00	182.00	3498
21	24.00	Total>	192.00	50.00m	341.13b	192.00	192.00	3628
		Total>	192.00	50.00m	337.36b	192.00	192.00	3628
22	23.70	Total>	198.00	51.50m	346.53b	198.00	198.00	3706
		Total>	198.00	51.50m	347.20b	198.00	198.00	3706
23	23.35	Total>	205.00	53.25m	357.92b	205.00	205.00	3796
		Total>	205.00	53.25m	358.63b	205.00	205.00	3796
24	23.00	Total>	212.00	55.00m	369.36b	212.00	212.00	3887
		Total>	212.00	55.00m	370.19b	212.00	212.00	3887
25	22.50	Total>	222.00	57.50m	385.56b	222.00	222.00	4017
		Total>	222.00	57.50m	386.51b	222.00	222.00	4017
26	22.00	Total>	232.00	60.00m	401.92b	232.00	232.00	4146
		Total>	232.00	60.00m	402.82b	232.00	232.00	4146
27	21.50	Total>	242.00	62.50m	418.27b	242.00	242.00	4276
		Total>	242.00	62.50m	419.14b	242.00	242.00	4276
28	21.00	Total>	252.00	65.00m	434.62b	252.00	252.00	4405
		Total>	252.00	65.00m	435.46b	252.00	252.00	4405
29	20.50	Total>	262.00	67.50m	450.96b	262.00	262.00	4535
		Total>	262.00	67.50m	451.78b	262.00	262.00	4535
30	20.00	Total>	272.00	70.00m	467.31b	272.00	272.00	4664
		Total>	272.00	70.00m	468.10b	272.00	272.00	4664
31	19.50	Total>	282.00	72.50m	483.66b	282.00	282.00	4794
		Total>	282.00	72.50m	484.42b	282.00	282.00	4794
32	19.00	Total>	292.00	75.00m	500.00b	292.00	292.00	4924
		Total>	292.00	75.00m	500.63b	292.00	292.00	4924
33	18.50	Total>	302.00	77.50m	516.46b	302.00	302.00	5053
34	18.00	Total>	312.00	80.00m	532.80b	312.00	312.00	5183
35	17.50	Total>	322.00	82.50m	549.14b	322.00	322.00	5312
36	17.00	Total>	332.00	85.00m	565.47b	332.00	332.00	5442
37	16.50	Total>	342.00	87.50m	581.81b	342.00	342.00	5571
38	16.00	Total>	352.00	90.00m	598.15b	352.00	352.00	5701

(continued)

Stage No.1 Excavate to elevation 34.00 on ACTIVE side
Toe of berm at elevation 32.00
Width of top of berm = 2.60
Width of toe of berm = 2.70

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
39	15.50	Total>	362.00	92.50m	614.49b	362.00	362.00	5831
40	15.00	Total>	372.00	95.00m	630.83b	372.00	372.00	5960
		Total>	372.00	95.00m	654.74	372.00	372.00	5960
41	14.50	Total>	382.00	97.50m	671.07	382.00	382.00	6090
42	14.00	Total>	392.00	100.00m	687.40	392.00	392.00	6219
43	13.50	Total>	402.00	102.50m	703.74	402.00	402.00	6349
44	13.00	Total>	412.00	105.00m	720.07	412.00	412.00	6478
45	12.50	Total>	422.00	107.73	736.40	422.00	422.00	6608
46	12.00	Total>	432.00	111.40	752.74	432.00	432.00	6738
47	11.50	Total>	442.00	115.07	769.07	442.00	442.00	6867
48	11.00	Total>	452.00	118.73	785.41	452.00	452.00	6997
49	10.50	Total>	462.00	122.40	801.74	462.00	462.00	7126
50	10.00	Total>	472.00	126.07	818.07	472.00	472.00	7256
51	9.50	Total>	482.00	129.74	834.41	482.00	482.00	7385
52	9.00	Total>	492.00	133.41	850.74	492.00	492.00	7515
53	8.50	Total>	502.00	137.08	867.07	502.00	502.00	7644
54	8.00	Total>	512.00	140.75	883.41	512.00	512.00	7774
55	7.50	Total>	522.00	144.42	899.74	522.00	522.00	7904
56	7.00	Total>	532.00	148.09	916.07	532.00	532.00	8033
57	6.50	Total>	542.00	151.76	932.41	542.00	542.00	8163
58	6.00	Total>	552.00	155.43	948.74	552.00	552.00	8292
59	5.50	Total>	562.00	159.10	965.07	562.00	562.00	8422
60	5.00	Total>	572.00	162.76	981.41	572.00	572.00	8551

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	34.00	Total>	0.00	0.00	71.70	0.00	0.00a	1097
2	33.50	Total>	9.50	2.50m	83.59	5.03	5.03	1097
3	33.00	Total>	19.00	5.00m	95.48	10.07	10.07	1097
4	32.50	Total>	28.50	7.50m	107.37	15.10	15.10	1097
5	32.00	Total>	38.00	10.00m	119.26	20.14	20.14	1097
6	31.50	Total>	47.50	12.50m	131.15	25.17	25.17	1097
7	31.00	Total>	57.00	15.00m	143.04	30.21	30.21	1097
8	30.50	Total>	66.50	17.50m	154.93	35.24	35.24	1097
9	30.00	Total>	76.00	20.00m	166.82	40.28	40.28	1097
10	29.50	Total>	85.50	22.50m	178.71	45.32	45.32	1097
11	29.00	Total>	95.00	25.00m	190.60	50.35	50.35	1097
12	28.50	Total>	104.50	27.50m	202.49	55.38	55.38	1097
13	28.00	Total>	114.00	30.00m	214.38	60.42	60.42	1097
14	27.50	Total>	123.50	32.50m	226.27	65.45	65.45	1097
15	27.00	Total>	133.00	35.00m	238.16	70.49	70.49	1097
16	26.50	Total>	142.50	37.50m	250.05	75.52	75.52	1097
17	26.00	Total>	152.00	42.09	261.94	80.56	80.56	1097
		Total>	152.00	40.00m	295.40	152.00	152.00	1316
18	25.50	Total>	162.00	42.50m	311.73	162.00	162.00	1371
19	25.00	Total>	172.00	45.00m	328.07	172.00	172.00	1426
20	24.50	Total>	182.00	47.50m	344.40	182.00	182.00	1481
21	24.00	Total>	192.00	50.00m	360.73	192.00	192.00	1536

(continued)

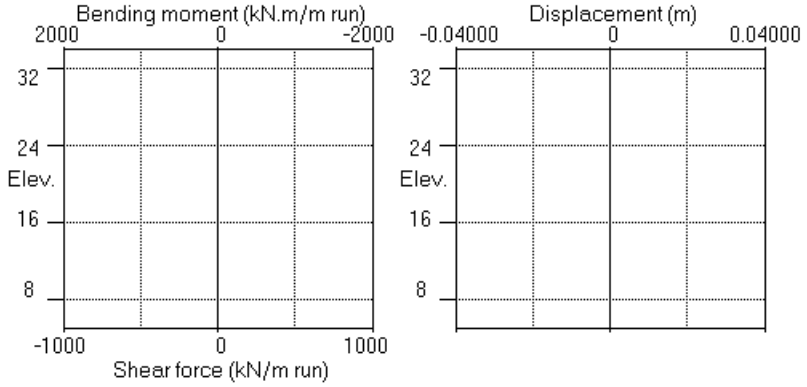
Stage No.1 Excavate to elevation 34.00 on ACTIVE side
Toe of berm at elevation 32.00
Width of top of berm = 2.60
Width of toe of berm = 2.70

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
22	23.70	Total> 198.00		51.50m	370.53	198.00	198.00	1569
23	23.35	Total> 205.00		53.25m	381.97	205.00	205.00	1607
24	23.00	Total> 212.00		55.00m	393.40	212.00	212.00	1645
25	22.50	Total> 222.00		57.50m	409.73	222.00	222.00	1700
26	22.00	Total> 232.00		60.00m	426.07	232.00	232.00	1755
27	21.50	Total> 242.00		62.50m	442.40	242.00	242.00	1810
28	21.00	Total> 252.00		65.00m	458.74	252.00	252.00	1865
29	20.50	Total> 262.00		67.50m	475.07	262.00	262.00	1919
30	20.00	Total> 272.00		70.00m	491.40	272.00	272.00	1974
31	19.50	Total> 282.00		72.50m	507.74	282.00	282.00	2029
32	19.00	Total> 292.00		75.00m	524.07	292.00	292.00	2084
33	18.50	Total> 302.00		77.50m	540.40	302.00	302.00	2139
34	18.00	Total> 312.00		80.00m	556.74	312.00	312.00	2194
35	17.50	Total> 322.00		82.50m	573.07	322.00	322.00	2249
36	17.00	Total> 332.00		85.00m	589.40	332.00	332.00	2303
37	16.50	Total> 342.00		87.50m	605.74	342.00	342.00	2358
38	16.00	Total> 352.00		90.00m	622.07	352.00	352.00	2413
39	15.50	Total> 362.00		92.50m	638.40	362.00	362.00	2468
40	15.00	Total> 372.00		95.00m	654.74	372.00	372.00	2523
41	14.50	Total> 382.00		97.50m	671.07	382.00	382.00	2578
42	14.00	Total> 392.00		100.00m	687.40	392.00	392.00	2632
43	13.50	Total> 402.00		102.50m	703.74	402.00	402.00	2687
44	13.00	Total> 412.00		105.00m	720.07	412.00	412.00	2742
45	12.50	Total> 422.00		107.73	736.40	422.00	422.00	2797
46	12.00	Total> 432.00		111.40	752.74	432.00	432.00	2852
47	11.50	Total> 442.00		115.07	769.07	442.00	442.00	2907
48	11.00	Total> 452.00		118.73	785.41	452.00	452.00	2962
49	10.50	Total> 462.00		122.40	801.74	462.00	462.00	3016
50	10.00	Total> 472.00		126.07	818.07	472.00	472.00	3071
51	9.50	Total> 482.00		129.74	834.41	482.00	482.00	3126
52	9.00	Total> 492.00		133.41	850.74	492.00	492.00	3181
53	8.50	Total> 502.00		137.08	867.07	502.00	502.00	3236
54	8.00	Total> 512.00		140.75	883.41	512.00	512.00	3291
55	7.50	Total> 522.00		144.42	899.74	522.00	522.00	3345
56	7.00	Total> 532.00		148.09	916.07	532.00	532.00	3400
57	6.50	Total> 542.00		151.76	932.41	542.00	542.00	3455
58	6.00	Total> 552.00		155.43	948.74	552.00	552.00	3510
59	5.50	Total> 562.00		159.10	965.07	562.00	562.00	3565
60	5.00	Total> 572.00		162.76	981.41	572.00	572.00	3620

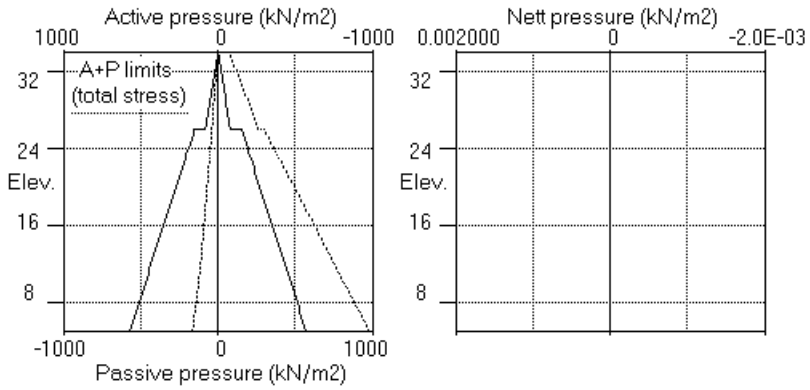
Note: 0.00a Soil pressure at active limit
123.45p Soil pressure at passive limit
590.83b Passive limit reduced because of berm

Units: kN,m

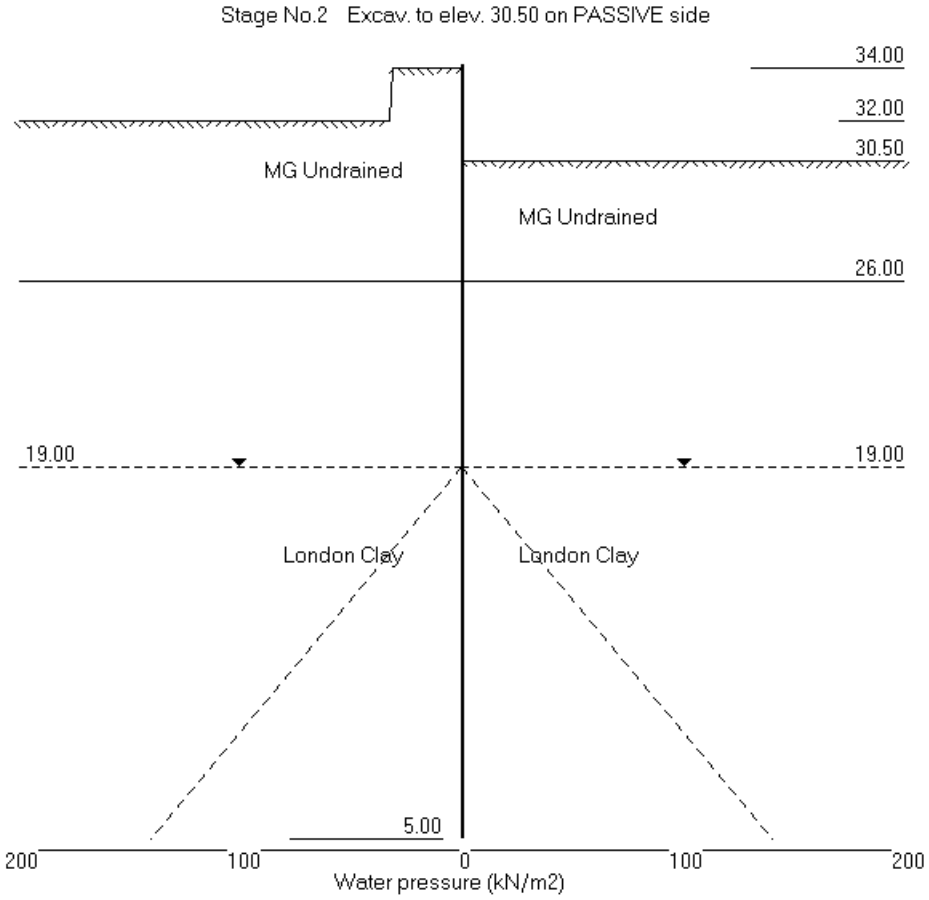
Stage No.1 Excav. to elev. 34.00 on ACTIVE side



Stage No.1 Excav. to elev. 34.00 on ACTIVE side



Units: kN,m


Stage No.2 Excav. to elev. 30.50 on PASSIVE side
34.00
32.00
30.50
MG Undrained
MG Undrained
26.00
19.00
19.00
London Clay
London Clay
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 2 Excavate to elevation 30.50 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
2	34.00	30.50	Cant.	4.996	7.44	28.56	1.94

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	0.00	0.019	7.44E-04	0.0	-0.0		12352200
2	33.50	2.50	0.019	7.44E-04	0.6	0.1		12352200
3	33.00	5.00	0.019	7.44E-04	2.5	0.8		12352200
4	32.50	7.50	0.018	7.44E-04	5.6	2.8		12352200
5	32.00	10.00	0.018	7.44E-04	10.0	6.7		12352200
6	31.50	12.50	0.017	7.44E-04	15.6	13.0		12352200
7	31.00	15.00	0.017	7.43E-04	22.5	22.5		12352200
8	30.50	17.50	0.017	7.42E-04	30.6	35.7		12352200
		-8.39	0.017	7.42E-04	30.6	35.7		
9	30.00	-5.31	0.016	7.40E-04	27.2	50.1		12352200
10	29.50	-2.24	0.016	7.38E-04	25.3	63.1		12352200
11	29.00	0.83	0.016	7.35E-04	25.0	75.6		12352200
12	28.50	3.90	0.015	7.32E-04	26.1	88.3		12352200
13	28.00	6.97	0.015	7.28E-04	28.9	102.0		12352200
14	27.50	10.03	0.014	7.23E-04	33.1	117.4		12352200
15	27.00	9.09	0.014	7.18E-04	37.9	135.1		12352200
16	26.50	8.97	0.014	7.12E-04	42.4	156.7		12352200
17	26.00	10.45	0.013	7.06E-04	47.3	179.0		12352200
		-3.37	0.013	7.06E-04	47.3	179.0		
18	25.50	-4.34	0.013	6.98E-04	45.3	202.2		12352200
19	25.00	-5.19	0.013	6.89E-04	43.0	224.4		12352200
20	24.50	-5.93	0.012	6.80E-04	40.2	245.2		12352200
21	24.00	-6.55	0.012	6.69E-04	37.1	264.5		12352200
22	23.70	-6.87	0.012	6.63E-04	35.0	275.4		12352200
23	23.35	-7.20	0.012	6.55E-04	32.6	287.2		12352200
24	23.00	-7.48	0.011	6.47E-04	30.0	298.2		12352200
25	22.50	-7.80	0.011	6.34E-04	26.2	312.2		12352200
26	22.00	-8.03	0.011	6.21E-04	22.2	324.4		12352200
27	21.50	-8.18	0.010	6.08E-04	18.2	334.5		12352200
28	21.00	-8.25	0.010	5.94E-04	14.1	342.5		12352200

(continued)

Stage No.2 Excavate to elevation 30.50 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
29	20.50	-8.24	0.010	5.80E-04	10.0	348.5		12352200
30	20.00	-8.17	0.010	5.66E-04	5.9	352.5		12352200
31	19.50	-8.04	0.009	5.52E-04	1.8	354.4		12352200
32	19.00	-7.85	0.009	5.37E-04	-2.2	354.3		12352200
33	18.50	-7.61	0.009	5.23E-04	-6.0	352.2		12352200
34	18.00	-7.31	0.008	5.09E-04	-9.8	348.2		12352200
35	17.50	-6.98	0.008	4.95E-04	-13.3	342.5		12352200
36	17.00	-6.60	0.008	4.81E-04	-16.7	334.9		12352200
37	16.50	-6.19	0.008	4.68E-04	-19.9	325.7		12352200
38	16.00	-5.74	0.008	4.55E-04	-22.9	315.0		12352200
39	15.50	-5.26	0.007	4.42E-04	-25.7	302.8		12352200
40	15.00	-4.74	0.007	4.30E-04	-28.2	289.3		12352200
41	14.50	-4.20	0.007	4.19E-04	-30.4	274.6		12352200
42	14.00	-3.63	0.007	4.08E-04	-32.4	258.9		12352200
43	13.50	-3.02	0.006	3.98E-04	-34.0	242.3		12352200
44	13.00	-2.39	0.006	3.89E-04	-35.4	224.9		12352200
45	12.50	-1.73	0.006	3.80E-04	-36.4	206.9		12352200
46	12.00	-1.03	0.006	3.72E-04	-37.1	188.5		12352200
47	11.50	-0.30	0.006	3.65E-04	-37.4	169.8		12352200
48	11.00	0.46	0.006	3.58E-04	-37.4	151.0		12352200
49	10.50	1.26	0.005	3.52E-04	-37.0	132.4		12352200
50	10.00	2.10	0.005	3.47E-04	-36.1	114.0		12352200
51	9.50	2.98	0.005	3.43E-04	-34.9	96.2		12352200
52	9.00	3.90	0.005	3.40E-04	-33.1	79.2		12352200
53	8.50	4.88	0.005	3.37E-04	-30.9	63.1		12352200
54	8.00	5.90	0.004	3.34E-04	-28.2	48.2		12352200
55	7.50	6.98	0.004	3.33E-04	-25.0	34.8		12352200
56	7.00	8.12	0.004	3.32E-04	-21.2	23.2		12352200
57	6.50	9.32	0.004	3.31E-04	-16.9	13.6		12352200
58	6.00	10.58	0.004	3.30E-04	-11.9	6.3		12352200
59	5.50	11.90	0.004	3.30E-04	-6.3	1.7		12352200
60	5.00	13.29	0.003	3.30E-04	0.0	0.0		---

