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INITIAL DATA

Notes
 Water pressure in LT equal to hydrostatic on passive side. Additional surcharge to counteract heave pressure.

Soil properties

No.	Description	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	London Clay- undrained	20.00	1.00	1.00	2.45	2.45	1.00	Calculated	
2	London Clay- drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	Terrace Gravel	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.00
2	24.00	0.67
3	25.00	0.67
4	33.00	0.67

Soil Strength Partial Factors
 Document and case: **tan Phi'** c' Cu E
 Unfactored 1.00 1.00 1.00 1.00
 Note: Only the parameters in bold have been affected by Partial Factors, No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	20.00	1.00	1.00	2.45	2.45	1.00	Calculated	
2	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.00
2	24.00	0.67
3	25.00	0.67
4	33.00	0.67

Surcharge properties

No.	Stage	Side	Level	Pressure	Partial Factor	Offset	Width	Ks
1	0	-	Left	10.00	10.00	1.00		
2	10	-	Right	0.82	65.00	1.00		
3	1	-	Left	10.00	90.00	1.00	7.50	12.00

Note: Only the parameters in bold have been affected by Partial Factors.

Surcharge Design properties

No.	Stage	Side	Level	Pressure	Offset	Width	Ks
1	0	-	Left	10.00	10.00		
2	10	-	Right	0.82	65.00		
3	1	-	Left	10.00	90.00	7.50	12.00

Strut properties

No.	Stage	Node	Level	Prestress	Stiffness	Angle	Lever arm
1	3	9	2	9.50	0.00	50000.00	0.00
2	5	8	11	5.50	0.00	50000.00	0.00
3	7	10	19	1.45	0.00	140000.00	0.00
4	8	10	12	5.00	0.00	140000.00	0.00
5	9	10	3	9.20	0.00	140000.00	0.00
6	10	-	19	1.45	0.00	100000.00	0.00
7	10	-	12	5.00	0.00	100000.00	0.00
8	10	-	3	9.20	0.00	100000.00	0.00

STAGE 0 : INITIAL CONDITION
 Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed

Water data on LEFT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Analysis details
 SAFE model with redistribution and with friction at wall/soil interface
 E profile Generated
 Boundary distances [m] : 30.00 30.00

Convergence control parameters
 Maximum number of iterations : 900
 Tolerance for displacement convergence [mm] : 0.01
 Tolerance for pressure convergence [kN/m²] : 0.10
 Damping coefficient : 1.00
 Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left	Right
	a yo b	a yo b
	[kN/m ² /m] [m] [kN/m ²]	[kN/m ² /m] [m] [kN/m ²]

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Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 0 : Initial condition

Surcharge or strut changes

Surcharge no. 1 applied at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	2.27	0.00	0.00
Max Shear	27	-2.00	1.08	0.00	0.00
Max BM	42	-9.50	0.68	0.00	0.00

STAGE 1 : INSTALL WALL AND UNDRAINED

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed and wall EI changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 1 : Install wall and undrained

Surcharge or strut changes

Surcharge no. 3 applied at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	1.43	0.00	0.00
Max Shear	12	5.00	0.96	-2.40	3.80
Max BM	15	3.50	0.82	-6.63	0.44
Wall toe	33	-5.00	0.38	0.00	0.00

STAGE 2 : EXCAVATE FOR TOP PROP

Ground level [m] LEFT: 10.00 RIGHT: 9.00 Soil zones changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 2 : Excavate for top prop

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.03	0.00	0.00
Dig level (R)	5	8.90	3.66	-3.67	8.23
Max BM	10	6.00	2.77	-22.26	2.07
Wall toe	33	-5.00	1.39	0.00	0.00

STAGE 3 : INSTALL TOP PROP

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 3 : Install top Prop

Surcharge or strut changes

Strut no 1 inserted at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.03	0.00	0.00
Above strut 1	2	9.50	3.86	-0.55	2.47
Below strut 1				-0.55	2.47
Dig level (R)	5	8.90	3.66	-3.67	8.24
Max BM	10	6.00	2.77	-22.26	2.07
Wall toe	33	-5.00	1.39	0.00	0.00

Strut Forces

No.	Node	Strut no.	Strut force	Horiz force	Moment	Max strut force
			[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	0.00	0.00	0.00	0.00	0.00

STAGE 4 : EXCAVATE TO 2ND PROP

Ground level [m] LEFT: 10.00 RIGHT: 4.75 Soil zones changed

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No. Node Strut Horiz Moment Max
no. force force force
[kN/m] [kN/m] [kNm/m] [kN/m]

Water data on LEFT side

No. Level Pressure Unit
wt.
[m] [kN/m²] [kN/m³]
1 7.00 0.00 9.80

Water data on RIGHT side

No. Level Pressure Unit
wt.
[m] [kN/m²] [kN/m³]
1 4.75 0.00 9.80

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-undrained						
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-drained						
Made	5.00	10.00	0.00	0.00	0.00	0.00
Ground						
Terrace	5.00	7.00	0.00	0.00	0.00	0.00
Gravel						

RESULTS FOR STAGE 4 : Excavate to 2nd prop

Summary Results

Node	Level	Displacement	Moment	Shear
		[mm]	[kNm/m]	[kN/m]
		[m]		
Top wall node	1	10.00	5.03	0.00
Above strut 1	2	9.50	5.53	-2.16
Below strut 1				-77.00
Max BM	10	6.00	8.22	141.22
Dig level (R)	13	4.50	8.49	106.01
Wall toe	33	-5.00	5.86	0.00

Strut Forces

No. Node Strut Horiz Moment Max
no. force force force
[kN/m] [kN/m] [kNm/m] [kN/m]