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	34.00	Total>	0.00	0.00	33.95b	0.00	0.00a	2627
2	33.50	Total>	9.50	2.50m	39.58b	2.50	2.50a	2627
		Total>	9.50	2.50m	83.59	2.50	2.50a	2627
3	33.00	Total>	19.00	5.00m	95.48	5.00	5.00a	2627
		Total>	19.00	5.00m	26.60b	5.00	5.00a	2627
4	32.50	Total>	28.50	7.50m	29.92b	7.50	7.50a	2627
		Total>	28.50	7.50m	27.52b	7.50	7.50a	2627
5	32.00	Total>	38.00	10.00m	30.57b	10.00	10.00a	2627
		Total>	38.00	10.00m	88.21b	10.00	10.00a	2627
6	31.50	Total>	47.50	12.50m	97.00b	12.50	12.50a	2627
		Total>	47.50	12.50m	99.96b	12.50	12.50a	2627
7	31.00	Total>	57.00	15.00m	109.02b	15.00	15.00a	2627
		Total>	57.00	15.00m	111.74b	15.00	15.00a	2627
8	30.50	Total>	66.50	17.50m	121.03b	17.50	17.50a	2627
		Total>	66.50	17.50m	123.53b	17.50	17.50a	2627
9	30.00	Total>	76.00	20.00m	133.01b	20.00	20.00a	2627
		Total>	76.00	20.00m	135.34b	20.00	20.00a	2627
10	29.50	Total>	85.50	22.50m	144.99b	22.50	22.50a	2627
		Total>	85.50	22.50m	147.16b	22.50	22.50a	2627

(continued)

Stage No.2 Excavate to elevation 30.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
11	29.00	Total>	95.00	25.00m	156.95b	25.00	25.00a	2627
		Total>	95.00	25.00m	158.98b	25.00	25.00a	2627
12	28.50	Total>	104.50	27.50m	168.90b	27.50	27.50a	2627
		Total>	104.50	27.50m	170.82b	27.50	27.50a	2627
13	28.00	Total>	114.00	30.00m	180.85b	30.00	30.00a	2627
		Total>	114.00	30.00m	182.66b	30.00	30.00a	2627
14	27.50	Total>	123.50	32.50m	192.79b	32.50	32.50a	2627
		Total>	123.50	32.50m	194.50b	32.50	32.50a	2627
15	27.00	Total>	133.00	35.00m	204.72b	35.00	35.00a	2627
		Total>	133.00	35.00m	206.35b	35.00	35.00a	2627
16	26.50	Total>	142.50	37.50m	216.65b	39.36	39.36	2627
		Total>	142.50	37.50m	218.20b	39.36	39.36	2627
17	26.00	Total>	152.00	42.09	228.58b	45.33	45.33	2627
		Total>	152.00	40.00m	295.40	109.72	109.72	3153
18	25.50	Total>	162.00	42.50m	311.73	119.11	119.11	3284
19	25.00	Total>	172.00	45.00m	328.07	128.58	128.58	3416
20	24.50	Total>	182.00	47.50m	344.40	138.13	138.13	3547
		Total>	182.00	47.50m	325.68b	138.13	138.13	3547
21	24.00	Total>	192.00	50.00m	341.13b	147.74	147.74	3678
		Total>	192.00	50.00m	337.36b	147.74	147.74	3678
22	23.70	Total>	198.00	51.50m	346.53b	153.55	153.55	3757
		Total>	198.00	51.50m	347.20b	153.55	153.55	3757
23	23.35	Total>	205.00	53.25m	357.92b	160.35	160.35	3849
		Total>	205.00	53.25m	358.63b	160.35	160.35	3849
24	23.00	Total>	212.00	55.00m	369.36b	167.18	167.18	3941
		Total>	212.00	55.00m	370.19b	167.18	167.18	3941
25	22.50	Total>	222.00	57.50m	385.56b	176.99	176.99	4072
		Total>	222.00	57.50m	386.51b	176.99	176.99	4072
26	22.00	Total>	232.00	60.00m	401.92b	186.86	186.86	4204
		Total>	232.00	60.00m	402.82b	186.86	186.86	4204
27	21.50	Total>	242.00	62.50m	418.27b	196.78	196.78	4335
		Total>	242.00	62.50m	419.14b	196.78	196.78	4335
28	21.00	Total>	252.00	65.00m	434.62b	206.75	206.75	4466
		Total>	252.00	65.00m	435.46b	206.75	206.75	4466
29	20.50	Total>	262.00	67.50m	450.96b	216.78	216.78	4598
		Total>	262.00	67.50m	451.78b	216.78	216.78	4598
30	20.00	Total>	272.00	70.00m	467.31b	226.84	226.84	4729
		Total>	272.00	70.00m	468.10b	226.84	226.84	4729
31	19.50	Total>	282.00	72.50m	483.66b	236.94	236.94	4861
		Total>	282.00	72.50m	484.42b	236.94	236.94	4861
32	19.00	Total>	292.00	75.00m	500.00b	247.09	247.09	4992
		Total>	292.00	75.00m	500.63b	247.09	247.09	4992
33	18.50	Total>	302.00	77.50m	516.46b	257.27	257.27	5123
34	18.00	Total>	312.00	80.00m	532.80b	267.48	267.48	5255
35	17.50	Total>	322.00	82.50m	549.14b	277.72	277.72	5386
36	17.00	Total>	332.00	85.00m	565.47b	287.98	287.98	5517
37	16.50	Total>	342.00	87.50m	581.81b	298.28	298.28	5649
38	16.00	Total>	352.00	90.00m	598.15b	308.59	308.59	5780
39	15.50	Total>	362.00	92.50m	614.49b	318.94	318.94	5911
40	15.00	Total>	372.00	95.00m	630.83b	329.30	329.30	6043
		Total>	372.00	95.00m	654.74	329.30	329.30	6043
41	14.50	Total>	382.00	97.50m	671.07	339.68	339.68	6174
42	14.00	Total>	392.00	100.00m	687.40	350.09	350.09	6306
43	13.50	Total>	402.00	102.50m	703.74	360.51	360.51	6437
44	13.00	Total>	412.00	105.00m	720.07	370.96	370.96	6568

(continued)

Stage No.2 Excavate to elevation 30.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
45	12.50	Total> 422.00		107.73	736.40	381.43	381.43	6700
46	12.00	Total> 432.00		111.40	752.74	391.92	391.92	6831
47	11.50	Total> 442.00		115.07	769.07	402.43	402.43	6962
48	11.00	Total> 452.00		118.73	785.41	412.97	412.97	7094
49	10.50	Total> 462.00		122.40	801.74	423.53	423.53	7225
50	10.00	Total> 472.00		126.07	818.07	434.12	434.12	7356
51	9.50	Total> 482.00		129.74	834.41	444.74	444.74	7488
52	9.00	Total> 492.00		133.41	850.74	455.39	455.39	7619
53	8.50	Total> 502.00		137.08	867.07	466.07	466.07	7751
54	8.00	Total> 512.00		140.75	883.41	476.78	476.78	7882
55	7.50	Total> 522.00		144.42	899.74	487.53	487.53	8013
56	7.00	Total> 532.00		148.09	916.07	498.32	498.32	8145
57	6.50	Total> 542.00		151.76	932.41	509.15	509.15	8276
58	6.00	Total> 552.00		155.43	948.74	520.02	520.02	8407
59	5.50	Total> 562.00		159.10	965.07	530.94	530.94	8539
60	5.00	Total> 572.00		162.76	981.41	541.89	541.89	8670

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	33.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	32.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	31.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	31.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	30.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00		0.00	88.43	25.89	25.89	1551
9	30.00	Total> 9.50		2.50m	100.32	25.31	25.31	1551
10	29.50	Total> 19.00		5.00m	112.21	24.74	24.74	1551
11	29.00	Total> 28.50		7.50m	124.10	24.17	24.17	1551
12	28.50	Total> 38.00		10.00m	135.99	23.60	23.60	1551
13	28.00	Total> 47.50		12.50m	147.88	23.03	23.03	1551
14	27.50	Total> 57.01		15.00m	159.77	22.47	22.47	1551
15	27.00	Total> 66.51		17.50m	171.67	25.91	25.91	1551
16	26.50	Total> 76.01		20.00m	183.56	30.39	30.39	1551
17	26.00	Total> 85.52		22.50m	195.46	34.88	34.88	1551
		Total> 85.52		22.50m	228.92	113.09	113.09	1861
18	25.50	Total> 95.53		25.00m	245.26	123.46	123.46	1939
19	25.00	Total> 105.54		27.50m	261.60	133.78	133.78	2017
20	24.50	Total> 115.55		30.00m	277.95	144.06	144.06	2094
21	24.00	Total> 125.56		32.50m	294.29	154.30	154.30	2172
22	23.70	Total> 131.57		34.00m	304.10	160.42	160.42	2218
23	23.35	Total> 138.58		35.75m	315.55	167.55	167.55	2273
24	23.00	Total> 145.59		37.50m	326.99	174.66	174.66	2327
25	22.50	Total> 155.61		40.00m	343.35	184.79	184.79	2404
26	22.00	Total> 165.63		42.50m	359.70	194.89	194.89	2482
27	21.50	Total> 175.66		45.00m	376.06	204.96	204.96	2560
28	21.00	Total> 185.69		47.50m	392.42	215.00	215.00	2637
29	20.50	Total> 195.72		50.00m	408.78	225.02	225.02	2715
30	20.00	Total> 205.75		52.50m	425.15	235.01	235.01	2792

(continued)

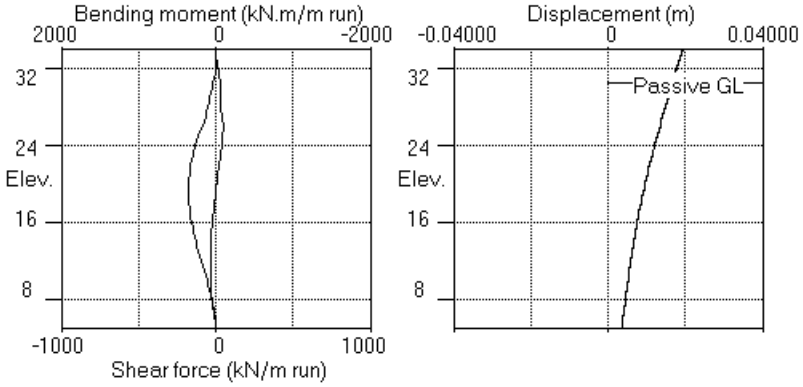
Stage No.2 Excavate to elevation 30.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth	Coeff. of subgrade
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	pressure	reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
31	19.50	Total>	215.78	55.00m	441.52	244.98	244.98	2870
32	19.00	Total>	225.82	57.50m	457.89	254.94	254.94	2947
33	18.50	Total>	235.86	60.00m	474.27	264.87	264.87	3025
34	18.00	Total>	245.91	62.50m	490.65	274.79	274.79	3102
35	17.50	Total>	255.96	65.00m	507.03	284.69	284.69	3180
36	17.00	Total>	266.01	67.50m	523.41	294.59	294.59	3258
37	16.50	Total>	276.07	70.00m	539.80	304.47	304.47	3335
38	16.00	Total>	286.12	72.50m	556.19	314.34	314.34	3413
39	15.50	Total>	296.19	75.00m	572.59	324.19	324.19	3490
40	15.00	Total>	306.25	77.50m	588.99	334.04	334.04	3568
41	14.50	Total>	316.32	80.00m	605.39	343.88	343.88	3645
42	14.00	Total>	326.40	82.50m	621.80	353.71	353.71	3723
43	13.50	Total>	336.47	85.00m	638.21	363.54	363.54	3800
44	13.00	Total>	346.55	87.50m	654.62	373.35	373.35	3878
45	12.50	Total>	356.64	90.00m	671.04	383.15	383.15	3956
46	12.00	Total>	366.72	92.50m	687.46	392.95	392.95	4033
47	11.50	Total>	376.82	95.00m	703.89	402.74	402.74	4111
48	11.00	Total>	386.91	97.50m	720.32	412.51	412.51	4188
49	10.50	Total>	397.01	100.00m	736.75	422.27	422.27	4266
50	10.00	Total>	407.11	102.50m	753.18	432.02	432.02	4343
51	9.50	Total>	417.22	105.00m	769.62	441.76	441.76	4421
52	9.00	Total>	427.33	107.50m	786.07	451.48	451.48	4499
53	8.50	Total>	437.44	110.00m	802.51	461.19	461.19	4576
54	8.00	Total>	447.56	112.50m	818.96	470.88	470.88	4654
55	7.50	Total>	457.68	115.00m	835.42	480.55	480.55	4731
56	7.00	Total>	467.80	117.50m	851.88	490.20	490.20	4809
57	6.50	Total>	477.93	120.00m	868.34	499.84	499.84	4886
58	6.00	Total>	488.06	122.50m	884.80	509.45	509.45	4964
59	5.50	Total>	498.19	125.00m	901.27	519.04	519.04	5041
60	5.00	Total>	508.33	127.50m	917.74	528.60	528.60	5119

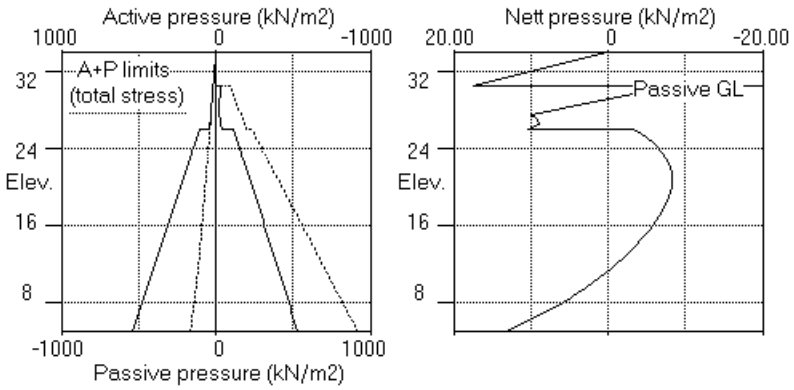
Note: 35.00a Soil pressure at active limit
123.45p Soil pressure at passive limit
590.83b Passive limit reduced because of berm

Units: kN,m

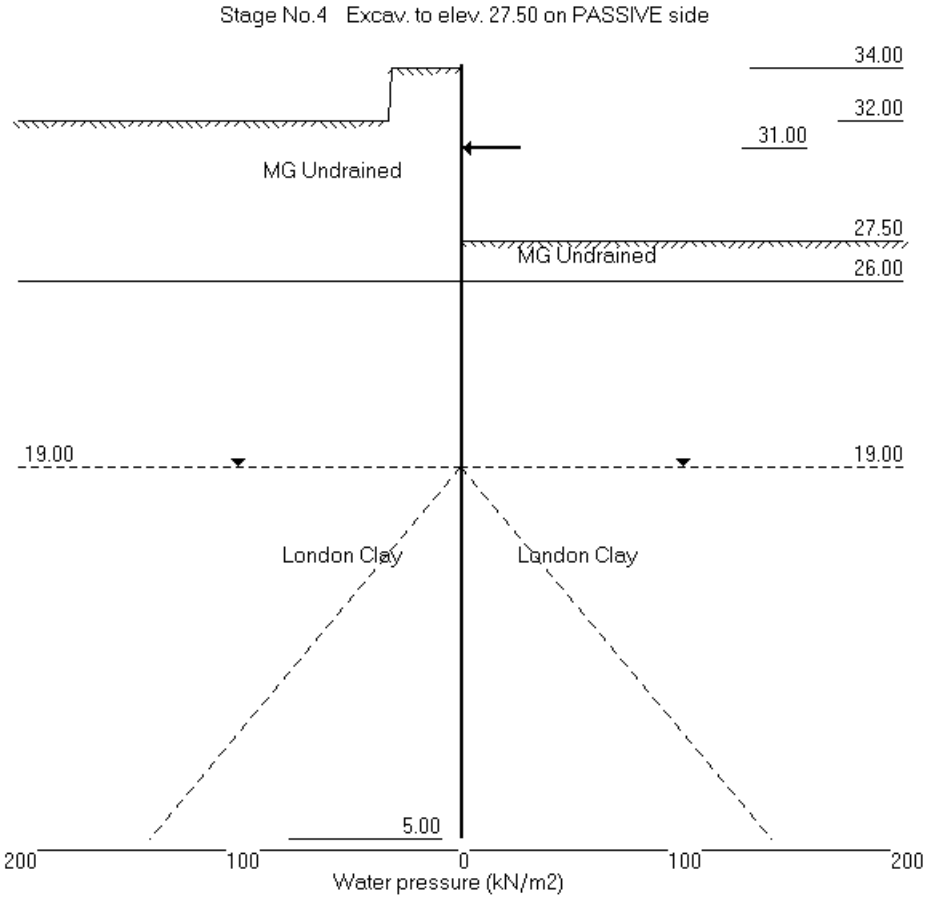
Stage No.2 Excav. to elev. 30.50 on PASSIVE side



Stage No.2 Excav. to elev. 30.50 on PASSIVE side



Units: kN,m


Stage No.4 Excav. to elev. 27.50 on PASSIVE side
34.00
32.00
31.00
MG Undrained
27.50
MG Undrained
26.00
19.00
19.00
London Clay
London Clay
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 4 Excavate to elevation 27.50 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
4	34.00	27.50	31.00	4.907	n/a	27.00	0.50

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	17.03	0.018	6.06E-06	0.0	-0.0		12352200
2	33.50	15.76	0.018	6.01E-06	8.2	2.2		12352200
3	33.00	14.49	0.018	5.80E-06	15.8	8.4		12352200
4	32.50	13.22	0.018	5.26E-06	22.7	18.2		12352200
5	32.00	11.94	0.018	4.26E-06	29.0	31.3		12352200
6	31.50	12.50	0.018	2.66E-06	35.1	47.4		12352200
7	31.00	15.00	0.018	3.62E-07	42.0	66.6	220.5	12352200
		15.00	0.018	3.62E-07	-178.5	66.6		
8	30.50	17.50	0.018	-5.66E-07	-170.4	-20.7		12352200
9	30.00	20.00	0.018	1.94E-06	-161.0	-103.6		12352200
10	29.50	22.50	0.018	7.72E-06	-150.4	-181.6		12352200
11	29.00	25.00	0.018	1.65E-05	-138.5	-253.9		12352200
12	28.50	27.50	0.018	2.81E-05	-125.4	-319.9		12352200
13	28.00	30.00	0.018	4.22E-05	-111.0	-379.1		12352200
14	27.50	32.50	0.018	5.86E-05	-95.4	-430.8		12352200
		28.81	0.018	5.86E-05	-95.4	-430.8		
15	27.00	30.92	0.018	7.70E-05	-80.5	-474.8		12352200
16	26.50	32.50	0.017	9.69E-05	-64.6	-509.8		12352200
17	26.00	34.59	0.017	1.18E-04	-47.8	-538.0		12352200
		33.55	0.017	1.18E-04	-47.8	-538.0		
18	25.50	30.51	0.017	1.40E-04	-31.8	-557.7		12352200
19	25.00	27.55	0.017	1.63E-04	-17.3	-569.8		12352200
20	24.50	24.70	0.017	1.86E-04	-4.2	-575.0		12352200
21	24.00	21.95	0.017	2.09E-04	7.4	-574.1		12352200
22	23.70	20.35	0.017	2.23E-04	13.8	-570.9		12352200
23	23.35	18.53	0.017	2.39E-04	20.6	-564.8		12352200
24	23.00	16.78	0.017	2.55E-04	26.7	-556.5		12352200
25	22.50	14.37	0.017	2.77E-04	34.5	-541.0		12352200
26	22.00	12.08	0.017	2.99E-04	41.1	-521.9		12352200
27	21.50	9.91	0.016	3.19E-04	46.6	-499.9		12352200

(continued)

Stage No.4 Excavate to elevation 27.50 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
28	21.00	7.88	0.016	3.39E-04	51.1	-475.3		12352200
29	20.50	5.97	0.016	3.58E-04	54.5	-448.8		12352200
30	20.00	4.19	0.016	3.75E-04	57.1	-420.8		12352200
31	19.50	2.54	0.016	3.92E-04	58.8	-391.7		12352200
32	19.00	1.02	0.016	4.07E-04	59.7	-362.0		12352200
33	18.50	-0.37	0.015	4.21E-04	59.8	-332.1		12352200
34	18.00	-1.64	0.015	4.34E-04	59.3	-302.2		12352200
35	17.50	-2.77	0.015	4.46E-04	58.2	-272.7		12352200
36	17.00	-3.78	0.015	4.56E-04	56.6	-244.0		12352200
37	16.50	-4.67	0.014	4.65E-04	54.5	-216.2		12352200
38	16.00	-5.44	0.014	4.74E-04	51.9	-189.5		12352200
39	15.50	-6.09	0.014	4.81E-04	49.0	-164.2		12352200
40	15.00	-6.63	0.014	4.87E-04	45.9	-140.5		12352200
41	14.50	-7.05	0.013	4.92E-04	42.4	-118.4		12352200
42	14.00	-7.37	0.013	4.97E-04	38.8	-98.1		12352200
43	13.50	-7.57	0.013	5.00E-04	35.1	-79.6		12352200
44	13.00	-7.67	0.013	5.03E-04	31.3	-63.0		12352200
45	12.50	-7.67	0.012	5.05E-04	27.5	-48.3		12352200
46	12.00	-7.57	0.012	5.07E-04	23.6	-35.5		12352200
47	11.50	-7.37	0.012	5.08E-04	19.9	-24.6		12352200
48	11.00	-7.07	0.012	5.09E-04	16.3	-15.6		12352200
49	10.50	-6.67	0.011	5.09E-04	12.9	-8.3		12352200
50	10.00	-6.18	0.011	5.10E-04	9.7	-2.7		12352200
51	9.50	-5.60	0.011	5.10E-04	6.7	1.3		12352200
52	9.00	-4.92	0.011	5.10E-04	4.1	4.0		12352200
53	8.50	-4.15	0.010	5.09E-04	1.8	5.4		12352200
54	8.00	-3.29	0.010	5.09E-04	-0.0	5.8		12352200
55	7.50	-2.33	0.010	5.09E-04	-1.4	5.3		12352200
56	7.00	-1.28	0.010	5.09E-04	-2.3	4.3		12352200
57	6.50	-0.14	0.009	5.09E-04	-2.7	3.0		12352200
58	6.00	1.10	0.009	5.09E-04	-2.5	1.6		12352200
59	5.50	2.44	0.009	5.09E-04	-1.6	0.5		12352200
60	5.00	3.87	0.009	5.09E-04	0.0	0.0		---

At elev. 31.00 Strut force = 1102.4 kN/strut = 220.5 kN/m run

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	34.00	Total>	0.00	0.00	33.95b	17.03	17.03	10204
2	33.50	Total>	9.50	2.50m	39.58b	15.76	15.76	10204
		Total>	9.50	2.50m	83.59	15.76	15.76	10204
3	33.00	Total>	19.00	5.00m	95.48	14.49	14.49	10204
		Total>	19.00	5.00m	26.60b	14.49	14.49	10204
4	32.50	Total>	28.50	7.50m	29.92b	13.22	13.22	10204
		Total>	28.50	7.50m	27.52b	13.22	13.22	10204
5	32.00	Total>	38.00	10.00m	30.57b	11.94	11.94	10204
		Total>	38.00	10.00m	88.21b	11.94	11.94	10204
6	31.50	Total>	47.50	12.50m	97.00b	12.50	12.50a	2512
		Total>	47.50	12.50m	99.96b	12.50	12.50a	2512
7	31.00	Total>	57.00	15.00m	109.02b	15.00	15.00a	2512
		Total>	57.00	15.00m	111.74b	15.00	15.00a	2512
8	30.50	Total>	66.50	17.50m	121.03b	17.50	17.50a	2512
		Total>	66.50	17.50m	123.53b	17.50	17.50a	2512
9	30.00	Total>	76.00	20.00m	133.01b	20.00	20.00a	2512
		Total>	76.00	20.00m	135.34b	20.00	20.00a	2512

(continued)

Stage No.4 Excavate to elevation 27.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
10	29.50	Total>	85.50	22.50m	144.99b	22.50	22.50a	2512
		Total>	85.50	22.50m	147.16b	22.50	22.50a	2512
11	29.00	Total>	95.00	25.00m	156.95b	25.00	25.00a	2512
		Total>	95.00	25.00m	158.98b	25.00	25.00a	2512
12	28.50	Total>	104.50	27.50m	168.90b	27.50	27.50a	2512
		Total>	104.50	27.50m	170.82b	27.50	27.50a	2512
13	28.00	Total>	114.00	30.00m	180.85b	30.00	30.00a	2512
		Total>	114.00	30.00m	182.66b	30.00	30.00a	2512
14	27.50	Total>	123.50	32.50m	192.79b	32.50	32.50a	2512
		Total>	123.50	32.50m	194.50b	32.50	32.50a	2512
15	27.00	Total>	133.00	35.00m	204.72b	35.00	35.00a	2512
		Total>	133.00	35.00m	206.35b	35.00	35.00a	2512
16	26.50	Total>	142.50	37.50m	216.65b	37.50	37.50a	2512
		Total>	142.50	37.50m	218.20b	37.50	37.50a	2512
17	26.00	Total>	152.00	42.09	228.58b	42.09	42.09a	2512
		Total>	152.00	40.00m	295.40	97.64	97.64	3014
18	25.50	Total>	162.00	42.50m	311.73	105.63	105.63	3140
19	25.00	Total>	172.00	45.00m	328.07	113.68	113.68	3265
20	24.50	Total>	182.00	47.50m	344.40	121.79	121.79	3391
		Total>	182.00	47.50m	325.68b	121.79	121.79	3391
21	24.00	Total>	192.00	50.00m	341.13b	129.96	129.96	3516
		Total>	192.00	50.00m	337.36b	129.96	129.96	3516
22	23.70	Total>	198.00	51.50m	346.53b	134.89	134.89	3592
		Total>	198.00	51.50m	347.20b	134.89	134.89	3592
23	23.35	Total>	205.00	53.25m	357.92b	140.69	140.69	3680
		Total>	205.00	53.25m	358.63b	140.69	140.69	3680
24	23.00	Total>	212.00	55.00m	369.36b	146.52	146.52	3767
		Total>	212.00	55.00m	370.19b	146.52	146.52	3767
25	22.50	Total>	222.00	57.50m	385.56b	154.91	154.91	3893
		Total>	222.00	57.50m	386.51b	154.91	154.91	3893
26	22.00	Total>	232.00	60.00m	401.92b	163.38	163.38	4019
		Total>	232.00	60.00m	402.82b	163.38	163.38	4019
27	21.50	Total>	242.00	62.50m	418.27b	171.94	171.94	4144
		Total>	242.00	62.50m	419.14b	171.94	171.94	4144
28	21.00	Total>	252.00	65.00m	434.62b	180.58	180.58	4270
		Total>	252.00	65.00m	435.46b	180.58	180.58	4270
29	20.50	Total>	262.00	67.50m	450.96b	189.31	189.31	4395
		Total>	262.00	67.50m	451.78b	189.31	189.31	4395
30	20.00	Total>	272.00	70.00m	467.31b	198.12	198.12	4521
		Total>	272.00	70.00m	468.10b	198.12	198.12	4521
31	19.50	Total>	282.00	72.50m	483.66b	207.02	207.02	4646
		Total>	282.00	72.50m	484.42b	207.02	207.02	4646
32	19.00	Total>	292.00	75.00m	500.00b	216.01	216.01	4772
		Total>	292.00	75.00m	500.63b	216.01	216.01	4772
33	18.50	Total>	302.00	77.50m	516.46b	225.08	225.08	4898
34	18.00	Total>	312.00	80.00m	532.80b	234.25	234.25	5023
35	17.50	Total>	322.00	82.50m	549.14b	243.50	243.50	5149
36	17.00	Total>	332.00	85.00m	565.47b	252.83	252.83	5274
37	16.50	Total>	342.00	87.50m	581.81b	262.25	262.25	5400
38	16.00	Total>	352.00	90.00m	598.15b	271.75	271.75	5526
39	15.50	Total>	362.00	92.50m	614.49b	281.34	281.34	5651
40	15.00	Total>	372.00	95.00m	630.83b	291.00	291.00	5777
		Total>	372.00	95.00m	654.74	291.00	291.00	5777
41	14.50	Total>	382.00	97.50m	671.07	300.75	300.75	5902
42	14.00	Total>	392.00	100.00m	687.40	310.57	310.57	6028

(continued)

Stage No.4 Excavate to elevation 27.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
43	13.50	Total>	402.00	102.50m	703.74	320.46	320.46	6153
44	13.00	Total>	412.00	105.00m	720.07	330.43	330.43	6279
45	12.50	Total>	422.00	107.73	736.40	340.47	340.47	6405
46	12.00	Total>	432.00	111.40	752.74	350.59	350.59	6530
47	11.50	Total>	442.00	115.07	769.07	360.77	360.77	6656
48	11.00	Total>	452.00	118.73	785.41	371.02	371.02	6781
49	10.50	Total>	462.00	122.40	801.74	381.34	381.34	6907
50	10.00	Total>	472.00	126.07	818.07	391.72	391.72	7033
51	9.50	Total>	482.00	129.74	834.41	402.17	402.17	7158
52	9.00	Total>	492.00	133.41	850.74	412.68	412.68	7284
53	8.50	Total>	502.00	137.08	867.07	423.26	423.26	7409
54	8.00	Total>	512.00	140.75	883.41	433.91	433.91	7535
55	7.50	Total>	522.00	144.42	899.74	444.62	444.62	7660
56	7.00	Total>	532.00	148.09	916.07	455.39	455.39	7786
57	6.50	Total>	542.00	151.76	932.41	466.23	466.23	7912
58	6.00	Total>	552.00	155.43	948.74	477.13	477.13	8037
59	5.50	Total>	562.00	159.10	965.07	488.10	488.10	8163
60	5.00	Total>	572.00	162.76	981.41	499.14	499.14	8288

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	33.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	32.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	31.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	31.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	30.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	29.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	29.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	28.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	28.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	27.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	102.77	3.69	3.69	1203
15	27.00	Total>	9.50	2.50m	114.66	4.08	4.08	1203
16	26.50	Total>	19.00	5.00m	126.55	5.00	5.00a	1203
17	26.00	Total>	28.50	7.50m	138.44	7.50	7.50a	1203
		Total>	28.50	7.50m	171.90	64.09	64.09	1444
18	25.50	Total>	38.50	10.00m	188.24	75.13	75.13	1504
19	25.00	Total>	48.51	12.50m	204.57	86.12	86.12	1564
20	24.50	Total>	58.51	15.00m	220.91	97.09	97.09	1624
21	24.00	Total>	68.52	17.50m	237.25	108.01	108.01	1685
22	23.70	Total>	74.52	19.00m	247.06	114.55	114.55	1721
23	23.35	Total>	81.53	20.75m	258.50	122.15	122.15	1763
24	23.00	Total>	88.54	22.50m	269.94	129.74	129.74	1805
25	22.50	Total>	98.55	25.00m	286.29	140.55	140.55	1865
26	22.00	Total>	108.57	27.50m	302.64	151.31	151.31	1925
27	21.50	Total>	118.59	30.00m	318.99	162.03	162.03	1985
28	21.00	Total>	128.61	32.50m	335.35	172.70	172.70	2046

(continued)

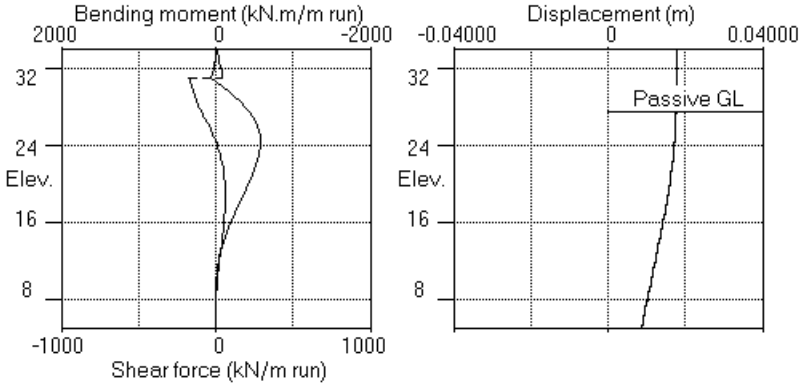
Stage No.4 Excavate to elevation 27.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
		Water press.	Effective stresses Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
29	20.50	Total>	138.64	35.00m	351.71	183.34	183.34	2106
30	20.00	Total>	148.67	37.50m	368.07	193.93	193.93	2166
31	19.50	Total>	158.71	40.00m	384.44	204.48	204.48	2226
32	19.00	Total>	168.75	42.50m	400.82	214.99	214.99	2286
33	18.50	Total>	178.79	45.00m	417.20	225.46	225.46	2346
34	18.00	Total>	188.84	47.50m	433.58	235.88	235.88	2406
35	17.50	Total>	198.90	50.00m	449.97	246.27	246.27	2467
36	17.00	Total>	208.96	52.50m	466.36	256.61	256.61	2527
37	16.50	Total>	219.03	55.00m	482.76	266.92	266.92	2587
38	16.00	Total>	229.10	57.50m	499.17	277.20	277.20	2647
39	15.50	Total>	239.18	60.00m	515.58	287.43	287.43	2707
40	15.00	Total>	249.26	62.50m	532.00	297.63	297.63	2767
41	14.50	Total>	259.35	65.00m	548.42	307.80	307.80	2828
42	14.00	Total>	269.45	67.50m	564.85	317.93	317.93	2888
43	13.50	Total>	279.55	70.00m	581.29	328.03	328.03	2948
44	13.00	Total>	289.66	72.50m	597.73	338.10	338.10	3008
45	12.50	Total>	299.78	75.00m	614.18	348.14	348.14	3068
46	12.00	Total>	309.90	77.50m	630.64	358.15	358.15	3128
47	11.50	Total>	320.03	80.00m	647.10	368.13	368.13	3189
48	11.00	Total>	330.16	82.50m	663.57	378.08	378.08	3249
49	10.50	Total>	340.31	85.00m	680.04	388.01	388.01	3309
50	10.00	Total>	350.46	87.50m	696.53	397.90	397.90	3369
51	9.50	Total>	360.61	90.00m	713.02	407.77	407.77	3429
52	9.00	Total>	370.77	92.50m	729.51	417.60	417.60	3489
53	8.50	Total>	380.94	95.00m	746.02	427.41	427.41	3550
54	8.00	Total>	391.12	97.50m	762.53	437.20	437.20	3610
55	7.50	Total>	401.31	100.00m	779.04	446.95	446.95	3670
56	7.00	Total>	411.50	102.50m	795.57	456.67	456.67	3730
57	6.50	Total>	421.69	105.00m	812.10	466.37	466.37	3790
58	6.00	Total>	431.90	107.50m	828.64	476.03	476.03	3850
59	5.50	Total>	442.11	110.00m	845.18	485.67	485.67	3911
60	5.00	Total>	452.32	112.50m	861.73	495.27	495.27	3971

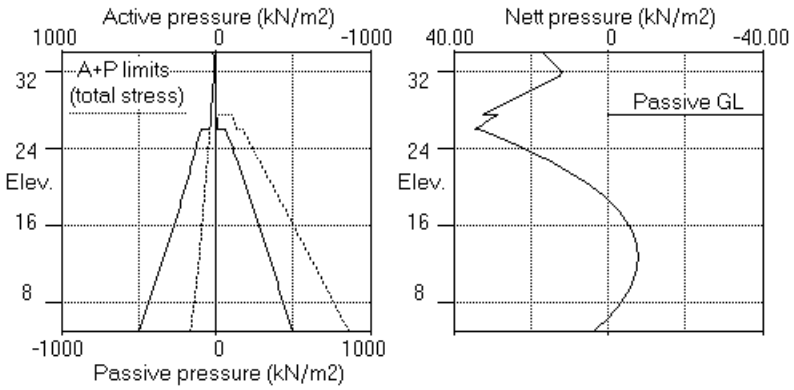
Note: 7.50a Soil pressure at active limit
123.45p Soil pressure at passive limit
590.83b Passive limit reduced because of berm