1 2 83.65 83.65 0.00 83.65

STAGE 5 : INSTALL 2ND PROP

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-undrained						
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-drained						
Made	5.00	10.00	0.00	0.00	0.00	0.00
Ground						
Terrace	5.00	7.00	0.00	0.00	0.00	0.00
Gravel						

RESULTS FOR STAGE 5 : Install 2nd prop

Surcharge or strut changes

Strut no 2 inserted at this stage

Summary Results

Node	Level	Displacement	Moment	Shear
		[mm]	[kNm/m]	[kN/m]
		[m]		
Top wall node	1	10.00	5.03	0.00
Above strut 1	2	9.50	5.53	-2.16
Below strut 1				-77.00
Max BM	10	6.00	8.22	141.22
Above strut 2	11	5.50	8.37	137.34
Below strut 2				15.21
Dig level (R)	13	4.50	8.49	106.01
Wall toe	33	-5.00	5.86	0.00

Strut Forces

No. Node Strut Horiz Moment Max
no. force force force
[kN/m] [kN/m] [kNm/m] [kN/m]

1 2 83.65 83.65 0.00 83.65

2 11 0.00 0.00 0.00 0.00

STAGE 6 : EXCAVATE TO FORMATION

Ground level [m] LEFT: 10.00 RIGHT: 0.82 Soil zones changed

Water data on LEFT side

No. Level Pressure Unit
wt.
[m] [kN/m²] [kN/m³]
1 7.00 0.00 9.80

Water data on RIGHT side

No. Level Pressure Unit
wt.
[m] [kN/m²] [kN/m³]
1 0.82 0.00 9.80

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-undrained						
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-drained						
Made	5.00	10.00	0.00	0.00	0.00	0.00
Ground						
Terrace	5.00	7.00	0.00	0.00	0.00	0.00
Gravel						

RESULTS FOR STAGE 6 : Excavate to formation

Summary Results

Node	Level	Displacement	Moment	Shear
		[mm]	[kNm/m]	[kN/m]
		[m]		
Top wall node	1	10.00	4.58	0.00
Above strut 1	2	9.50	5.46	-3.32
Below strut 1				-70.20
Above strut 2	11	5.50	11.57	70.58

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Node	Level	Displacement	Moment	Shear
[m]		[mm]	[kNm/m]	[kN/m]
Below strut 2			70.58	-117.81
Max BM	16	3.00	13.71	227.21
Dig level (R)	21	0.50	13.43	86.40
Wall toe	33	-5.00	10.06	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	80.02	80.02	0.00	83.65
2	11	159.89	159.89	0.00	159.89

STAGE 7 : BASE SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	0.82
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level	Soil	Cohesion [kN/m ²]		
[m]		Left	Right	Left	Right
1	10.00	3	0	0.00	0.00
2	9.50	3	0	0.00	0.00
3	9.20	3	0	0.00	0.00
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	0	75.00	0.00
15	3.50	1	0	77.50	0.00
16	3.00	1	0	80.00	0.00
17	2.50	1	0	82.50	0.00
18	2.00	1	0	85.00	0.00
19	1.45	1	0	87.75	0.00
20	1.15	1	0	89.25	0.00
21	0.50	1	1	92.50	60.12
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
* 33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Analysis details

SAFE model with redistribution
and with friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	30.00	30.00
Wall relaxation	0%	

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 7 : Base slab

Surcharge or strut changes

Strut no 3 inserted at this stage

Summary Results

Node	Level	Displacement	Moment	Shear
[m]		[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.58	0.00
Above strut 1	2	9.50	5.46	-3.32
Below strut 1				-70.20
Above strut 2	11	5.50	11.57	70.58
Below strut 2				70.58
Max BM	16	3.00	13.71	227.21
Above strut 3	19	1.45	13.80	182.45
Below strut 3				182.45
Dig level (R)	21	0.50	13.43	86.40
Wall toe	33	-5.00	10.06	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	80.02	80.02	0.00	83.65
2	11	159.89	159.89	0.00	159.89

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No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
3	19	-0.00	-0.00	0.00	0.00

STAGE 8 : B1 SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	0.82
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right
1	10.00	3	0	0.00
2	9.50	3	0	0.00
3	9.20	3	0	0.00
4	9.10	3	0	0.00
5	8.90	3	0	0.00
6	8.25	3	0	0.00
7	7.30	3	0	0.00
8	6.70	4	0	0.00
9	6.50	4	0	0.00
10	6.00	4	0	0.00
11	5.50	4	0	0.00
12	5.00	4	0	0.00
13	4.50	1	0	72.50
14	4.00	1	0	75.00
15	3.50	1	0	77.50
16	3.00	1	0	80.00
17	2.50	1	0	82.50
18	2.00	1	0	85.00
19	1.45	1	0	87.75
20	1.15	1	0	89.25
21	0.50	1	1	92.50
22	0.00	1	1	95.00
23	-0.50	1	1	97.50
24	-0.90	1	1	99.50
25	-1.00	1	1	100.00
26	-1.50	1	1	102.50
27	-2.00	1	1	105.00
28	-2.40	1	1	107.00
29	-2.70	1	1	108.50
30	-3.50	1	1	112.50
31	-4.00	1	1	115.00
32	-4.50	1	1	117.50
* 33	-5.00	1	1	120.00
34	-5.50	1	1	122.50
35	-6.00	1	1	125.00
36	-6.70	1	1	128.50
37	-7.10	1	1	130.50
38	-7.50	1	1	132.50
39	-8.00	1	1	135.00
40	-8.50	1	1	137.50
41	-9.00	1	1	140.00
42	-9.50	1	1	142.50
43	-10.00	1	1	145.00
44	-10.50	1	1	147.50
45	-11.00	1	1	150.00
46	-11.50	1	1	152.50
47	-12.00	1	1	155.00
48	-12.50	1	1	157.50
49	-13.00	1	1	160.00
50	-13.40	1	1	162.00
51	-14.00	1	1	165.00
52	-14.50	1	1	167.50
53	-15.00	1	1	170.00
54	-16.00	1	1	175.00
55	-17.00	1	1	180.00
56	-18.00	1	1	185.00
57	-19.00	1	1	190.00
58	-20.00	1	1	195.00

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]	[m]	[kN/m ²]
London Clay-undrained	5.00	4.75	0.00	0.00	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00	0.00	0.00
Terrace						
Gravel						

RESULTS FOR STAGE 8 : B1 Slab

Surcharge or strut changes

Strut no. 2 removed at this stage
 Strut no 4 inserted at this stage

Summary Results

	Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	4.89	0.00	0.00
Above strut 1	2	9.50	5.87	-3.51	10.29
Below strut 1				-3.51	-90.14
Above strut 4	12	5.00	12.89	148.38	26.69
Below strut 4				148.38	-76.13
Max BM	16	3.00	14.09	214.43	6.15
Above strut 3	19	1.45	13.95	153.63	74.09
Below strut 3				153.63	53.46
Dig level (R)	21	0.50	13.49	66.78	83.80
Wall toe	33	-5.00	10.07	0.00	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	100.43	100.43	0.00	100.43
2	11				159.89
3	19	20.63	20.63	0.00	20.63
4	12	102.82	102.82	0.00	102.82

STAGE 9 : CONSTRUCT GF SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	0.82
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right
1	10.00	3	0	0.00
2	9.50	3	0	0.00
3	9.20	3	0	0.00

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Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	0	75.00	0.00
15	3.50	1	0	77.50	0.00
16	3.00	1	0	80.00	0.00
17	2.50	1	0	82.50	0.00
18	2.00	1	0	85.00	0.00
19	1.45	1	0	87.75	0.00
20	1.15	1	0	89.25	0.00
21	0.50	1	1	92.50	60.12
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
* 33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 9 : Construct GF slab

Surcharge or strut changes

Strut no. 1 removed at this stage
 Strut no 5 inserted at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	5.82	0.00
Above strut 5	3	9.20	7.16	-6.64
Below strut 5				-6.64
Above strut 4	12	5.00	12.92	127.11
Below strut 4				127.11
Max BW	16	3.00	14.06	206.21
Above strut 3	19	1.45	13.92	153.11
Below strut 3				153.11
Dig level (R)	21	0.50	13.48	67.14
Wall toe	33	-5.00	10.07	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				100.43
2	11				159.89
3	19	17.37	17.37	0.00	20.63
4	12	107.33	107.33	0.00	107.33
5	3	98.66	98.66	0.00	98.66

STAGE 10 : DRAINED

Ground level [m] LEFT: 10.00 RIGHT: 0.82 Soil zones changed and wall EI changed

Water data on LEFT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	0.82	0.00	9.80
2	0.30	65.00	9.80

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				

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Material	Left		Right	
	a yo	b yo	a yo	b yo
	[kN/m ² /m]	[m]	[kN/m ²]	[m]
Terrace	5.00	7.00	0.00	0.00
Gravel			0.00	0.00

RESULTS FOR STAGE 10 : Drained

Surcharge or strut changes

Strut no. 3 removed at this stage
 Strut no. 4 removed at this stage
 Strut no. 5 removed at this stage
 Strut no. 6 inserted at this stage
 Strut no. 7 inserted at this stage
 Strut no. 8 inserted at this stage
 Surcharge no. 2 applied at this stage

Summary Results

Node	Level	Displacement	Moment	Shear
	[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	6.65	0.00
Above strut 8	3	9.20	8.09	-6.79
Below strut 8				-78.74
Above strut 7	12	5.00	14.56	115.38
Below strut 7				115.38
Max BM	16	3.00	16.02	294.31
Above strut 6	19	1.45	15.60	206.65
Below strut 6				206.65
Dig level (R)	21	0.50	14.74	178.93
Wall toe	33	-5.00	3.36	0.00