Units: kN,m

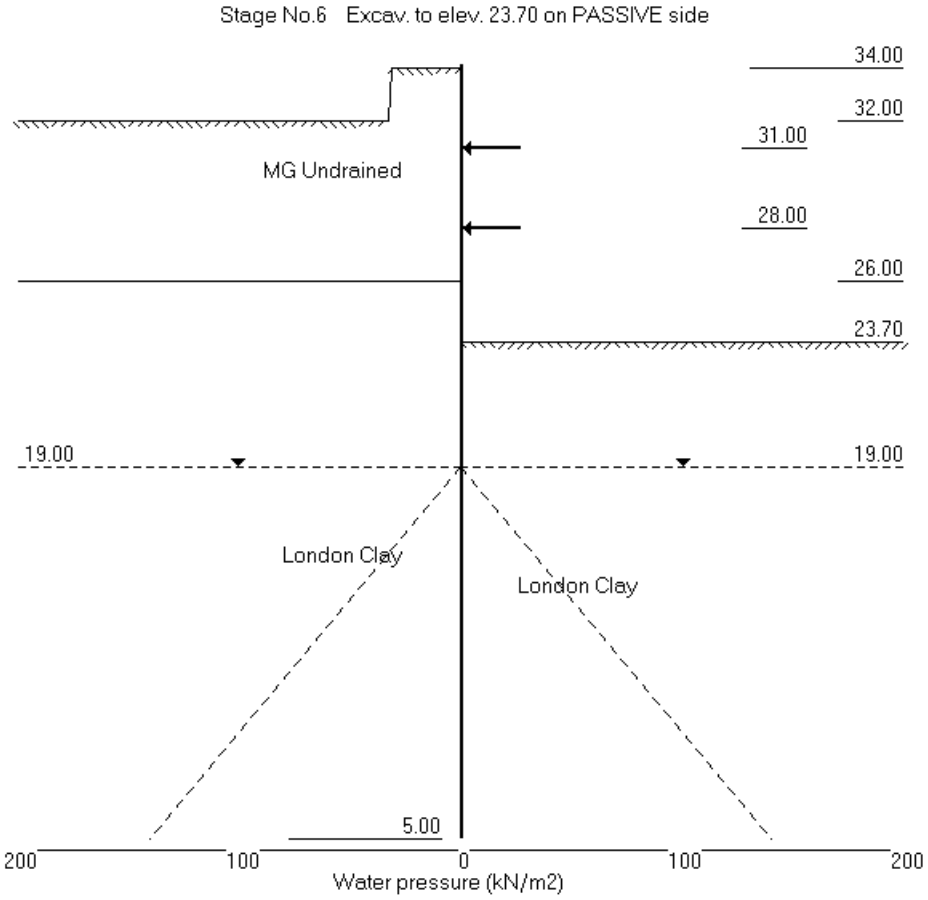
Stage No.4 Excav. to elev. 27.50 on PASSIVE side



Stage No.4 Excav. to elev. 27.50 on PASSIVE side



Units: kN,m


Stage No.6 Excav. to elev. 23.70 on PASSIVE side
34.00
32.00
31.00
28.00
26.00
23.70
19.00
19.00
MG Undrained
London Clay
London Clay
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 6 Excavate to elevation 23.70 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
6	34.00	23.70		More than one strut. No FoS calc.			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	28.65	0.016	-3.79E-04	0.0	-0.0		12352200
2	33.50	26.27	0.016	-3.79E-04	13.7	3.7		12352200
3	33.00	23.89	0.016	-3.80E-04	26.3	13.9		12352200
4	32.50	21.51	0.016	-3.80E-04	37.6	30.2		12352200
5	32.00	19.12	0.016	-3.82E-04	47.8	51.8		12352200
6	31.50	18.56	0.017	-3.85E-04	57.2	78.1		12352200
7	31.00	19.95	0.017	-3.89E-04	66.8	109.2	-123.5	12352200
		19.95	0.017	-3.89E-04	190.4	109.2		
8	30.50	21.32	0.017	-3.95E-04	200.7	206.9		12352200
9	30.00	22.67	0.017	-4.05E-04	211.7	310.0		12352200
10	29.50	23.97	0.017	-4.20E-04	223.3	418.8		12352200
11	29.00	25.20	0.018	-4.39E-04	235.6	533.5		12352200
12	28.50	27.50	0.018	-4.64E-04	248.8	654.6		12352200
13	28.00	30.00	0.018	-4.93E-04	263.2	782.5	771.4	12352200
		30.00	0.018	-4.93E-04	-508.2	782.5		
14	27.50	32.50	0.018	-5.19E-04	-492.6	532.2		12352200
15	27.00	35.00	0.019	-5.36E-04	-475.7	290.1		12352200
16	26.50	37.50	0.019	-5.43E-04	-457.6	58.0		12352200
17	26.00	42.09	0.019	-5.41E-04	-437.7	-165.9		12352200
		92.57	0.019	-5.41E-04	-437.7	-165.9		
18	25.50	99.29	0.019	-5.30E-04	-389.7	-372.7		12352200
19	25.00	105.98	0.020	-5.11E-04	-338.4	-554.7		12352200
20	24.50	112.64	0.020	-4.85E-04	-283.7	-710.2		12352200
21	24.00	119.29	0.020	-4.54E-04	-225.8	-837.6		12352200
22	23.70	123.28	0.020	-4.33E-04	-189.4	-899.8		12352200
		74.30	0.020	-4.33E-04	-189.4	-899.8		
23	23.35	70.78	0.020	-4.07E-04	-164.0	-961.6		12352200
24	23.00	67.28	0.021	-3.79E-04	-139.8	-1014.6		12352200
25	22.50	62.31	0.021	-3.36E-04	-107.4	-1076.1		12352200
26	22.00	57.42	0.021	-2.92E-04	-77.5	-1122.0		12352200

(continued)

Stage No.6 Excavate to elevation 23.70 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
27	21.50	52.62	0.021	-2.46E-04	-50.0	-1153.6		12352200
28	21.00	47.92	0.021	-1.99E-04	-24.8	-1172.0		12352200
29	20.50	43.34	0.021	-1.51E-04	-2.0	-1178.5		12352200
30	20.00	38.89	0.021	-1.04E-04	18.5	-1174.1		12352200
31	19.50	34.58	0.021	-5.67E-05	36.9	-1159.9		12352200
32	19.00	30.42	0.021	-1.02E-05	53.1	-1137.2		12352200
33	18.50	26.43	0.021	3.51E-05	67.4	-1106.8		12352200
34	18.00	22.61	0.021	7.91E-05	79.6	-1069.8		12352200
35	17.50	18.97	0.021	1.21E-04	90.0	-1027.2		12352200
36	17.00	15.51	0.021	1.62E-04	98.6	-979.8		12352200
37	16.50	12.24	0.021	2.00E-04	105.6	-928.5		12352200
38	16.00	9.15	0.021	2.37E-04	110.9	-874.2		12352200
39	15.50	6.25	0.021	2.71E-04	114.8	-817.6		12352200
40	15.00	3.53	0.021	3.03E-04	117.2	-759.5		12352200
41	14.50	1.01	0.021	3.33E-04	118.3	-700.4		12352200
42	14.00	-1.33	0.020	3.60E-04	118.3	-641.1		12352200
43	13.50	-3.49	0.020	3.84E-04	117.1	-582.2		12352200
44	13.00	-5.48	0.020	4.07E-04	114.8	-524.1		12352200
45	12.50	-7.29	0.020	4.27E-04	111.6	-467.4		12352200
46	12.00	-8.94	0.020	4.45E-04	107.6	-412.5		12352200
47	11.50	-10.43	0.019	4.60E-04	102.7	-359.8		12352200
48	11.00	-11.76	0.019	4.74E-04	97.2	-309.8		12352200
49	10.50	-12.95	0.019	4.86E-04	91.0	-262.7		12352200
50	10.00	-13.99	0.019	4.95E-04	84.3	-218.8		12352200
51	9.50	-14.90	0.018	5.03E-04	77.0	-178.4		12352200
52	9.00	-15.68	0.018	5.10E-04	69.4	-141.8		12352200
53	8.50	-16.34	0.018	5.15E-04	61.4	-109.0		12352200
54	8.00	-16.88	0.018	5.19E-04	53.1	-80.4		12352200
55	7.50	-17.31	0.017	5.21E-04	44.5	-56.0		12352200
56	7.00	-17.63	0.017	5.23E-04	35.8	-35.9		12352200
57	6.50	-17.85	0.017	5.24E-04	26.9	-20.2		12352200
58	6.00	-17.97	0.017	5.25E-04	18.0	-9.0		12352200
59	5.50	-18.00	0.016	5.25E-04	9.0	-2.2		12352200
60	5.00	-17.93	0.016	5.25E-04	0.0	-0.0		---

At elev. 31.00 Strut force = -617.7 kN/strut = -123.5 kN/m run
At elev. 28.00 Strut force = 771.4 kN/strut = 771.4 kN/m run

Node no.	Y coord	ACTIVE side						
		Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	34.00	Total>	0.00	0.00	33.95b	28.65	28.65	5751
2	33.50	Total>	9.50	2.50m	39.58b	26.27	26.27	5751
		Total>	9.50	2.50m	83.59	26.27	26.27	5751
3	33.00	Total>	19.00	5.00m	95.48	23.89	23.89	5751
		Total>	19.00	5.00m	26.60b	23.89	23.89	5751
4	32.50	Total>	28.50	7.50m	29.92b	21.51	21.51	5751
		Total>	28.50	7.50m	27.52b	21.51	21.51	5751
5	32.00	Total>	38.00	10.00m	30.57b	19.12	19.12	5751
		Total>	38.00	10.00m	88.21b	19.12	19.12	5751
6	31.50	Total>	47.50	12.50m	97.00b	18.56	18.56	5751
		Total>	47.50	12.50m	99.96b	18.56	18.56	5751
7	31.00	Total>	57.00	15.00m	109.02b	19.95	19.95	5751
		Total>	57.00	15.00m	111.74b	19.95	19.95	5751
8	30.50	Total>	66.50	17.50m	121.03b	21.32	21.32	5751
		Total>	66.50	17.50m	123.53b	21.32	21.32	5751

(continued)

Stage No.6 Excavate to elevation 23.70 on PASSIVE side

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
9	30.00	Total>	76.00	20.00m	133.01b	22.67	22.67	5751
		Total>	76.00	20.00m	135.34b	22.67	22.67	5751
10	29.50	Total>	85.50	22.50m	144.99b	23.97	23.97	5751
		Total>	85.50	22.50m	147.16b	23.97	23.97	5751
11	29.00	Total>	95.00	25.00m	156.95b	25.20	25.20	5751
		Total>	95.00	25.00m	158.98b	25.20	25.20	5751
12	28.50	Total>	104.50	27.50m	168.90b	27.50	27.50a	2526
		Total>	104.50	27.50m	170.82b	27.50	27.50a	2526
13	28.00	Total>	114.00	30.00m	180.85b	30.00	30.00a	2526
		Total>	114.00	30.00m	182.66b	30.00	30.00a	2526
14	27.50	Total>	123.50	32.50m	192.79b	32.50	32.50a	2526
		Total>	123.50	32.50m	194.50b	32.50	32.50a	2526
15	27.00	Total>	133.00	35.00m	204.72b	35.00	35.00a	2526
		Total>	133.00	35.00m	206.35b	35.00	35.00a	2526
16	26.50	Total>	142.50	37.50m	216.65b	37.50	37.50a	2526
		Total>	142.50	37.50m	218.20b	37.50	37.50a	2526
17	26.00	Total>	152.00	42.09	228.58b	42.09	42.09a	2526
		Total>	152.00	40.00m	295.40	92.57	92.57	3031
18	25.50	Total>	162.00	42.50m	311.73	99.29	99.29	3158
19	25.00	Total>	172.00	45.00m	328.07	105.98	105.98	3284
20	24.50	Total>	182.00	47.50m	344.40	112.64	112.64	3410
		Total>	182.00	47.50m	325.68b	112.64	112.64	3410
21	24.00	Total>	192.00	50.00m	341.13b	119.29	119.29	3537
		Total>	192.00	50.00m	337.36b	119.29	119.29	3537
22	23.70	Total>	198.00	51.50m	346.53b	123.28	123.28	3612
		Total>	198.00	51.50m	347.20b	123.28	123.28	3612
23	23.35	Total>	205.00	53.25m	357.92b	127.95	127.95	3701
		Total>	205.00	53.25m	358.63b	127.95	127.95	3701
24	23.00	Total>	212.00	55.00m	369.36b	132.62	132.62	3789
		Total>	212.00	55.00m	370.19b	132.62	132.62	3789
25	22.50	Total>	222.00	57.50m	385.56b	139.33	139.33	3916
		Total>	222.00	57.50m	386.51b	139.33	139.33	3916
26	22.00	Total>	232.00	60.00m	401.92b	146.08	146.08	4042
		Total>	232.00	60.00m	402.82b	146.08	146.08	4042
27	21.50	Total>	242.00	62.50m	418.27b	152.89	152.89	4168
		Total>	242.00	62.50m	419.14b	152.89	152.89	4168
28	21.00	Total>	252.00	65.00m	434.62b	159.77	159.77	4294
		Total>	252.00	65.00m	435.46b	159.77	159.77	4294
29	20.50	Total>	262.00	67.50m	450.96b	166.72	166.72	4421
		Total>	262.00	67.50m	451.78b	166.72	166.72	4421
30	20.00	Total>	272.00	70.00m	467.31b	173.76	173.76	4547
		Total>	272.00	70.00m	468.10b	173.76	173.76	4547
31	19.50	Total>	282.00	72.50m	483.66b	180.90	180.90	4673
		Total>	282.00	72.50m	484.42b	180.90	180.90	4673
32	19.00	Total>	292.00	75.00m	500.00b	188.14	188.14	4800
		Total>	292.00	75.00m	500.63b	188.14	188.14	4800
33	18.50	Total>	302.00	77.50m	516.46b	195.50	195.50	4926
34	18.00	Total>	312.00	80.00m	532.80b	202.96	202.96	5052
35	17.50	Total>	322.00	82.50m	549.14b	210.55	210.55	5179
36	17.00	Total>	332.00	85.00m	565.47b	218.26	218.26	5305
37	16.50	Total>	342.00	87.50m	581.81b	226.10	226.10	5431
38	16.00	Total>	352.00	90.00m	598.15b	234.06	234.06	5558
39	15.50	Total>	362.00	92.50m	614.49b	242.16	242.16	5684
40	15.00	Total>	372.00	95.00m	630.83b	250.38	250.38	5810
		Total>	372.00	95.00m	654.74	250.38	250.38	5810

(continued)

Stage No.6 Excavate to elevation 23.70 on PASSIVE side

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
41	14.50	Total>	382.00	97.50m	671.07	258.73	258.73	5936
42	14.00	Total>	392.00	100.00m	687.40	267.21	267.21	6063
43	13.50	Total>	402.00	102.50m	703.74	275.81	275.81	6189
44	13.00	Total>	412.00	105.00m	720.07	284.54	284.54	6315
45	12.50	Total>	422.00	107.73	736.40	293.38	293.38	6442
46	12.00	Total>	432.00	111.40	752.74	302.34	302.34	6568
47	11.50	Total>	442.00	115.07	769.07	311.41	311.41	6694
48	11.00	Total>	452.00	118.73	785.41	320.59	320.59	6821
49	10.50	Total>	462.00	122.40	801.74	329.87	329.87	6947
50	10.00	Total>	472.00	126.07	818.07	339.25	339.25	7073
51	9.50	Total>	482.00	129.74	834.41	348.72	348.72	7200
52	9.00	Total>	492.00	133.41	850.74	358.29	358.29	7326
53	8.50	Total>	502.00	137.08	867.07	367.94	367.94	7452
54	8.00	Total>	512.00	140.75	883.41	377.68	377.68	7578
55	7.50	Total>	522.00	144.42	899.74	387.49	387.49	7705
56	7.00	Total>	532.00	148.09	916.07	397.38	397.38	7831
57	6.50	Total>	542.00	151.76	932.41	407.35	407.35	7957
58	6.00	Total>	552.00	155.43	948.74	417.38	417.38	8084
59	5.50	Total>	562.00	159.10	965.07	427.49	427.49	8210
60	5.00	Total>	572.00	162.76	981.41	437.66	437.66	8336

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	33.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	32.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	31.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	31.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	30.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	29.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	29.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	28.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	28.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	27.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	27.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	26.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	25.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	24.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	23.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	172.53	48.98	48.98	1878
23	23.35	Total>	7.00	1.75m	183.97	57.17	57.17	1923
24	23.00	Total>	14.00	3.50m	195.40	65.35	65.35	1969
25	22.50	Total>	24.00	6.00m	211.74	77.02	77.02	2035
26	22.00	Total>	34.00	8.50m	228.07	88.66	88.66	2101
27	21.50	Total>	44.01	11.00m	244.41	100.27	100.27	2166

(continued)

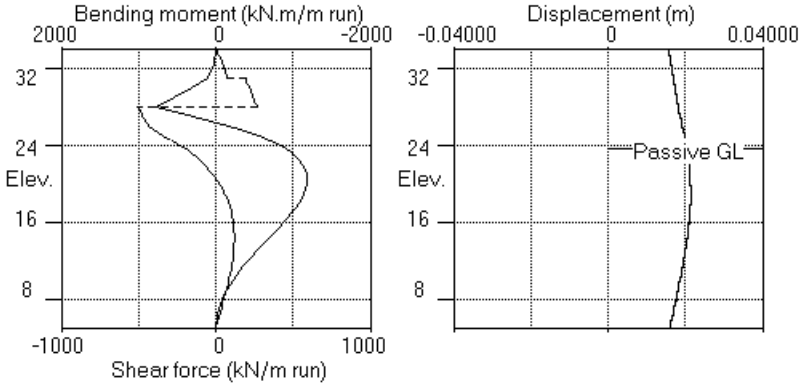
Stage No.6 Excavate to elevation 23.70 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
28	21.00	Total>	54.01	13.50m	260.75	111.85	111.85	2232
29	20.50	Total>	64.02	16.00m	277.09	123.39	123.39	2298
30	20.00	Total>	74.03	18.50m	293.44	134.88	134.88	2363
31	19.50	Total>	84.05	21.00m	309.78	146.32	146.32	2429
32	19.00	Total>	94.07	23.50m	326.14	157.72	157.72	2495
33	18.50	Total>	104.09	26.00m	342.50	169.06	169.06	2560
34	18.00	Total>	114.12	28.50m	358.86	180.35	180.35	2626
35	17.50	Total>	124.16	31.00m	375.23	191.58	191.58	2692
36	17.00	Total>	134.20	33.50m	391.60	202.75	202.75	2757
37	16.50	Total>	144.24	36.00m	407.98	213.86	213.86	2823
38	16.00	Total>	154.30	38.50m	424.37	224.92	224.92	2889
39	15.50	Total>	164.36	41.00m	440.76	235.91	235.91	2954
40	15.00	Total>	174.43	43.50m	457.16	246.85	246.85	3020
41	14.50	Total>	184.50	46.00m	473.57	257.72	257.72	3085
42	14.00	Total>	194.59	48.50m	489.99	268.54	268.54	3151
43	13.50	Total>	204.68	51.00m	506.42	279.31	279.31	3217
44	13.00	Total>	214.78	53.50m	522.85	290.02	290.02	3282
45	12.50	Total>	224.89	56.00m	539.30	300.67	300.67	3348
46	12.00	Total>	235.01	58.50m	555.75	311.28	311.28	3414
47	11.50	Total>	245.14	61.00m	572.21	321.84	321.84	3479
48	11.00	Total>	255.28	63.50m	588.68	332.35	332.35	3545
49	10.50	Total>	265.43	66.00m	605.16	342.81	342.81	3611
50	10.00	Total>	275.58	68.50m	621.66	353.24	353.24	3676
51	9.50	Total>	285.75	71.00m	638.16	363.62	363.62	3742
52	9.00	Total>	295.93	73.50m	654.67	373.97	373.97	3808
53	8.50	Total>	306.12	76.00m	671.20	384.28	384.28	3873
54	8.00	Total>	316.32	78.50m	687.73	394.56	394.56	3939
55	7.50	Total>	326.53	81.00m	704.27	404.80	404.80	4005
56	7.00	Total>	336.76	83.50m	720.83	415.01	415.01	4070
57	6.50	Total>	346.99	86.00m	737.40	425.20	425.20	4136
58	6.00	Total>	357.23	88.50m	753.97	435.35	435.35	4201
59	5.50	Total>	367.49	91.00m	770.56	445.48	445.48	4267
60	5.00	Total>	377.75	93.50m	787.16	455.58	455.58	4333