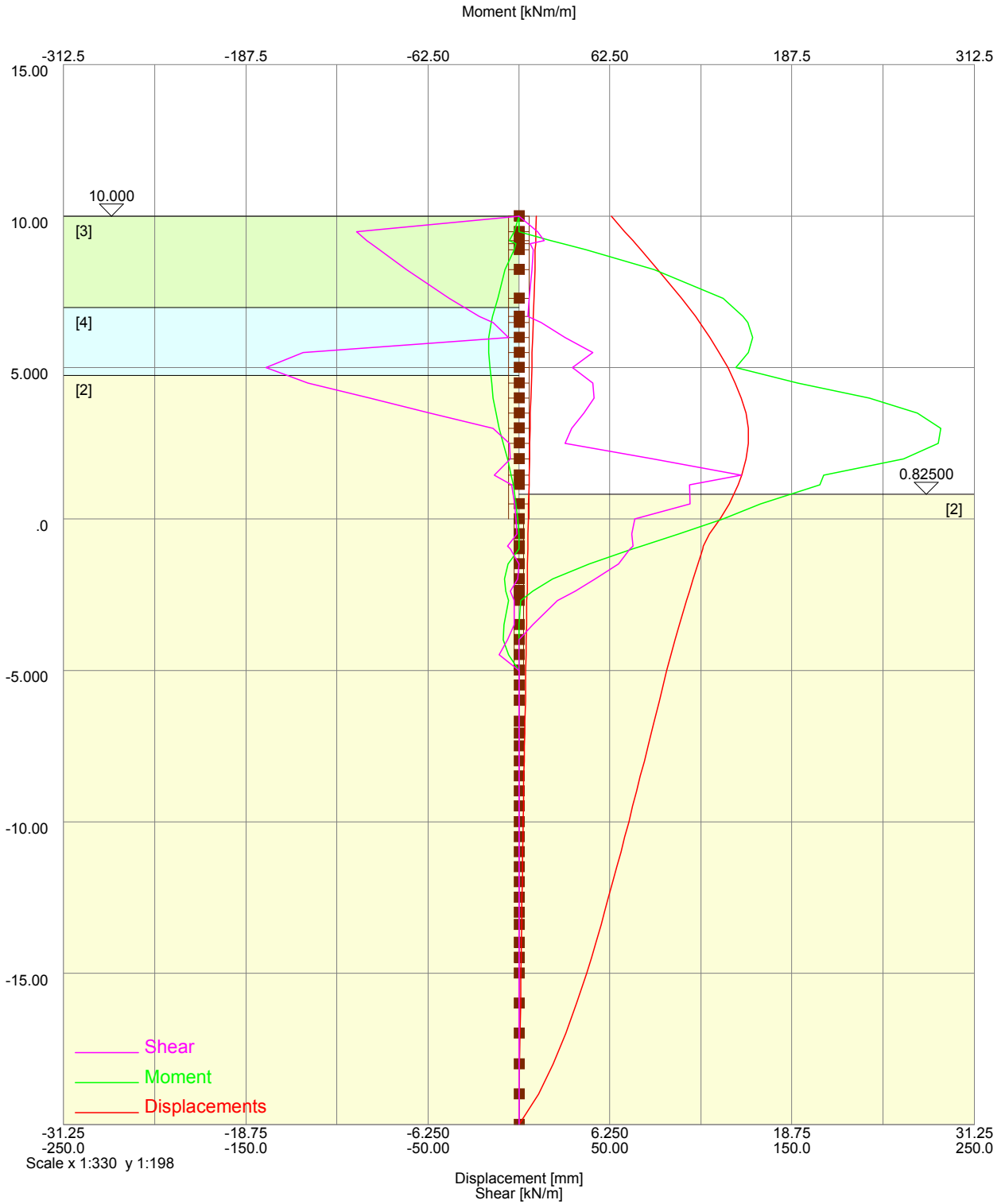
Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2				100.43
2	11				159.89
3	19				20.63
4	12				107.33
5	3				98.66
6	19	167.30	167.30	0.00	167.30
7	12	163.50	163.50	0.00	163.50
8	3	92.91	92.91	0.00	92.91

Results Envelope

Node	Level	Displacements		Moments	Shears	
		Min	Max		Min	Max
	[m]			[kNm/m]	[kN/m]	
1	10.00	1.43	6.65	0.00	0.00	0.00
2	9.50	1.38	7.55	-3.51	0.29	-90.14
3	9.20	1.36	8.09	-6.79	22.55	-84.68
4	9.10	1.35	8.27	-2.26	30.79	-82.27
5	8.90	1.33	8.63	-3.67	47.13	-77.52
6	8.25	1.27	9.79	-9.79	94.11	-62.44
7	7.30	1.19	11.40	-15.15	141.74	-38.29
8	6.70	1.13	12.33	-19.19	155.40	-21.56
9	6.50	1.11	12.62	-20.19	158.60	-13.10
10	6.00	1.06	13.32	-22.26	161.27	-2.33
11	5.50	1.01	13.97	-22.26	158.08	-117.81
12	5.00	0.96	14.56	-21.83	148.38	-145.46
13	4.50	0.91	15.08	-20.94	185.39	-122.57
14	4.00	0.87	15.52	-20.22	237.95	-89.01
15	3.50	0.82	15.84	-18.47	274.40	-56.36
16	3.00	0.79	16.02	-15.92	294.31	-17.94
17	2.50	0.75	16.04	-13.04	292.34	-5.82
18	2.00	0.71	15.90	-10.10	266.10	-5.28
19	1.45	0.68	15.60	-7.53	206.65	-34.70
20	1.15	0.66	15.37	-5.76	209.71	-4.53
21	0.50	0.63	14.74	-3.70	178.93	-2.98
22	0.00	0.60	14.13	-2.31	157.83	-2.28
23	-0.50	0.57	13.38	-1.47	129.41	-1.42
24	-0.90	0.55	12.67	-1.18	103.69	-6.71
25	-1.00	0.55	12.54	-0.98	97.10	-4.98
26	-1.50	0.53	12.21	-0.79	63.48	-0.34
27	-2.00	0.50	11.88	-11.09	31.99	-1.11
28	-2.40	0.49	11.62	-10.15	10.62	-5.10
29	-2.70	0.47	11.43	-7.80	0.54	-3.12
30	-3.50	0.44	10.95	-19.14	0.00	-3.19
31	-4.00	0.42	10.65	-17.55	0.00	-8.71
32	-4.50	0.40	10.36	-10.43	0.00	-17.55
33	-5.00	0.38	10.07	0.00	0.00	0.00
34	-5.50	0.36	9.82	0.00	0.00	0.00
35	-6.00	0.34	9.57	0.00	0.00	0.00
36	-6.70	0.32	9.18	0.00	0.00	0.00
37	-7.10	0.31	9.00	0.00	0.00	0.00
38	-7.50	0.29	8.79	0.00	0.00	0.00
39	-8.00	0.28	8.51	0.00	0.00	0.00
40	-8.50	0.26	8.25	0.00	0.00	0.00
41	-9.00	0.25	7.99	0.00	0.00	0.00
42	-9.50	0.23	7.73	0.00	0.00	0.00
43	-10.00	0.22	7.46	0.00	0.00	0.00
44	-10.50	0.20	7.19	0.00	0.00	0.00
45	-11.00	0.19	6.92	0.00	0.00	0.00
46	-11.50	0.18	6.65	0.00	0.00	0.00
47	-12.00	0.17	6.37	0.00	0.00	0.00
48	-12.50	0.15	6.09	0.00	0.00	0.00
49	-13.00	0.14	5.81	0.00	0.00	0.00
50	-13.40	0.13	5.58	0.00	0.00	0.00
51	-14.00	0.12	5.21	0.00	0.00	0.00
52	-14.50	0.11	4.92	0.00	0.00	0.00
53	-15.00	0.10	4.61	0.00	0.00	0.00
54	-16.00	0.08	3.91	0.00	0.00	0.00
55	-17.00	0.06	3.18	0.00	0.00	0.00
56	-18.00	0.04	2.36	0.00	0.00	0.00
57	-19.00	0.02	1.36	0.00	0.00	0.00
58	-20.00	0.00	0.00	0.00	0.00	0.00

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Envelope for stages 0 to 10

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INITIAL DATA

Notes
 Water pressure in LT equal to hydrostatic on passive side. Additional surcharge to counteract heave pressure.

Soil properties

No.	Description	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients
1	London Clay- undrained	20.00	1.00	1.00	2.45	2.45	1.00	Calculated	
2	London Clay- drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	Terrace Gravel	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.00
2	24.00	0.67
3	25.00	0.67
4	33.00	0.67

Soil Strength Partial Factors

Document and case: **tan Phi'** **c'** **Cu** **E**
 Unfactored 1.00 1.00 1.00 1.00
 Note: Only the parameters in bold have been affected by Partial Factors, No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients
1	20.00	1.00	1.00	2.45	2.45	1.00	Calculated	
2	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

Parameters used to calculate design Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.00
2	24.00	0.67
3	25.00	0.67
4	33.00	0.67

Surcharge properties

No.	Stage	Side	Level	Pressure	Partial Factor	Offset	Width	Ks
1	0	-	Left	10.00	10.00	1.00		
2	10	-	Right	0.82	65.00	1.00		
3	1	-	Left	10.00	82.00	1.00	10.00	20.00

Note: Only the parameters in bold have been affected by Partial Factors.

Surcharge Design properties

No.	Stage	Side	Level	Pressure	Offset	Width	Ks
1	0	-	Left	10.00	10.00		
2	10	-	Right	0.82	65.00		
3	1	-	Left	10.00	82.00	10.00	20.00

Strut properties

No.	Stage	Node	Level	Prestress	Stiffness	Angle	Lever arm
1	3	9	2	9.50	0.00	50000.00	0.00
2	5	8	11	5.50	0.00	50000.00	0.00
3	7	10	19	1.45	0.00	140000.00	0.00
4	8	10	12	5.00	0.00	140000.00	0.00
5	9	10	3	9.20	0.00	140000.00	0.00
6	10	-	19	1.45	0.00	100000.00	0.00
7	10	-	12	5.00	0.00	100000.00	0.00
8	10	-	3	9.20	0.00	100000.00	0.00

STAGE 0 : INITIAL CONDITION

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed

Water data on LEFT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Analysis details

SAFE model with redistribution and with friction at wall/soil interface
 E profile Generated
 Boundary distances [m] : 30.00 30.00

Convergence control parameters

Maximum number of iterations : 900
 Tolerance for displacement convergence [mm] : 0.01
 Tolerance for pressure convergence [kN/m²] : 0.10
 Damping coefficient : 1.00
 Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left	Right
	a yo b	a yo b
	[kN/m ² /m] [m] [kN/m ²]	[kN/m ² /m] [m] [kN/m ²]

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Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 0 : Initial condition

Surcharge or strut changes

Surcharge no. 1 applied at this stage

Summary Results

	Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	2.27	0.00	0.00
Max Shear	34	-5.50	0.89	0.00	0.00
Max BM	58	-20.00	0.00	0.00	0.00

STAGE 1 : INSTALL WALL AND UNDRAINED

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed and wall EI changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 1 : Install wall and undrained

Surcharge or strut changes

Surcharge no. 3 applied at this stage

Summary Results

	Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	1.21	0.00	0.00
Max Shear	13	4.50	0.88	-2.88	3.05
Max BM	15	3.50	0.82	-4.71	0.41
Wall toe	33	-5.00	0.49	0.00	0.00

STAGE 2 : EXCAVATE FOR TOP PROP

Ground level [m] LEFT: 10.00 RIGHT: 9.00 Soil zones changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 2 : Excavate for top prop

Summary Results

	Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	3.77	0.00	0.00
Dig level (R)	5	8.90	3.44	-3.67	8.15
Max BM	10	6.00	2.67	-20.99	1.32
Wall toe	33	-5.00	1.50	0.00	0.00

STAGE 3 : INSTALL TOP PROP

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	b	yo
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace Gravel				

RESULTS FOR STAGE 3 : Install top Prop

Surcharge or strut changes

Strut no 1 inserted at this stage

Summary Results

	Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	3.77	0.00	0.00
Above strut 1	2	9.50	3.62	-0.55	2.47
Below strut 1	10	6.00	2.67	-0.55	2.47
Dig level (R)	5	8.90	3.44	-3.67	8.15
Max BM	10	6.00	2.67	-20.99	1.32
Wall toe	33	-5.00	1.50	0.00	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	0.00	0.00	0.00	0.00