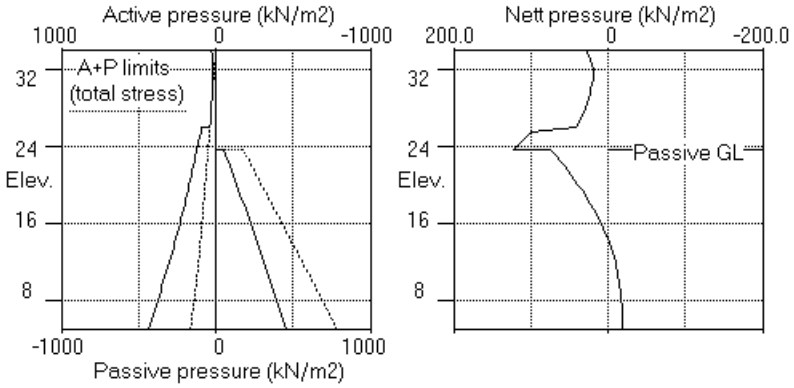
Note: 42.09a Soil pressure at active limit
123.45p Soil pressure at passive limit
590.83b Passive limit reduced because of berm

Units: kN,m

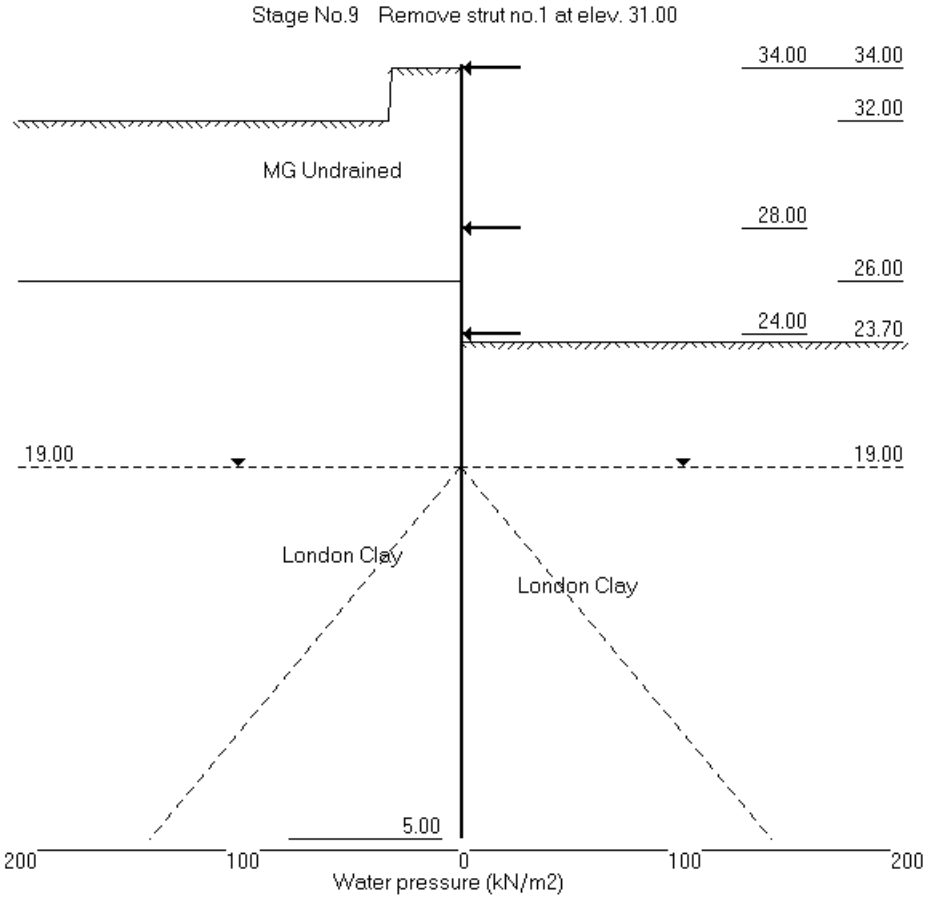
Stage No.6 Excav. to elev. 23.70 on PASSIVE side



Stage No.6 Excav. to elev. 23.70 on PASSIVE side



Units: kN,m


Stage No.9 Remove strut no.1 at elev. 31.00
34.00
34.00
32.00
MG Undrained
28.00
26.00
24.00
23.70
19.00
19.00
London Clay
London Clay
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 9 Remove strut or anchor no.1 at elevation 31.00

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
9	34.00	23.70		More than one strut. No FoS calc.			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	28.74	0.016	-3.57E-04	56.1	-0.0	-56.1	12352200
2	33.50	26.40	0.016	-3.57E-04	69.9	31.7		12352200
3	33.00	24.06	0.016	-3.59E-04	82.5	70.1		12352200
4	32.50	21.71	0.016	-3.63E-04	93.9	114.4		12352200
5	32.00	19.35	0.016	-3.69E-04	104.2	164.2		12352200
6	31.50	18.82	0.016	-3.76E-04	113.7	218.8		12352200
7	31.00	20.21	0.017	-3.87E-04	123.5	278.1		12352200
8	30.50	21.58	0.017	-3.99E-04	133.9	342.5		12352200
9	30.00	22.91	0.017	-4.14E-04	145.1	412.3		12352200
10	29.50	24.19	0.017	-4.33E-04	156.8	487.7		12352200
11	29.00	25.40	0.018	-4.54E-04	169.2	569.3		12352200
12	28.50	27.68	0.018	-4.79E-04	182.5	657.1		12352200
13	28.00	30.15	0.018	-5.07E-04	197.0	751.9	702.5	12352200
		30.15	0.018	-5.07E-04	-505.5	751.9		
14	27.50	32.62	0.018	-5.33E-04	-489.8	503.0		12352200
15	27.00	35.10	0.019	-5.48E-04	-472.9	262.3		12352200
16	26.50	37.58	0.019	-5.54E-04	-454.7	31.6		12352200
17	26.00	42.15	0.019	-5.51E-04	-434.8	-190.9		12352200
		92.64	0.019	-5.51E-04	-434.8	-190.9		
18	25.50	99.34	0.019	-5.39E-04	-386.8	-396.3		12352200
19	25.00	106.01	0.020	-5.19E-04	-335.5	-576.8		12352200
20	24.50	112.65	0.020	-4.93E-04	-280.8	-730.8		12352200
21	24.00	119.29	0.020	-4.61E-04	-222.8	-856.7	0.8	12352200
		119.29	0.020	-4.61E-04	-223.6	-856.7		
22	23.70	123.27	0.020	-4.39E-04	-187.3	-918.3		12352200
		74.29	0.020	-4.39E-04	-187.3	-918.3		
23	23.35	70.75	0.020	-4.12E-04	-161.9	-979.3		12352200
24	23.00	67.23	0.021	-3.84E-04	-137.7	-1031.6		12352200
25	22.50	62.26	0.021	-3.41E-04	-105.4	-1092.1		12352200
26	22.00	57.35	0.021	-2.96E-04	-75.5	-1137.0		12352200

(continued)

Stage No.9 Remove strut or anchor no.1 at elevation 31.00

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
27	21.50	52.53	0.021	-2.49E-04	-48.0	-1167.5		12352200
28	21.00	47.82	0.021	-2.01E-04	-22.9	-1184.9		12352200
29	20.50	43.22	0.021	-1.53E-04	-0.1	-1190.4		12352200
30	20.00	38.76	0.021	-1.05E-04	20.4	-1185.1		12352200
31	19.50	34.44	0.021	-5.81E-05	38.7	-1170.1		12352200
32	19.00	30.28	0.021	-1.12E-05	54.8	-1146.4		12352200
33	18.50	26.28	0.021	3.44E-05	69.0	-1115.2		12352200
34	18.00	22.46	0.021	7.88E-05	81.2	-1077.5		12352200
35	17.50	18.81	0.021	1.21E-04	91.5	-1034.1		12352200
36	17.00	15.34	0.021	1.62E-04	100.0	-986.0		12352200
37	16.50	12.07	0.021	2.01E-04	106.9	-934.1		12352200
38	16.00	8.98	0.021	2.38E-04	112.1	-879.1		12352200
39	15.50	6.08	0.021	2.72E-04	115.9	-822.0		12352200
40	15.00	3.37	0.021	3.04E-04	118.2	-763.3		12352200
41	14.50	0.84	0.021	3.34E-04	119.3	-703.7		12352200
42	14.00	-1.50	0.020	3.61E-04	119.1	-644.0		12352200
43	13.50	-3.65	0.020	3.86E-04	117.9	-584.6		12352200
44	13.00	-5.64	0.020	4.08E-04	115.5	-526.1		12352200
45	12.50	-7.44	0.020	4.29E-04	112.3	-469.1		12352200
46	12.00	-9.08	0.020	4.46E-04	108.1	-413.9		12352200
47	11.50	-10.57	0.019	4.62E-04	103.2	-361.0		12352200
48	11.00	-11.89	0.019	4.76E-04	97.6	-310.7		12352200
49	10.50	-13.07	0.019	4.87E-04	91.4	-263.4		12352200
50	10.00	-14.10	0.019	4.97E-04	84.6	-219.3		12352200
51	9.50	-15.00	0.018	5.05E-04	77.3	-178.8		12352200
52	9.00	-15.77	0.018	5.12E-04	69.6	-142.0		12352200
53	8.50	-16.42	0.018	5.17E-04	61.5	-109.2		12352200
54	8.00	-16.95	0.018	5.21E-04	53.2	-80.5		12352200
55	7.50	-17.37	0.017	5.23E-04	44.6	-56.0		12352200
56	7.00	-17.68	0.017	5.25E-04	35.9	-35.9		12352200
57	6.50	-17.89	0.017	5.26E-04	27.0	-20.2		12352200
58	6.00	-18.00	0.017	5.27E-04	18.0	-9.0		12352200
59	5.50	-18.01	0.016	5.27E-04	9.0	-2.2		12352200
60	5.00	-17.93	0.016	5.27E-04	0.0	-0.0		---

At elev. 34.00 Strut force = -56.1 kN/strut = -56.1 kN/m run
At elev. 28.00 Strut force = 702.5 kN/strut = 702.5 kN/m run
At elev. 24.00 Strut force = 0.8 kN/strut = 0.8 kN/m run

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	34.00	Total>	0.00	0.00	33.95b	28.74	28.74	3617
2	33.50	Total>	9.50	2.50m	39.58b	26.40	26.40	3617
		Total>	9.50	2.50m	83.59	26.40	26.40	3617
3	33.00	Total>	19.00	5.00m	95.48	24.06	24.06	3617
		Total>	19.00	5.00m	26.60b	24.06	24.06	3617
4	32.50	Total>	28.50	7.50m	29.92b	21.71	21.71	3617
		Total>	28.50	7.50m	27.52b	21.71	21.71	3617
5	32.00	Total>	38.00	10.00m	30.57b	19.35	19.35	3617
		Total>	38.00	10.00m	88.21b	19.35	19.35	3617
6	31.50	Total>	47.50	12.50m	97.00b	18.82	18.82	3617
		Total>	47.50	12.50m	99.96b	18.82	18.82	3617
7	31.00	Total>	57.00	15.00m	109.02b	20.21	20.21	3617
		Total>	57.00	15.00m	111.74b	20.21	20.21	3617
8	30.50	Total>	66.50	17.50m	121.03b	21.58	21.58	3617
		Total>	66.50	17.50m	123.53b	21.58	21.58	3617

(continued)

Stage No.9 Remove strut or anchor no.1 at elevation 31.00

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
9	30.00	Total>	76.00	20.00m	133.01b	22.91	22.91	3617
		Total>	76.00	20.00m	135.34b	22.91	22.91	3617
10	29.50	Total>	85.50	22.50m	144.99b	24.19	24.19	3617
		Total>	85.50	22.50m	147.16b	24.19	24.19	3617
11	29.00	Total>	95.00	25.00m	156.95b	25.40	25.40	3617
		Total>	95.00	25.00m	158.98b	25.40	25.40	3617
12	28.50	Total>	104.50	27.50m	168.90b	27.68	27.68	3617
		Total>	104.50	27.50m	170.82b	27.68	27.68	3617
13	28.00	Total>	114.00	30.00m	180.85b	30.15	30.15	3617
		Total>	114.00	30.00m	182.66b	30.15	30.15	3617
14	27.50	Total>	123.50	32.50m	192.79b	32.62	32.62	3617
		Total>	123.50	32.50m	194.50b	32.62	32.62	3617
15	27.00	Total>	133.00	35.00m	204.72b	35.10	35.10	3617
		Total>	133.00	35.00m	206.35b	35.10	35.10	3617
16	26.50	Total>	142.50	37.50m	216.65b	37.58	37.58	3617
		Total>	142.50	37.50m	218.20b	37.58	37.58	3617
17	26.00	Total>	152.00	42.09	228.58b	42.15	42.15	3617
		Total>	152.00	40.00m	295.40	92.64	92.64	4340
18	25.50	Total>	162.00	42.50m	311.73	99.34	99.34	4521
19	25.00	Total>	172.00	45.00m	328.07	106.01	106.01	4702
20	24.50	Total>	182.00	47.50m	344.40	112.65	112.65	4883
		Total>	182.00	47.50m	325.68b	112.65	112.65	4883
21	24.00	Total>	192.00	50.00m	341.13b	119.29	119.29	3768
		Total>	192.00	50.00m	337.36b	119.29	119.29	3768
22	23.70	Total>	198.00	51.50m	346.53b	123.27	123.27	3849
		Total>	198.00	51.50m	347.20b	123.27	123.27	3849
23	23.35	Total>	205.00	53.25m	357.92b	127.93	127.93	3943
		Total>	205.00	53.25m	358.63b	127.93	127.93	3943
24	23.00	Total>	212.00	55.00m	369.36b	132.60	132.60	4037
		Total>	212.00	55.00m	370.19b	132.60	132.60	4037
25	22.50	Total>	222.00	57.50m	385.56b	139.29	139.29	4172
		Total>	222.00	57.50m	386.51b	139.29	139.29	4172
26	22.00	Total>	232.00	60.00m	401.92b	146.04	146.04	4306
		Total>	232.00	60.00m	402.82b	146.04	146.04	4306
27	21.50	Total>	242.00	62.50m	418.27b	152.83	152.83	4441
		Total>	242.00	62.50m	419.14b	152.83	152.83	4441
28	21.00	Total>	252.00	65.00m	434.62b	159.70	159.70	4575
		Total>	252.00	65.00m	435.46b	159.70	159.70	4575
29	20.50	Total>	262.00	67.50m	450.96b	166.65	166.65	4710
		Total>	262.00	67.50m	451.78b	166.65	166.65	4710
30	20.00	Total>	272.00	70.00m	467.31b	173.68	173.68	4845
		Total>	272.00	70.00m	468.10b	173.68	173.68	4845
31	19.50	Total>	282.00	72.50m	483.66b	180.82	180.82	4979
		Total>	282.00	72.50m	484.42b	180.82	180.82	4979
32	19.00	Total>	292.00	75.00m	500.00b	188.05	188.05	5114
		Total>	292.00	75.00m	500.63b	188.05	188.05	5114
33	18.50	Total>	302.00	77.50m	516.46b	195.40	195.40	5248
34	18.00	Total>	312.00	80.00m	532.80b	202.86	202.86	5383
35	17.50	Total>	322.00	82.50m	549.14b	210.45	210.45	5517
36	17.00	Total>	332.00	85.00m	565.47b	218.16	218.16	5652
37	16.50	Total>	342.00	87.50m	581.81b	225.99	225.99	5787
38	16.00	Total>	352.00	90.00m	598.15b	233.96	233.96	5921
39	15.50	Total>	362.00	92.50m	614.49b	242.05	242.05	6056
40	15.00	Total>	372.00	95.00m	630.83b	250.27	250.27	6190
		Total>	372.00	95.00m	654.74	250.27	250.27	6190

(continued)

Stage No.9 Remove strut or anchor no.1 at elevation 31.00

Node no.	Y coord	ACTIVE side						
		Water press.	Effective stresses: Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
41	14.50	Total> 382.00	97.50m	671.07	258.63	258.63	6325	
42	14.00	Total> 392.00	100.00m	687.40	267.11	267.11	6459	
43	13.50	Total> 402.00	102.50m	703.74	275.71	275.71	6594	
44	13.00	Total> 412.00	105.00m	720.07	284.44	284.44	6728	
45	12.50	Total> 422.00	107.73	736.40	293.28	293.28	6863	
46	12.00	Total> 432.00	111.40	752.74	302.25	302.25	6998	
47	11.50	Total> 442.00	115.07	769.07	311.32	311.32	7132	
48	11.00	Total> 452.00	118.73	785.41	320.50	320.50	7267	
49	10.50	Total> 462.00	122.40	801.74	329.79	329.79	7401	
50	10.00	Total> 472.00	126.07	818.07	339.18	339.18	7536	
51	9.50	Total> 482.00	129.74	834.41	348.66	348.66	7670	
52	9.00	Total> 492.00	133.41	850.74	358.23	358.23	7805	
53	8.50	Total> 502.00	137.08	867.07	367.89	367.89	7940	
54	8.00	Total> 512.00	140.75	883.41	377.63	377.63	8074	
55	7.50	Total> 522.00	144.42	899.74	387.45	387.45	8209	
56	7.00	Total> 532.00	148.09	916.07	397.35	397.35	8343	
57	6.50	Total> 542.00	151.76	932.41	407.32	407.32	8478	
58	6.00	Total> 552.00	155.43	948.74	417.36	417.36	8612	
59	5.50	Total> 562.00	159.10	965.07	427.48	427.48	8747	
60	5.00	Total> 572.00	162.76	981.41	437.66	437.66	8882	

Node no.	Y coord	PASSIVE side						
		Water press.	Effective stresses: Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	33.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	32.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	31.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	31.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	30.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	29.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	29.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	28.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	28.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	27.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	27.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	26.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	25.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	24.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	23.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00	0.00	172.53	48.99	48.99	2243	
23	23.35	Total> 7.00	1.75m	183.97	57.18	57.18	2298	
24	23.00	Total> 14.00	3.50m	195.40	65.36	65.36	2353	
25	22.50	Total> 24.00	6.00m	211.74	77.04	77.04	2432	
26	22.00	Total> 34.00	8.50m	228.07	88.69	88.69	2510	
27	21.50	Total> 44.01	11.00m	244.41	100.30	100.30	2589	

(continued)

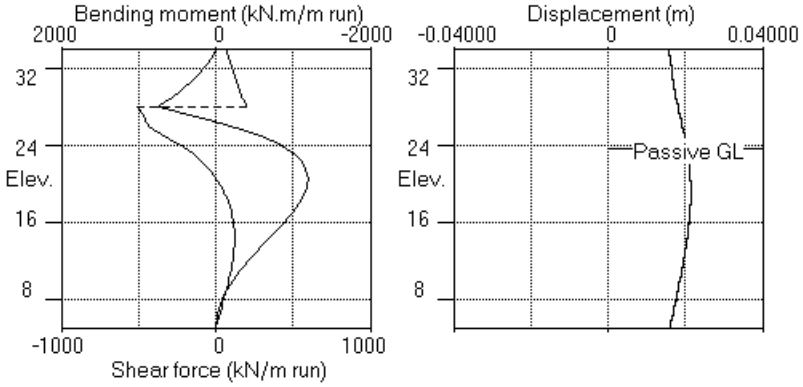
Stage No.9 Remove strut or anchor no.1 at elevation 31.00