STAGE 4 : EXCAVATE TO 2ND PROP

Ground level [m] LEFT: 10.00 RIGHT: 4.75 Soil zones changed

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No. Node Strut Horiz Moment Max
no. force force force strut
[kN/m] [kN/m] [kNm/m] [kN/m]

Water data on LEFT side

No.	Level	Pressure	Unit
			wt.
	[m]	[kN/m ²]	[kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level	Pressure	Unit
			wt.
	[m]	[kN/m ²]	[kN/m ³]
1	4.75	0.00	9.80

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]	[m]	[kN/m ²]
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-undrained						
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-drained						
Made	5.00	10.00	0.00	0.00	0.00	0.00
Ground						
Terrace	5.00	7.00	0.00	0.00	0.00	0.00
Gravel						

RESULTS FOR STAGE 4 : Excavate to 2nd prop

Summary Results

Node	Level	Displacement	Moment	Shear
	[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.76	0.00
Above strut 1	2	9.50	5.28	-2.16
Below strut 1				-76.09
Max BM	10	6.00	8.10	140.96
Dig level (R)	13	4.50	8.43	109.05
Wall toe	33	-5.00	5.97	0.00

Strut Forces

No.	Node	Strut	Horiz	Moment	Max
no.	force	force	force	force	strut
					force
					[kN/m]
1	2	82.72	82.72	0.00	82.72

STAGE 5 : INSTALL 2ND PROP

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]	[m]	[kN/m ²]
Above strut 1	5.00	4.75	0.00	0.00	0.00	0.00
London						
Clay-undrained						
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-drained						
Made	5.00	10.00	0.00	0.00	0.00	0.00
Ground						
Terrace	5.00	7.00	0.00	0.00	0.00	0.00
Gravel						

RESULTS FOR STAGE 5 : Install 2nd prop

Surcharge or strut changes

Strut no 2 inserted at this stage

Summary Results

Node	Level	Displacement	Moment	Shear
	[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.76	0.00
Above strut 1	2	9.50	5.28	-2.16
Below strut 1				-76.09
Max BM	10	6.00	8.10	140.96
Dig level (R)	11	5.50	8.27	137.72
Below strut 2				137.72
Dig level (R)	13	4.50	8.43	109.05
Wall toe	33	-5.00	5.97	0.00

Strut Forces

No.	Node	Strut	Horiz	Moment	Max
no.	force	force	force	force	strut
					force
					[kN/m]
1	2	82.72	82.72	0.00	82.72
2	11	0.00	0.00	0.00	0.00

STAGE 6 : EXCAVATE TO FORMATION

Ground level [m] LEFT: 10.00 RIGHT: 0.82 Soil zones changed

Water data on LEFT side

No.	Level	Pressure	Unit
			wt.
	[m]	[kN/m ²]	[kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level	Pressure	Unit
			wt.
	[m]	[kN/m ²]	[kN/m ³]
1	0.82	0.00	9.80

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]	[m]	[kN/m ²]
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-undrained						
London	5.00	4.75	0.00	0.00	0.00	0.00
Clay-drained						
Made	5.00	10.00	0.00	0.00	0.00	0.00
Ground						
Terrace	5.00	7.00	0.00	0.00	0.00	0.00
Gravel						

RESULTS FOR STAGE 6 : Excavate to formation

Summary Results

Node	Level	Displacement	Moment	Shear
	[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.31	0.00
Above strut 1	2	9.50	5.20	-3.31
Below strut 1				-69.21
Above strut 2	11	5.50	11.46	70.70

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	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Below strut 2				70.70	-118.52
Max BM	16	3.00	13.69	229.24	-6.23
Dig level (R)	21	0.50	13.48	88.46	94.17
Wall toe	33	-5.00	10.17	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	79.01	79.01	0.00	82.72
2	11	159.28	159.28	0.00	159.28

STAGE 7 : BASE SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	0.82
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level	Soil	Cohesion	[kN/m ²]	
	[m]	Left	Right	Left	Right
1	10.00	3	0	0.00	0.00
2	9.50	3	0	0.00	0.00
3	9.20	3	0	0.00	0.00
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	0	75.00	0.00
15	3.50	1	0	77.50	0.00
16	3.00	1	0	80.00	0.00
17	2.50	1	0	82.50	0.00
18	2.00	1	0	85.00	0.00
19	1.45	1	0	87.75	0.00
20	1.15	1	0	89.25	0.00
21	0.50	1	1	92.50	60.12
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
* 33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Analysis details

SAFE model with redistribution
and with friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	30.00	30.00
Wall relaxation	0%	

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 7 : Base slab

Surcharge or strut changes

Strut no 3 inserted at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.31	0.00	0.00
Above strut 1	2	9.50	5.20	-3.31	9.80
Below strut 1				-3.31	-69.21
Above strut 2	11	5.50	11.46	70.70	40.76
Below strut 2				70.70	-118.52
Max BM	16	3.00	13.69	229.24	-6.23
Above strut 3	19	1.45	13.82	184.80	63.89
Below strut 3				184.80	63.89
Dig level (R)	21	0.50	13.48	88.46	94.17
Wall toe	33	-5.00	10.17	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	79.01	79.01	0.00	82.72
2	11	159.28	159.28	0.00	159.28

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No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
3	19	-0.00	-0.00	0.00	0.00