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
28	21.00	Total>	54.01	13.50m	260.75	111.89	111.89	2667
29	20.50	Total>	64.02	16.00m	277.09	123.43	123.43	2745
30	20.00	Total>	74.03	18.50m	293.44	134.93	134.93	2824
31	19.50	Total>	84.05	21.00m	309.78	146.37	146.37	2902
32	19.00	Total>	94.07	23.50m	326.14	157.77	157.77	2981
33	18.50	Total>	104.09	26.00m	342.50	169.12	169.12	3059
34	18.00	Total>	114.12	28.50m	358.86	180.41	180.41	3138
35	17.50	Total>	124.16	31.00m	375.23	191.64	191.64	3216
36	17.00	Total>	134.20	33.50m	391.60	202.81	202.81	3295
37	16.50	Total>	144.24	36.00m	407.98	213.93	213.93	3373
38	16.00	Total>	154.30	38.50m	424.37	224.98	224.98	3451
39	15.50	Total>	164.36	41.00m	440.76	235.97	235.97	3530
40	15.00	Total>	174.43	43.50m	457.16	246.91	246.91	3608
41	14.50	Total>	184.50	46.00m	473.57	257.78	257.78	3687
42	14.00	Total>	194.59	48.50m	489.99	268.60	268.60	3765
43	13.50	Total>	204.68	51.00m	506.42	279.37	279.37	3844
44	13.00	Total>	214.78	53.50m	522.85	290.07	290.07	3922
45	12.50	Total>	224.89	56.00m	539.30	300.73	300.73	4001
46	12.00	Total>	235.01	58.50m	555.75	311.33	311.33	4079
47	11.50	Total>	245.14	61.00m	572.21	321.89	321.89	4157
48	11.00	Total>	255.28	63.50m	588.68	332.39	332.39	4236
49	10.50	Total>	265.43	66.00m	605.16	342.86	342.86	4314
50	10.00	Total>	275.58	68.50m	621.66	353.28	353.28	4393
51	9.50	Total>	285.75	71.00m	638.16	363.66	363.66	4471
52	9.00	Total>	295.93	73.50m	654.67	374.00	374.00	4550
53	8.50	Total>	306.12	76.00m	671.20	384.31	384.31	4628
54	8.00	Total>	316.32	78.50m	687.73	394.58	394.58	4707
55	7.50	Total>	326.53	81.00m	704.27	404.82	404.82	4785
56	7.00	Total>	336.76	83.50m	720.83	415.03	415.03	4863
57	6.50	Total>	346.99	86.00m	737.40	425.21	425.21	4942
58	6.00	Total>	357.23	88.50m	753.97	435.37	435.37	5020
59	5.50	Total>	367.49	91.00m	770.56	445.49	445.49	5099
60	5.00	Total>	377.75	93.50m	787.16	455.59	455.59	5177

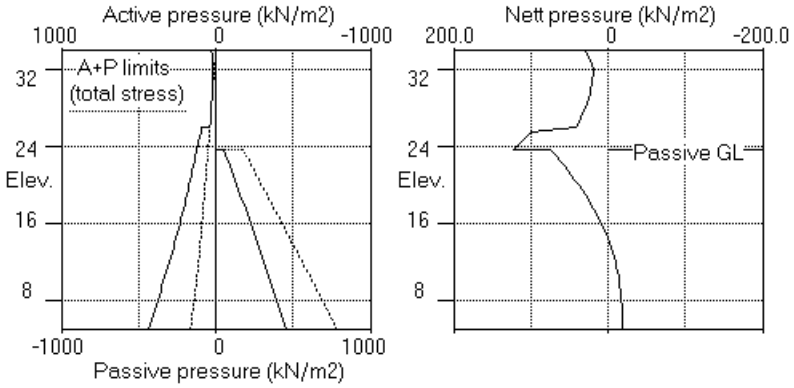
590.83b Passive limit reduced because of berm

Units: kN,m

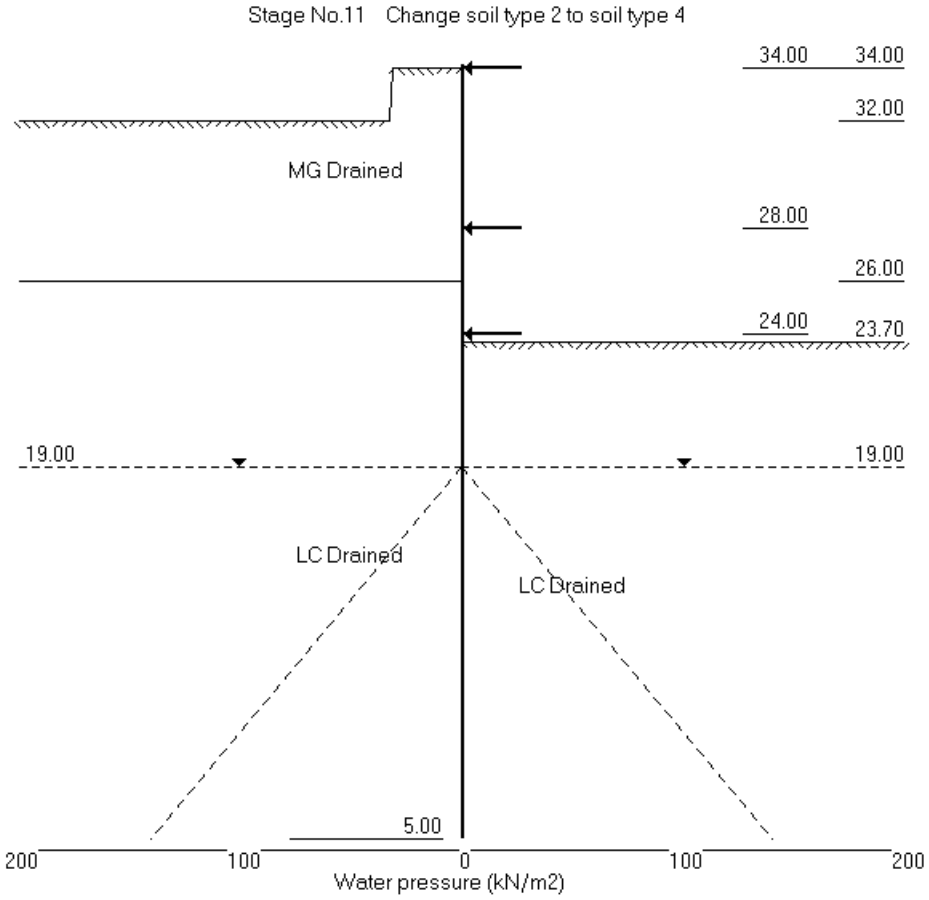
Stage No.9 Remove strut no.1 at elev. 31.00



Stage No.9 Remove strut no.1 at elev. 31.00



Units: kN,m


Stage No.11 Change soil type 2 to soil type 4
34.00
34.00
32.00
MG Drained
28.00
26.00
24.00
23.70
19.00
19.00
LC Drained
LC Drained
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 11 Change properties of soil type 2 to soil type 4
Ko pressures will not be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
11	34.00	23.70		More than one strut. No FoS calc.			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	0.74	0.016	-3.58E-04	69.3	-0.0	-69.3	12352200
2	33.50	5.59	0.016	-3.59E-04	70.9	35.1		12352200
		15.48	0.016	-3.59E-04	70.9	35.1		
3	33.00	24.07	0.016	-3.61E-04	80.8	73.1		12352200
4	32.50	21.72	0.016	-3.65E-04	92.2	116.6		12352200
5	32.00	19.36	0.016	-3.70E-04	102.5	165.5		12352200
6	31.50	18.82	0.016	-3.78E-04	112.0	219.3		12352200
7	31.00	20.21	0.017	-3.88E-04	121.8	277.7		12352200
8	30.50	21.58	0.017	-4.01E-04	132.2	341.2		12352200
9	30.00	22.91	0.017	-4.16E-04	143.4	410.1		12352200
10	29.50	24.39	0.017	-4.34E-04	155.2	484.8		12352200
11	29.00	27.25	0.018	-4.55E-04	168.1	565.6		12352200
12	28.50	30.11	0.018	-4.80E-04	182.4	653.1		12352200
13	28.00	32.96	0.018	-5.08E-04	198.2	748.2	707.5	12352200
		32.96	0.018	-5.08E-04	-509.3	748.2		
14	27.50	35.82	0.018	-5.34E-04	-492.1	497.8		12352200
15	27.00	38.68	0.019	-5.49E-04	-473.4	256.3		12352200
16	26.50	41.53	0.019	-5.55E-04	-453.4	25.9		12352200
17	26.00	44.39	0.019	-5.51E-04	-431.9	-195.6		12352200
		92.63	0.019	-5.51E-04	-431.9	-195.6		
18	25.50	99.34	0.019	-5.39E-04	-383.9	-399.5		12352200
19	25.00	106.00	0.020	-5.19E-04	-332.6	-578.6		12352200
20	24.50	112.65	0.020	-4.93E-04	-277.9	-731.1		12352200
21	24.00	119.28	0.020	-4.61E-04	-219.9	-855.6	7.7	12352200
		119.28	0.020	-4.61E-04	-227.6	-855.6		
22	23.70	123.27	0.020	-4.39E-04	-191.2	-918.4		12352200
		94.42	0.020	-4.39E-04	-191.2	-918.4		
23	23.35	72.38	0.020	-4.12E-04	-162.0	-979.9		12352200
24	23.00	67.22	0.021	-3.84E-04	-137.6	-1032.2		12352200

(continued)

Stage No.11 Change properties of soil type 2 to soil type 4
Ko pressures will not be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
25	22.50	62.24	0.021	-3.41E-04	-105.2	-1092.6		12352200
26	22.00	57.33	0.021	-2.96E-04	-75.3	-1137.4		12352200
27	21.50	52.52	0.021	-2.49E-04	-47.9	-1167.9		12352200
28	21.00	47.80	0.021	-2.01E-04	-22.8	-1185.3		12352200
29	20.50	43.21	0.021	-1.53E-04	-0.0	-1190.7		12352200
30	20.00	38.74	0.021	-1.05E-04	20.4	-1185.4		12352200
31	19.50	34.43	0.021	-5.79E-05	38.7	-1170.3		12352200
32	19.00	30.27	0.021	-1.10E-05	54.9	-1146.6		12352200
33	18.50	26.27	0.021	3.47E-05	69.0	-1115.4		12352200
34	18.00	22.44	0.021	7.91E-05	81.2	-1077.6		12352200
35	17.50	18.80	0.021	1.21E-04	91.5	-1034.2		12352200
36	17.00	15.33	0.021	1.62E-04	100.1	-986.0		12352200
37	16.50	12.05	0.021	2.01E-04	106.9	-934.1		12352200
38	16.00	8.97	0.021	2.38E-04	112.2	-879.1		12352200
39	15.50	6.07	0.021	2.72E-04	115.9	-821.9		12352200
40	15.00	3.36	0.021	3.04E-04	118.3	-763.2		12352200
41	14.50	0.83	0.021	3.34E-04	119.3	-703.7		12352200
42	14.00	-1.51	0.020	3.61E-04	119.2	-643.9		12352200
43	13.50	-3.66	0.020	3.86E-04	117.9	-584.5		12352200
44	13.00	-5.64	0.020	4.09E-04	115.5	-526.1		12352200
45	12.50	-7.45	0.020	4.29E-04	112.3	-469.0		12352200
46	12.00	-9.09	0.020	4.47E-04	108.1	-413.8		12352200
47	11.50	-10.57	0.019	4.62E-04	103.2	-360.9		12352200
48	11.00	-11.90	0.019	4.76E-04	97.6	-310.6		12352200
49	10.50	-13.07	0.019	4.88E-04	91.4	-263.3		12352200
50	10.00	-14.11	0.019	4.97E-04	84.6	-219.3		12352200
51	9.50	-15.01	0.018	5.05E-04	77.3	-178.7		12352200
52	9.00	-15.78	0.018	5.12E-04	69.6	-142.0		12352200
53	8.50	-16.42	0.018	5.17E-04	61.5	-109.2		12352200
54	8.00	-16.95	0.018	5.21E-04	53.2	-80.5		12352200
55	7.50	-17.37	0.017	5.24E-04	44.6	-56.0		12352200
56	7.00	-17.68	0.017	5.25E-04	35.8	-35.9		12352200
57	6.50	-17.89	0.017	5.27E-04	26.9	-20.2		12352200
58	6.00	-17.99	0.017	5.27E-04	18.0	-9.0		12352200
59	5.50	-18.00	0.016	5.27E-04	9.0	-2.2		12352200
60	5.00	-17.91	0.016	5.27E-04	0.0	-0.0		---

At elev. 34.00 Strut force = -69.3 kN/strut = -69.3 kN/m run
At elev. 28.00 Strut force = 707.5 kN/strut = 707.5 kN/m run
At elev. 24.00 Strut force = 7.7 kN/strut = 7.7 kN/m run

Node no.	Y coord	ACTIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	34.00	0.00	0.00	0.00	0.74b	0.74	0.74p	3374
2	33.50	0.00	9.50	1.54	5.59b	5.59	5.59p	3374
		0.00	9.50	1.54	15.48b	15.48	15.48p	3374
3	33.00	0.00	19.00	4.40	28.92b	24.07	24.07	3374
		0.00	19.00	4.40	28.54b	24.07	24.07	3374
4	32.50	0.00	28.50	7.25	41.79b	21.72	21.72	3374
		0.00	28.50	7.25	44.85b	21.72	21.72	3374
5	32.00	0.00	38.00	10.11	59.07b	19.36	19.36	3374
		0.00	38.00	10.11	48.35b	19.36	19.36	3374
6	31.50	0.00	47.50	12.97	59.99b	18.82	18.82	3374
		0.00	47.50	12.97	86.95b	18.82	18.82	3374

(continued)

Stage No.11 Change properties of soil type 2 to soil type 4
Ko pressures will not be reset

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
7	31.00	0.00	57.00	15.82	103.83b	20.21	20.21	3374
		0.00	57.00	15.82	126.34b	20.21	20.21	3374
8	30.50	0.00	66.50	18.68	146.88b	21.58	21.58	3374
		0.00	66.50	18.68	166.21b	21.58	21.58	3374
9	30.00	0.00	76.00	21.54	189.45b	22.91	22.91	1139
		0.00	76.00	21.54	206.40b	22.91	22.91	1139
10	29.50	0.00	85.50	24.39	231.71b	24.39	24.39a	1139
		0.00	85.50	24.39	246.80b	24.39	24.39a	1139
11	29.00	0.00	95.00	27.25	273.76b	27.25	27.25a	1139
		0.00	95.00	27.25	287.35b	27.25	27.25a	1139
12	28.50	0.00	104.50	30.11	315.65b	30.11	30.11a	1139
		0.00	104.50	30.11	328.02b	30.11	30.11a	1139
13	28.00	0.00	114.00	32.96	357.43b	32.96	32.96a	1139
		0.00	114.00	32.96	368.77b	32.96	32.96a	1139
14	27.50	0.00	123.50	35.82	399.12b	35.82	35.82a	1139
		0.00	123.50	35.82	409.59b	35.82	35.82a	1139
15	27.00	0.00	133.00	38.68	440.74b	38.68	38.68a	1139
		0.00	133.00	38.68	450.47b	38.68	38.68a	1139
16	26.50	0.00	142.50	41.53	482.30b	41.53	41.53a	1139
		0.00	142.50	41.53	491.39b	41.53	41.53a	1139
17	26.00	0.00	152.00	44.39	523.82b	44.39	44.39a	1139
		0.00	152.00	43.07	479.65b	92.63	92.63	1562
18	25.50	0.00	162.00	46.36	509.71b	99.34	99.34	1627
		0.00	162.00	46.36	531.47b	99.34	99.34	1627
19	25.00	0.00	172.00	49.65	562.81b	106.00	106.00	1692
		0.00	172.00	49.65	569.42b	106.00	106.00	1692
20	24.50	0.00	182.00	52.93	601.13b	112.65	112.65	1757
		0.00	182.00	52.93	607.39b	112.65	112.65	1757
21	24.00	0.00	192.00	56.22	639.43b	119.28	119.28	1822
		0.00	192.00	56.22	644.24b	119.28	119.28	1822
22	23.70	0.00	198.00	58.19	663.61b	123.27	123.27	1861
		0.00	198.00	58.19	667.35b	123.27	123.27	1861
23	23.35	0.00	205.00	60.49	690.07b	127.92	127.92	1907
		0.00	205.00	60.49	693.98b	127.92	127.92	1907
24	23.00	0.00	212.00	62.79	716.83b	132.59	132.59	1952
		0.00	212.00	62.79	721.39b	132.59	132.59	1952
25	22.50	0.00	222.00	66.08	754.25b	139.29	139.29	2017
		0.00	222.00	66.08	759.42b	139.29	139.29	2017
26	22.00	0.00	232.00	69.36	792.50b	146.03	146.03	2082
		0.00	232.00	69.36	797.45b	146.03	146.03	2082
27	21.50	0.00	242.00	72.65	830.74b	152.83	152.83	2147
		0.00	242.00	72.65	835.49b	152.83	152.83	2147
28	21.00	0.00	252.00	75.94	868.97b	159.69	159.69	2212
		0.00	252.00	75.94	873.54b	159.69	159.69	2212
29	20.50	0.00	262.00	79.22	907.20b	166.64	166.64	2278
		0.00	262.00	79.22	911.60b	166.64	166.64	2278
30	20.00	0.00	272.00	82.51	945.41b	173.68	173.68	2343
		0.00	272.00	82.51	949.66b	173.68	173.68	2343
31	19.50	0.00	282.00	85.80	983.63b	180.81	180.81	2408
		0.00	282.00	85.80	987.72b	180.81	180.81	2408
32	19.00	0.00	292.00	89.08	1021.83b	188.04	188.04	2473
		0.00	292.00	89.08	1012.01b	188.04	188.04	2473
33	18.50	5.00	297.00	90.73	1028.90b	190.39	195.39	2538
		5.00	297.00	90.73	1031.06b	190.39	195.39	2538

(continued)

Stage No.11 Change properties of soil type 2 to soil type 4
Ko pressures will not be reset

Node no.	Y coord	ACTIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
34	18.00	10.00	302.00	92.37	1047.99b	192.86	202.86	2603
		10.00	302.00	92.37	1050.11b	192.86	202.86	2603
35	17.50	15.00	307.00	94.01	1067.07b	195.44	210.44	2668
		15.00	307.00	94.01	1069.16b	195.44	210.44	2668
36	17.00	20.00	312.00	95.66	1086.16b	198.15	218.15	2733
		20.00	312.00	95.66	1088.21b	198.15	218.15	2733
37	16.50	25.00	317.00	97.30	1105.24b	200.99	225.99	2798
		25.00	317.00	97.30	1107.27b	200.99	225.99	2798
38	16.00	30.00	322.00	98.94	1124.32b	203.95	233.95	2863
		30.00	322.00	98.94	1126.32b	203.95	233.95	2863
39	15.50	35.00	327.00	100.59	1143.41b	207.04	242.04	2928
		35.00	327.00	100.59	1145.37b	207.04	242.04	2928
40	15.00	40.00	332.00	102.23	1162.49b	210.27	250.27	2993
		40.00	332.00	102.23	1294.97	210.27	250.27	2993
41	14.50	45.00	337.00	103.87	1314.04	213.62	258.62	3058
42	14.00	50.00	342.00	105.52	1333.11	217.10	267.10	3123
43	13.50	55.00	347.00	107.16	1352.18	220.71	275.71	3189
44	13.00	60.00	352.00	108.80	1371.24	224.43	284.43	3254
45	12.50	65.00	357.00	110.45	1390.31	228.28	293.28	3319
46	12.00	70.00	362.00	112.09	1409.38	232.24	302.24	3384
47	11.50	75.00	367.00	113.73	1428.45	236.32	311.32	3449
48	11.00	80.00	372.00	115.38	1447.52	240.50	320.50	3514
49	10.50	85.00	377.00	117.02	1466.59	244.79	329.79	3579
50	10.00	90.00	382.00	118.66	1485.65	249.17	339.17	3644
51	9.50	95.00	387.00	120.31	1504.72	253.65	348.65	3709
52	9.00	100.00	392.00	121.95	1523.79	258.23	358.23	3774
53	8.50	105.00	397.00	123.59	1542.86	262.89	367.89	3839
54	8.00	110.00	402.00	125.23	1561.93	267.63	377.63	3904
55	7.50	115.00	407.00	126.88	1580.99	272.45	387.45	14820
56	7.00	120.00	412.00	128.52	1600.06	277.35	397.35	15062
57	6.50	125.00	417.00	130.16	1619.13	282.32	407.32	15305
58	6.00	130.00	422.00	131.81	1638.20	287.37	417.37	15548
59	5.50	135.00	427.00	133.45	1657.27	292.48	427.48	15791
60	5.00	140.00	432.00	135.09	1676.34	297.67	437.67	16034

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	33.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	32.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	31.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	31.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	30.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	29.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	29.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	28.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	28.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

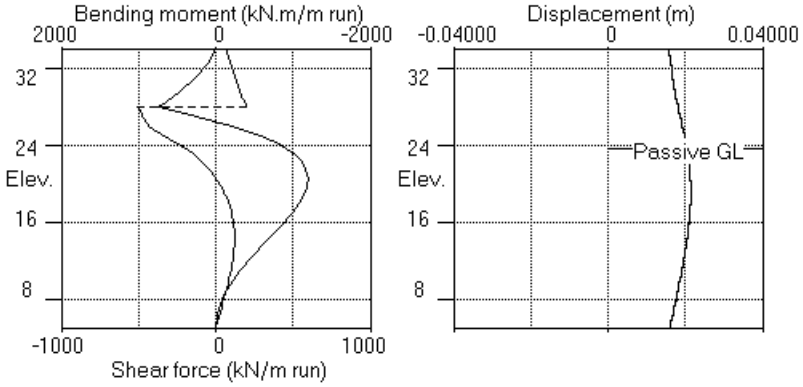
Stage No.11 Change properties of soil type 2 to soil type 4
Ko pressures will not be reset

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
14	27.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	27.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	26.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	25.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	24.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	23.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	28.84	28.84	28.84p	1547
23	23.35	0.00	7.00	0.00	55.54	55.54	55.54p	1585
24	23.00	0.00	14.00	0.00	82.24	65.37	65.37	1623
25	22.50	0.00	24.00	1.01	120.38	77.04	77.04	1677
26	22.00	0.00	34.00	4.29	158.52	88.69	88.69	1731
27	21.50	0.00	44.01	7.58	196.67	100.31	100.31	1785
28	21.00	0.00	54.01	10.87	234.83	111.89	111.89	1840
29	20.50	0.00	64.02	14.16	273.00	123.43	123.43	1894
30	20.00	0.00	74.03	17.45	311.18	134.93	134.93	1948
31	19.50	0.00	84.05	20.74	349.38	146.38	146.38	2002
32	19.00	0.00	94.07	24.03	387.59	157.78	157.78	2056
33	18.50	5.00	99.09	25.68	406.75	164.12	169.12	2110
34	18.00	10.00	104.12	27.34	425.93	170.41	180.41	2164
35	17.50	15.00	109.16	28.99	445.13	176.65	191.65	2218
36	17.00	20.00	114.20	30.65	464.35	182.82	202.82	2272
37	16.50	25.00	119.24	32.31	483.60	188.93	213.93	2327
38	16.00	30.00	124.30	33.97	502.87	194.99	224.99	2381
39	15.50	35.00	129.36	35.63	522.17	200.98	235.98	2435
40	15.00	40.00	134.43	37.30	541.50	206.91	246.91	2489
41	14.50	45.00	139.50	38.97	560.86	212.79	257.79	2543
42	14.00	50.00	144.59	40.64	580.25	218.61	268.61	2597
43	13.50	55.00	149.68	42.31	599.67	224.37	279.37	2651
44	13.00	60.00	154.78	43.99	619.12	230.08	290.08	2705
45	12.50	65.00	159.89	45.67	638.61	235.73	300.73	2759
46	12.00	70.00	165.01	47.35	658.13	241.33	311.33	2813
47	11.50	75.00	170.14	49.03	677.69	246.89	321.89	2868
48	11.00	80.00	175.28	50.72	697.29	252.40	332.40	2922
49	10.50	85.00	180.43	52.41	716.92	257.86	342.86	2976
50	10.00	90.00	185.58	54.11	736.60	263.28	353.28	3030
51	9.50	95.00	190.75	55.81	756.31	268.66	363.66	3084
52	9.00	100.00	195.93	57.51	776.06	274.00	374.00	3138
53	8.50	105.00	201.12	59.22	795.85	279.31	384.31	3192
54	8.00	110.00	206.32	60.93	815.69	284.58	394.58	3246
55	7.50	115.00	211.53	62.64	835.56	289.82	404.82	9251
56	7.00	120.00	216.76	64.35	855.48	295.03	415.03	9403
57	6.50	125.00	221.99	66.07	875.43	300.21	425.21	9555
58	6.00	130.00	227.23	67.80	895.43	305.36	435.36	9706
59	5.50	135.00	232.49	69.53	915.47	310.48	445.48	9858
60	5.00	140.00	237.75	71.26	935.55	315.58	455.58	10010

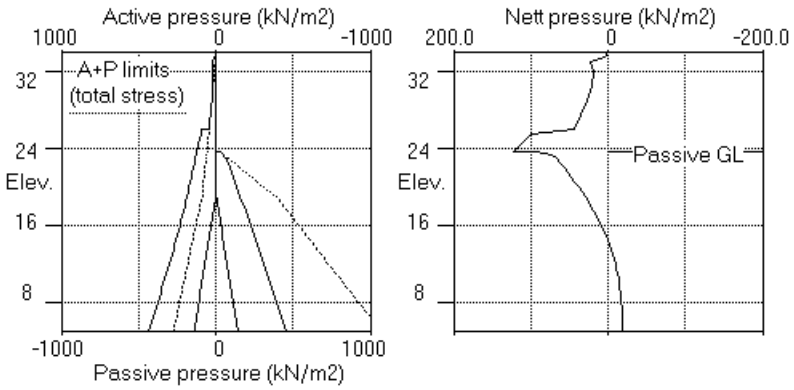
Note: 44.39a Soil pressure at active limit
55.54p Soil pressure at passive limit
1162.49b Passive limit reduced because of berm

Units: kN,m

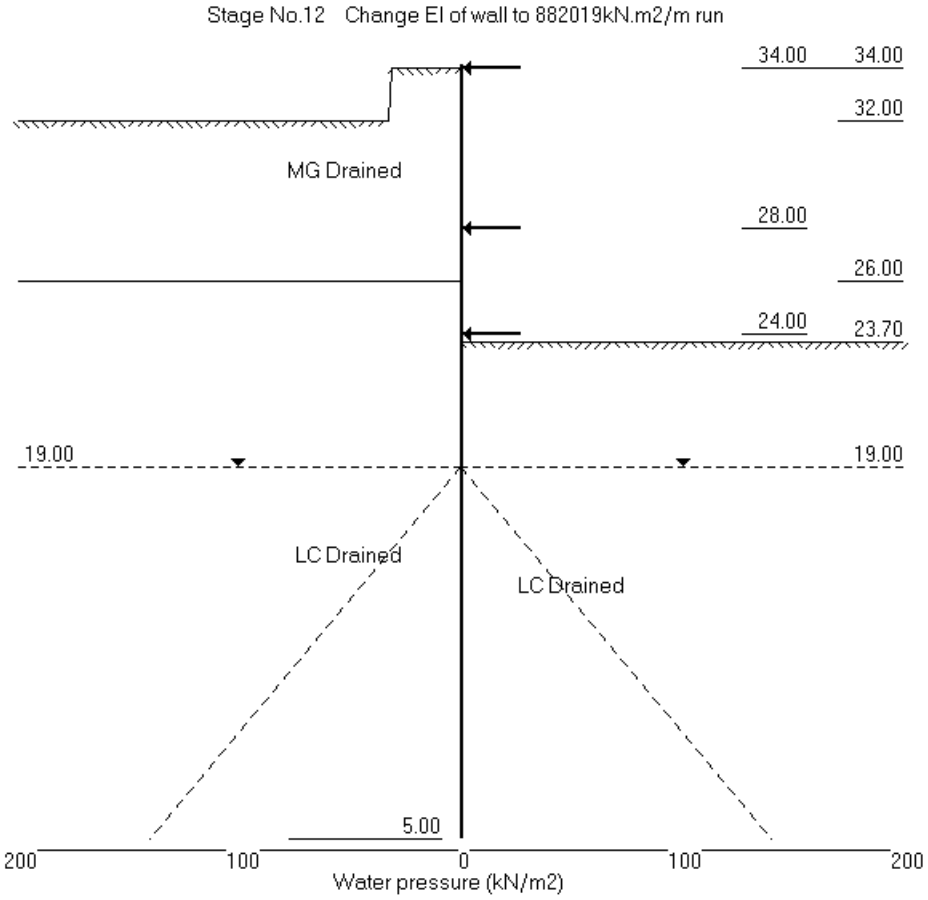
Stage No.11 Change soil type 2 to soil type 4



Stage No.11 Change soil type 2 to soil type 4



Units: kN,m


Stage No.12 Change EI of wall to 882019kN.m2/m run
34.00
34.00
32.00
MG Drained
28.00
26.00
24.00
23.70
19.00
19.00
LC Drained
LC Drained
5.00
200
100
0
100
200
Water pressure (kN/m2)

Units: kN,m

Stage No. 12 Change EI of wall to 882019 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
12	34.00	23.70		More than one strut. No FoS calc.			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
1	34.00	0.60	0.016	-3.76E-04	-27.9	-0.0	27.9	882019
2	33.50	5.42	0.016	-3.72E-04	-26.4	9.9		882019
		15.32	0.016	-3.72E-04	-26.4	9.9		
3	33.00	23.89	0.016	-3.62E-04	-16.6	22.6		882019
4	32.50	21.56	0.016	-3.46E-04	-5.2	40.9		882019
5	32.00	19.24	0.016	-3.30E-04	5.0	64.5		882019
6	31.50	18.79	0.016	-3.15E-04	14.5	93.0		882019
7	31.00	20.27	0.017	-3.04E-04	24.2	126.2		882019
8	30.50	21.74	0.017	-3.00E-04	34.7	164.4		882019
9	30.00	23.19	0.017	-3.05E-04	46.0	208.1		882019
10	29.50	24.79	0.017	-3.24E-04	58.0	257.5		882019
11	29.00	27.76	0.017	-3.60E-04	71.1	313.1		882019
12	28.50	30.71	0.017	-4.15E-04	85.7	375.5		882019
13	28.00	33.61	0.018	-4.96E-04	101.8	445.6	212.5	882019
		33.61	0.018	-4.96E-04	-110.6	445.6		
14	27.50	36.45	0.018	-5.74E-04	-93.1	298.5		882019
15	27.00	39.24	0.018	-6.27E-04	-74.2	160.6		882019
16	26.50	41.99	0.019	-6.59E-04	-53.9	33.6		882019
17	26.00	44.72	0.019	-6.76E-04	-32.2	-84.2		882019
		93.09	0.019	-6.76E-04	-32.2	-84.2		
18	25.50	99.61	0.019	-6.85E-04	15.9	-184.5		882019
19	25.00	106.02	0.020	-7.00E-04	67.4	-259.9		882019
20	24.50	112.42	0.020	-7.34E-04	122.0	-308.8		882019
21	24.00	118.71	0.020	-8.03E-04	179.7	-329.5	415.8	882019
		118.71	0.020	-8.03E-04	-236.1	-329.5		
22	23.70	122.42	0.021	-8.46E-04	-199.9	-393.7		882019
		93.57	0.021	-8.46E-04	-199.9	-393.7		
23	23.35	71.14	0.021	-8.70E-04	-171.1	-456.8		882019

(continued)

Stage No.12 Change EI of wall to 882019 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m	EI of wall kN.m2/m
24	23.00	64.36	0.021	-8.70E-04	-147.4	-510.8		882019
25	22.50	58.20	0.022	-8.37E-04	-116.7	-573.9		882019
26	22.00	52.06	0.022	-7.70E-04	-89.1	-622.0		882019
27	21.50	46.02	0.022	-6.78E-04	-64.6	-656.4		882019
28	21.00	40.15	0.023	-5.67E-04	-43.1	-678.5		882019
29	20.50	34.52	0.023	-4.45E-04	-24.4	-689.7		882019
30	20.00	29.16	0.023	-3.15E-04	-8.5	-691.2		882019
31	19.50	24.14	0.023	-1.84E-04	4.8	-684.3		882019
32	19.00	19.47	0.023	-5.35E-05	15.7	-670.1		882019
33	18.50	15.19	0.023	7.25E-05	24.4	-649.7		882019
34	18.00	11.29	0.023	1.91E-04	31.0	-624.2		882019
35	17.50	7.79	0.023	3.02E-04	35.8	-594.5		882019
36	17.00	4.69	0.023	4.02E-04	38.9	-561.5		882019
37	16.50	1.96	0.023	4.91E-04	40.6	-526.1		882019
38	16.00	-0.39	0.022	5.69E-04	41.0	-489.0		882019
39	15.50	-2.40	0.022	6.35E-04	40.3	-450.9		882019
40	15.00	-4.08	0.022	6.89E-04	38.6	-412.3		882019
41	14.50	-5.46	0.021	7.33E-04	36.3	-373.9		882019
42	14.00	-6.56	0.021	7.67E-04	33.3	-336.1		882019
43	13.50	-7.42	0.021	7.91E-04	29.8	-299.3		882019
44	13.00	-8.06	0.020	8.06E-04	25.9	-263.9		882019
45	12.50	-8.50	0.020	8.14E-04	21.8	-230.3		882019
46	12.00	-8.63	0.020	8.16E-04	17.5	-198.6		882019
47	11.50	-8.14	0.019	8.14E-04	13.3	-169.1		882019
48	11.00	-7.54	0.019	8.07E-04	9.4	-142.0		882019
49	10.50	-6.83	0.018	7.98E-04	5.8	-117.3		882019
50	10.00	-6.04	0.018	7.87E-04	2.6	-95.1		882019
51	9.50	-5.16	0.018	7.75E-04	-0.2	-75.3		882019
52	9.00	-4.21	0.017	7.64E-04	-2.6	-58.0		882019
53	8.50	-3.19	0.017	7.53E-04	-4.4	-43.1		882019
54	8.00	-2.10	0.016	7.43E-04	-5.8	-30.7		882019
55	7.50	-0.91	0.016	7.35E-04	-6.5	-20.5		882019
56	7.00	0.36	0.016	7.29E-04	-6.7	-12.6		882019
57	6.50	1.74	0.015	7.25E-04	-6.1	-6.7		882019
58	6.00	3.23	0.015	7.23E-04	-4.9	-2.8		882019
59	5.50	4.85	0.015	7.21E-04	-2.9	-0.6		882019
60	5.00	6.60	0.014	7.21E-04	-0.0	-0.0		---

At elev. 34.00 Strut force = 27.9 kN/strut = 27.9 kN/m run
At elev. 28.00 Strut force = 212.5 kN/strut = 212.5 kN/m run
At elev. 24.00 Strut force = 415.8 kN/strut = 415.8 kN/m run

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	34.00	0.00	0.00	0.00	0.74b	0.60	0.60	3204
2	33.50	0.00	9.50	1.54	5.59b	5.42	5.42	3204
		0.00	9.50	1.54	15.48b	15.32	15.32	3204
3	33.00	0.00	19.00	4.40	28.92b	23.89	23.89	3204
		0.00	19.00	4.40	28.54b	23.89	23.89	3204
4	32.50	0.00	28.50	7.25	41.79b	21.56	21.56	3204
		0.00	28.50	7.25	44.85b	21.56	21.56	3204
5	32.00	0.00	38.00	10.11	59.07b	19.24	19.24	3204
		0.00	38.00	10.11	48.35b	19.24	19.24	3204

(continued)