STAGE 8 : B1 SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	0.82
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right
1	10.00	3	0	0.00
2	9.50	3	0	0.00
3	9.20	3	0	0.00
4	9.10	3	0	0.00
5	8.90	3	0	0.00
6	8.25	3	0	0.00
7	7.30	3	0	0.00
8	6.70	4	0	0.00
9	6.50	4	0	0.00
10	6.00	4	0	0.00
11	5.50	4	0	0.00
12	5.00	4	0	0.00
13	4.50	1	0	72.50
14	4.00	1	0	75.00
15	3.50	1	0	77.50
16	3.00	1	0	80.00
17	2.50	1	0	82.50
18	2.00	1	0	85.00
19	1.45	1	0	87.75
20	1.15	1	0	89.25
21	0.50	1	1	92.50
22	0.00	1	1	95.00
23	-0.50	1	1	97.50
24	-0.90	1	1	99.50
25	-1.00	1	1	100.00
26	-1.50	1	1	102.50
27	-2.00	1	1	105.00
28	-2.40	1	1	107.00
29	-2.70	1	1	108.50
30	-3.50	1	1	112.50
31	-4.00	1	1	115.00
32	-4.50	1	1	117.50
* 33	-5.00	1	1	120.00
34	-5.50	1	1	122.50
35	-6.00	1	1	125.00
36	-6.70	1	1	128.50
37	-7.10	1	1	130.50
38	-7.50	1	1	132.50
39	-8.00	1	1	135.00
40	-8.50	1	1	137.50
41	-9.00	1	1	140.00
42	-9.50	1	1	142.50
43	-10.00	1	1	145.00
44	-10.50	1	1	147.50
45	-11.00	1	1	150.00
46	-11.50	1	1	152.50
47	-12.00	1	1	155.00
48	-12.50	1	1	157.50
49	-13.00	1	1	160.00
50	-13.40	1	1	162.00
51	-14.00	1	1	165.00
52	-14.50	1	1	167.50
53	-15.00	1	1	170.00
54	-16.00	1	1	175.00
55	-17.00	1	1	180.00
56	-18.00	1	1	185.00
57	-19.00	1	1	190.00
58	-20.00	1	1	195.00

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]	[m]	[kN/m ²]
London Clay-undrained	5.00	4.75	0.00	0.00	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00	0.00	0.00
Terrace						
Gravel						

RESULTS FOR STAGE 8 : B1 Slab

Surcharge or strut changes

Strut no. 2 removed at this stage
 Strut no 4 inserted at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	4.62	0.00	0.00
Above strut 1	2	9.50	5.61	-3.50	10.27
Below strut 1				-3.50	-89.07
Above strut 4	12	5.00	12.79	148.84	25.29
Below strut 4				148.84	-77.15
Max BM	16	3.00	14.06	216.52	5.66
Above strut 3	19	1.45	13.97	156.09	74.09
Below strut 3				156.09	53.54
Dig level (R)	21	0.50	13.54	68.92	84.29
Wall toe	33	-5.00	10.18	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	99.34	99.34	0.00	99.34
2	11				159.28
3	19	20.55	20.55	0.00	20.55
4	12	102.44	102.44	0.00	102.44

STAGE 9 : CONSTRUCT GF SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	0.82
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right
1	10.00	3	0	0.00
2	9.50	3	0	0.00
3	9.20	3	0	0.00

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Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	0	75.00	0.00
15	3.50	1	0	77.50	0.00
16	3.00	1	0	80.00	0.00
17	2.50	1	0	82.50	0.00
18	2.00	1	0	85.00	0.00
19	1.45	1	0	87.75	0.00
20	1.15	1	0	89.25	0.00
21	0.50	1	1	92.50	60.12
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
* 33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 9 : Construct GF slab

Surcharge or strut changes

Strut no. 1 removed at this stage
 Strut no 5 inserted at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	5.53	0.00
Above strut 5	3	9.20	6.90	-6.64
Below strut 5				-6.64
Above strut 4	12	5.00	12.82	127.80
Below strut 4				127.80
Max BW	16	3.00	14.04	208.38
Above strut 3	19	1.45	13.94	155.58
Below strut 3				155.58
Dig level (R)	21	0.50	13.52	69.28
Wall toe	33	-5.00	10.18	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				99.34
2	11				159.28
3	19	17.33	17.33	0.00	20.55
4	12	106.89	106.89	0.00	106.89
5	3	97.60	97.60	0.00	97.60

STAGE 10 : DRAINED

Ground level [m] LEFT: 10.00 RIGHT: 0.82 Soil zones changed and wall EI changed

Water data on LEFT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	0.82	0.00	9.80
2	0.30	65.00	9.80

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				

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Material	Left		Right	
	a [kN/m ² /m]	b [m]	a [kN/m ² /m]	b [m]
Terrace	5.00	7.00	0.00	0.00
Gravel			0.00	0.00

RESULTS FOR STAGE 10 : Drained

Surcharge or strut changes

Strut no. 3 removed at this stage
 Strut no. 4 removed at this stage
 Strut no. 5 removed at this stage
 Strut no. 6 inserted at this stage
 Strut no. 7 inserted at this stage
 Strut no. 8 inserted at this stage
 Surcharge no. 2 applied at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	6.38	0.00
Above strut 8	3	9.20	7.84	-6.73
Below strut 8				-6.73
Above strut 7	12	5.00	14.35	124.75
Below strut 7				124.75
Max BM	16	3.00	15.75	289.72
Above strut 6	19	1.45	15.30	209.34
Below strut 6				209.34
Dig level (R)	21	0.50	14.43	166.12
Wall toe	33	-5.00	3.84	0.00