Stage No.12 Change EI of wall to 882019 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
6	31.50	0.00	47.50	12.97	59.99b	18.79	18.79	3204
		0.00	47.50	12.97	86.95b	18.79	18.79	3204
7	31.00	0.00	57.00	15.82	103.83b	20.27	20.27	2186
		0.00	57.00	15.82	126.34b	20.27	20.27	2186
8	30.50	0.00	66.50	18.68	146.88b	21.74	21.74	2186
		0.00	66.50	18.68	166.21b	21.74	21.74	2186
9	30.00	0.00	76.00	21.54	189.45b	23.19	23.19	2186
		0.00	76.00	21.54	206.40b	23.19	23.19	2186
10	29.50	0.00	85.50	24.39	231.71b	24.79	24.79	2186
		0.00	85.50	24.39	246.80b	24.79	24.79	2186
11	29.00	0.00	95.00	27.25	273.76b	27.76	27.76	2186
		0.00	95.00	27.25	287.35b	27.76	27.76	2186
12	28.50	0.00	104.50	30.11	315.65b	30.71	30.71	2186
		0.00	104.50	30.11	328.02b	30.71	30.71	2186
13	28.00	0.00	114.00	32.96	357.43b	33.61	33.61	2186
		0.00	114.00	32.96	368.77b	33.61	33.61	2186
14	27.50	0.00	123.50	35.82	399.12b	36.45	36.45	2186
		0.00	123.50	35.82	409.59b	36.45	36.45	2186
15	27.00	0.00	133.00	38.68	440.74b	39.24	39.24	2186
		0.00	133.00	38.68	450.47b	39.24	39.24	2186
16	26.50	0.00	142.50	41.53	482.30b	41.99	41.99	2186
		0.00	142.50	41.53	491.39b	41.99	41.99	2186
17	26.00	0.00	152.00	44.39	523.82b	44.72	44.72	2186
		0.00	152.00	43.07	479.65b	93.09	93.09	2998
18	25.50	0.00	162.00	46.36	509.71b	99.61	99.61	3123
		0.00	162.00	46.36	531.47b	99.61	99.61	3123
19	25.00	0.00	172.00	49.65	562.81b	106.02	106.02	3248
		0.00	172.00	49.65	569.42b	106.02	106.02	3248
20	24.50	0.00	182.00	52.93	601.13b	112.42	112.42	2257
		0.00	182.00	52.93	607.39b	112.42	112.42	2257
21	24.00	0.00	192.00	56.22	639.43b	118.71	118.71	2341
		0.00	192.00	56.22	644.24b	118.71	118.71	2341
22	23.70	0.00	198.00	58.19	663.61b	122.42	122.42	2391
		0.00	198.00	58.19	667.35b	122.42	122.42	2391
23	23.35	0.00	205.00	60.49	690.07b	126.68	126.68	2449
		0.00	205.00	60.49	693.98b	126.68	126.68	2449
24	23.00	0.00	212.00	62.79	716.83b	130.90	130.90	2508
		0.00	212.00	62.79	721.39b	130.90	130.90	2508
25	22.50	0.00	222.00	66.08	754.25b	136.90	136.90	2591
		0.00	222.00	66.08	759.42b	136.90	136.90	2591
26	22.00	0.00	232.00	69.36	792.50b	142.91	142.91	2675
		0.00	232.00	69.36	797.45b	142.91	142.91	2675
27	21.50	0.00	242.00	72.65	830.74b	148.99	148.99	2759
		0.00	242.00	72.65	835.49b	148.99	148.99	2759
28	21.00	0.00	252.00	75.94	868.97b	155.17	155.17	2842
		0.00	252.00	75.94	873.54b	155.17	155.17	2842
29	20.50	0.00	262.00	79.22	907.20b	161.51	161.51	2926
		0.00	262.00	79.22	911.60b	161.51	161.51	2926
30	20.00	0.00	272.00	82.51	945.41b	168.02	168.02	3009
		0.00	272.00	82.51	949.66b	168.02	168.02	3009
31	19.50	0.00	282.00	85.80	983.63b	174.73	174.73	3093
		0.00	282.00	85.80	987.72b	174.73	174.73	3093
32	19.00	0.00	292.00	89.08	1021.83b	181.67	181.67	3177
		0.00	292.00	89.08	1012.01b	181.67	181.67	3177

(continued)

Stage No.12 Change EI of wall to 882019 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

Node no.	Y coord	ACTIVE side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
33	18.50	5.00	297.00	90.73	1028.90b	183.85	188.85	3260
		5.00	297.00	90.73	1031.06b	183.85	188.85	3260
34	18.00	10.00	302.00	92.37	1047.99b	186.27	196.27	3344
		10.00	302.00	92.37	1050.11b	186.27	196.27	3344
35	17.50	15.00	307.00	94.01	1067.07b	188.94	203.94	3427
		15.00	307.00	94.01	1069.16b	188.94	203.94	3427
36	17.00	20.00	312.00	95.66	1086.16b	191.86	211.86	3511
		20.00	312.00	95.66	1088.21b	191.86	211.86	3511
37	16.50	25.00	317.00	97.30	1105.24b	195.02	220.02	3595
		25.00	317.00	97.30	1107.27b	195.02	220.02	3595
38	16.00	30.00	322.00	98.94	1124.32b	198.42	228.42	3678
		30.00	322.00	98.94	1126.32b	198.42	228.42	3678
39	15.50	35.00	327.00	100.59	1143.41b	202.04	237.04	3762
		35.00	327.00	100.59	1145.37b	202.04	237.04	3762
40	15.00	40.00	332.00	102.23	1162.49b	205.88	245.88	3845
		40.00	332.00	102.23	1294.97	205.88	245.88	3845
41	14.50	45.00	337.00	103.87	1314.04	209.91	254.91	3929
42	14.00	50.00	342.00	105.52	1333.11	214.11	264.11	4013
43	13.50	55.00	347.00	107.16	1352.18	218.49	273.49	4096
44	13.00	60.00	352.00	108.80	1371.24	223.01	283.01	4180
45	12.50	65.00	357.00	110.45	1390.31	227.66	292.66	4263
46	12.00	70.00	362.00	112.09	1409.38	232.51	302.51	6105
47	11.50	75.00	367.00	113.73	1428.45	237.71	312.71	6222
48	11.00	80.00	372.00	115.38	1447.52	243.00	323.00	6340
49	10.50	85.00	377.00	117.02	1466.59	248.37	333.37	6457
50	10.00	90.00	382.00	118.66	1485.65	253.81	343.81	6574
51	9.50	95.00	387.00	120.31	1504.72	259.31	354.31	6692
52	9.00	100.00	392.00	121.95	1523.79	264.87	364.87	6809
53	8.50	105.00	397.00	123.59	1542.86	270.48	375.48	6927
54	8.00	110.00	402.00	125.23	1561.93	276.16	386.16	7044
55	7.50	115.00	407.00	126.88	1580.99	281.90	396.90	7161
56	7.00	120.00	412.00	128.52	1600.06	287.71	407.71	7279
57	6.50	125.00	417.00	130.16	1619.13	293.59	418.59	7396
58	6.00	130.00	422.00	131.81	1638.20	299.56	429.56	7514
59	5.50	135.00	427.00	133.45	1657.27	305.60	440.60	7631
60	5.00	140.00	432.00	135.09	1676.34	311.74	451.74	7748

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	33.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	32.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	31.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	31.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	30.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	29.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

Stage No.12 Change EI of wall to 882019 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
11	29.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	28.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	28.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	27.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	27.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	26.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	25.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	24.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	23.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	28.84	28.84	28.84p	1656
23	23.35	0.00	7.00	0.00	55.54	55.54	55.54p	1696
24	23.00	0.00	14.00	0.00	82.24	66.54	66.54	1737
25	22.50	0.00	24.00	1.01	120.38	78.70	78.70	1795
26	22.00	0.00	34.00	4.29	158.52	90.85	90.85	1852
27	21.50	0.00	44.01	7.58	196.67	102.97	102.97	1910
28	21.00	0.00	54.01	10.87	234.83	115.02	115.02	1968
29	20.50	0.00	64.02	14.16	273.00	126.99	126.99	2026
30	20.00	0.00	74.03	17.45	311.18	138.85	138.85	2084
31	19.50	0.00	84.05	20.74	349.38	150.59	150.59	2142
32	19.00	0.00	94.07	24.03	387.59	162.19	162.19	2200
33	18.50	5.00	99.09	25.68	406.75	168.66	173.66	2258
34	18.00	10.00	104.12	27.34	425.93	174.98	184.98	2316
35	17.50	15.00	109.16	28.99	445.13	181.15	196.15	2373
36	17.00	20.00	114.20	30.65	464.35	187.17	207.17	2431
37	16.50	25.00	119.24	32.31	483.60	193.06	218.06	2489
38	16.00	30.00	124.30	33.97	502.87	198.81	228.81	2547
39	15.50	35.00	129.36	35.63	522.17	204.44	239.44	2605
40	15.00	40.00	134.43	37.30	541.50	209.95	249.95	2663
41	14.50	45.00	139.50	38.97	560.86	215.36	260.36	2721
42	14.00	50.00	144.59	40.64	580.25	220.68	270.68	2779
43	13.50	55.00	149.68	42.31	599.67	225.91	280.91	2837
44	13.00	60.00	154.78	43.99	619.12	231.06	291.06	2894
45	12.50	65.00	159.89	45.67	638.61	236.16	301.16	2952
46	12.00	70.00	165.01	47.35	658.13	241.14	311.14	4527
47	11.50	75.00	170.14	49.03	677.69	245.85	320.85	4614
48	11.00	80.00	175.28	50.72	697.29	250.54	330.54	4701
49	10.50	85.00	180.43	52.41	716.92	255.20	340.20	4788
50	10.00	90.00	185.58	54.11	736.60	259.84	349.84	4875
51	9.50	95.00	190.75	55.81	756.31	264.47	359.47	4962
52	9.00	100.00	195.93	57.51	776.06	269.08	369.08	5049
53	8.50	105.00	201.12	59.22	795.85	273.68	378.68	5136
54	8.00	110.00	206.32	60.93	815.69	278.26	388.26	5223
55	7.50	115.00	211.53	62.64	835.56	282.82	397.82	5310
56	7.00	120.00	216.76	64.35	855.48	287.35	407.35	5397
57	6.50	125.00	221.99	66.07	875.43	291.85	416.85	5484
58	6.00	130.00	227.23	67.80	895.43	296.32	426.32	5571
59	5.50	135.00	232.49	69.53	915.47	300.75	435.75	5658
60	5.00	140.00	237.75	71.26	935.55	305.14	445.14	5746

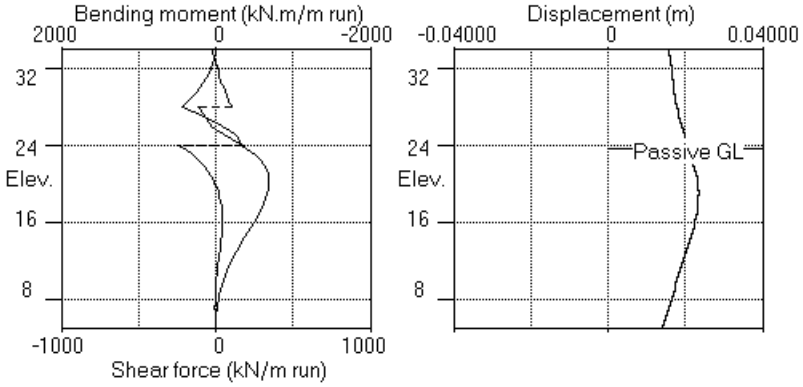
(continued)

Stage No.12 Change EI of wall to 882019 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

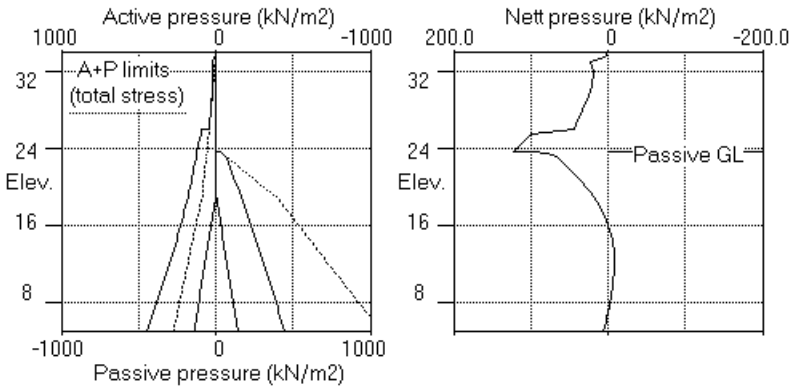
Note: 12.34a Soil pressure at active limit
55.54p Soil pressure at passive limit
1162.49b Passive limit reduced because of berm

Units: kN,m

Stage No.12 Change EI of wall to 882019kN.m2/m run



Stage No.12 Change EI of wall to 882019kN.m2/m run



Units: kN,m

Summary of results

LIMIT STATE PARAMETERS

Limit State: Serviceability Limit State
All loads and soil strengths are unfactored

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 5.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	34.00	34.00	Cant.	Conditions not suitable for FoS calc.			
2	34.00	30.50	Cant.	4.996	7.44	28.56	1.94
3	34.00	30.50		No analysis at this stage			
4	34.00	27.50	31.00	4.907	n/a	27.00	0.50
5	34.00	27.50		No analysis at this stage			

All remaining stages have more than one strut - FoS calculation n/a

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 50.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	34.00	0.019	0.000	0	-0	0	-0	69	-28	94	-38
2	33.50	0.019	0.000	35	0	47	0	71	-26	96	-36
3	33.00	0.019	0.000	73	0	99	0	82	-17	111	-22
4	32.50	0.018	0.000	117	0	157	0	94	-5	127	-7
5	32.00	0.018	0.000	165	0	223	0	104	0	141	0
6	31.50	0.018	0.000	219	0	296	0	114	0	154	0
7	31.00	0.018	0.000	278	0	376	0	190	-179	257	-241
8	30.50	0.018	0.000	343	-21	462	-28	201	-170	271	-230
9	30.00	0.018	0.000	412	-104	557	-140	212	-161	286	-217
10	29.50	0.018	0.000	488	-182	658	-245	223	-150	302	-203
11	29.00	0.018	0.000	569	-254	769	-343	236	-139	318	-187
12	28.50	0.018	0.000	657	-320	887	-432	249	-125	336	-169
13	28.00	0.018	0.000	783	-379	1056	-512	263	-509	355	-687
14	27.50	0.018	0.000	532	-431	719	-582	33	-493	45	-665
15	27.00	0.019	0.000	290	-475	392	-641	38	-476	51	-642
16	26.50	0.019	0.000	157	-510	212	-688	42	-458	57	-618
17	26.00	0.019	0.000	179	-538	242	-726	47	-438	64	-591
18	25.50	0.019	0.000	202	-558	273	-753	45	-390	61	-526
19	25.00	0.020	0.000	224	-579	303	-781	67	-338	91	-457
20	24.50	0.020	0.000	245	-731	331	-987	122	-284	165	-383
21	24.00	0.020	0.000	265	-857	357	-1156	180	-236	243	-319
22	23.70	0.021	0.000	275	-918	372	-1240	35	-200	47	-270
23	23.35	0.021	0.000	287	-980	388	-1323	33	-171	44	-231
24	23.00	0.021	0.000	298	-1032	403	-1393	30	-147	41	-199
25	22.50	0.022	0.000	312	-1093	422	-1475	35	-117	47	-158
26	22.00	0.022	0.000	324	-1137	438	-1536	41	-89	56	-120
27	21.50	0.022	0.000	334	-1168	452	-1577	47	-65	63	-87
28	21.00	0.023	0.000	343	-1185	462	-1600	51	-43	69	-58
29	20.50	0.023	0.000	349	-1191	471	-1607	55	-24	74	-33
30	20.00	0.023	0.000	352	-1185	476	-1600	57	-8	77	-11
31	19.50	0.023	0.000	354	-1170	478	-1580	59	0	79	0
32	19.00	0.023	0.000	354	-1147	478	-1548	60	-2	81	-3
33	18.50	0.023	0.000	352	-1115	475	-1506	69	-6	93	-8
34	18.00	0.023	0.000	348	-1078	470	-1455	81	-10	110	-13
35	17.50	0.023	0.000	342	-1034	462	-1396	92	-13	124	-18
36	17.00	0.023	0.000	335	-986	452	-1331	100	-17	135	-23
37	16.50	0.023	0.000	326	-934	440	-1261	107	-20	144	-27
38	16.00	0.022	0.000	315	-879	425	-1187	112	-23	151	-31
39	15.50	0.022	0.000	303	-822	409	-1110	116	-26	156	-35
40	15.00	0.022	0.000	289	-763	391	-1030	118	-28	160	-38

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
41	14.50	0.021	0.000	275	-704	371	-950	119	-30	161	-41
42	14.00	0.021	0.000	259	-644	349	-869	119	-32	161	-44
43	13.50	0.021	0.000	242	-585	327	-789	118	-34	159	-46
44	13.00	0.020	0.000	225	-526	304	-710	116	-35	156	-48
45	12.50	0.020	0.000	207	-469	279	-633	112	-36	152	-49
46	12.00	0.020	0.000	188	-414	254	-559	108	-37	146	-50
47	11.50	0.019	0.000	170	-361	229	-487	103	-37	139	-51
48	11.00	0.019	0.000	151	-311	204	-419	98	-37	132	-50
49	10.50	0.019	0.000	132	-263	179	-356	91	-37	123	-50
50	10.00	0.019	0.000	114	-219	154	-296	85	-36	114	-49
51	9.50	0.018	0.000	96	-179	130	-241	77	-35	104	-47
52	9.00	0.018	0.000	79	-142	107	-192	70	-33	94	-45
53	8.50	0.018	0.000	63	-109	85	-147	62	-31	83	-42
54	8.00	0.018	0.000	48	-81	65	-109	53	-28	72	-38
55	7.50	0.017	0.000	35	-56	47	-76	45	-25	60	-34
56	7.00	0.017	0.000	23	-36	31	-48	36	-21	48	-29
57	6.50	0.017	0.000	14	-20	18	-27	27	-17	36	-23
58	6.00	0.017	0.000	6	-9	9	-12	18	-12	24	-16
59	5.50	0.016	0.000	2	-2	2	-3	9	-6	12	-9
60	5.00	0.016	0.000	0	-0	0	-0	0	-0	0	-0

Maximum and minimum bending moment and shear force at each stage

Stage no.	Bending moment Calculated				Bending moment Factored		Shear force Calculated				Shear force Factored	
	max.	elev.	min.	elev.	max.	min.	max.	elev.	min.	elev.	max.	min.
	kN.m/m		kN.m/m		kN.m/m		kN/m		kN/m		kN/m	kN/m
1	0	34.00	0	34.00	0	0	0	34.00	0	34.00	0	0
2	354	19.50	-0	34.00	478	-0	47	26.00	-37	11.50	64	-51
3	No calculation at this stage											
4	67	31.00	-575	24.50	90	-776	60	18.50	-179	31.00	81	-241
5	No calculation at this stage											
6	783	28.00	-1178	20.50	1056	-1591	263	28.00	-508	28.00	355	-686
7	No calculation at this stage											
8	No calculation at this stage											
9	752	28.00	-1190	20.50	1015	-1607	197	28.00	-506	28.00	266	-682
10	No calculation at this stage											
11	748	28.00	-1191	20.50	1010	-1607	198	28.00	-509	28.00	268	-687
12	446	28.00	-691	20.00	602	-933	180	24.00	-236	24.00	243	-319

Maximum and minimum displacement at each stage

Stage no.	Displacement maximum	elev.	minimum	elev.	Stage description
	m		m		
1	0.000	34.00	0.000	34.00	Excav. to elev. 34.00 on ACTIVE side
2	0.019	34.00	0.000	34.00	Excav. to elev. 30.50 on PASSIVE side
3	No calculation at this stage				Install strut no.1 at elev. 31.00
4	0.018	34.00	0.000	34.00	Excav. to elev. 27.50 on PASSIVE side
5	No calculation at this stage				Install strut no.2 at elev. 28.00
6	0.021	19.00	0.000	34.00	Excav. to elev. 23.70 on PASSIVE side
7	No calculation at this stage				Install strut no.3 at elev. 24.00
8	No calculation at this stage				Install strut no.4 at elev. 34.00
9	0.021	19.00	0.000	34.00	Remove strut no.1 at elev. 31.00
10	No calculation at this stage				Change soil type 1 to soil type 3
11	0.021	19.00	0.000	34.00	Change soil type 2 to soil type 4
12	0.023	19.00	0.000	34.00	Change EI of wall to 882019kN.m2/m run

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Strut forces at each stage (horizontal components)

Stage no.	Strut no. 1 at elev. 31.00			Strut no. 2 at elev. 28.00			Strut no. 3 at elev. 24.00		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
4	220	1102	1488	---	---	---	---	---	---
6	-124	-618	-834	771	771	1041	---	---	---
9	---	---	---	702	702	948	1	1	1
11	---	---	---	707	707	955	8	8	10
12	---	---	---	212	212	287	416	416	561

Stage no.	Strut no. 4 at elev. 34.00		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut
9	-56	-56	-76
11	-69	-69	-94
12	28	28	38

Units: kN,m

Bending moment, shear force, displacement envelopes