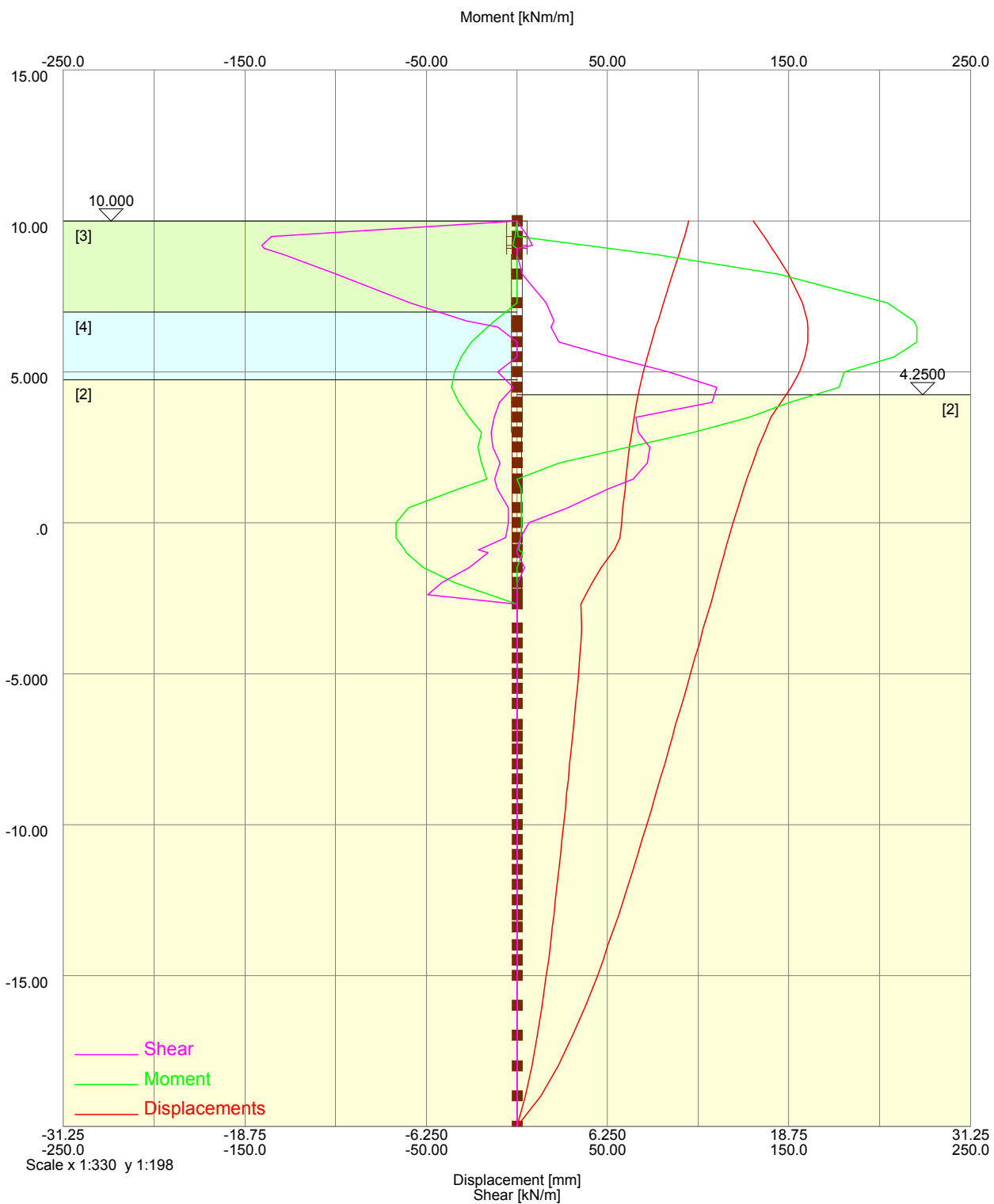
Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				99.34
2	11				159.28
3	19				20.55
4	12				106.89
5	3				97.60
6	19	135.67	135.67	0.00	135.67
7	12	152.76	152.76	0.00	152.76
8	3	93.29	93.29	0.00	93.29

Results Envelope

Node	Level [m]	Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
		Min	Max	Min	Max	Min	Max
1	10.00	1.21	6.38	0.00	0.00	0.00	0.00
2	9.50	1.18	7.29	-3.50	0.22	-89.07	10.27
3	9.20	1.17	7.84	-6.73	22.24	-83.62	14.05
4	9.10	1.16	8.02	-2.26	30.37	-81.21	6.33
5	8.90	1.15	8.38	-3.67	46.50	-76.94	8.15
6	8.25	1.11	9.56	-9.69	92.90	-61.80	7.34
7	7.30	1.06	11.18	-14.83	140.19	-38.27	5.76
8	6.70	1.02	12.12	-18.49	154.06	-22.04	5.16
9	6.50	1.01	12.42	-19.34	157.40	-14.21	12.29
10	6.00	0.98	13.12	-20.99	160.52	-5.68	25.51
11	5.50	0.94	13.77	-20.66	157.87	-118.52	40.76
12	5.00	0.91	14.35	-19.85	148.84	-138.94	29.67
13	4.50	0.88	14.87	-18.62	191.55	-115.95	40.82
14	4.00	0.85	15.29	-17.77	240.70	-81.92	41.30
15	3.50	0.82	15.59	-16.06	273.47	-49.02	35.87
16	3.00	0.79	15.75	-13.62	289.72	-14.51	29.27
17	2.50	0.77	15.76	-10.88	287.98	-5.51	25.72
18	2.00	0.74	15.62	-8.11	264.00	-4.93	73.67
19	1.45	0.72	15.30	-5.74	209.34	-13.61	122.06
20	1.15	0.71	15.07	-4.05	206.62	-4.20	93.92
21	0.50	0.68	14.43	-2.24	166.12	-2.61	94.17
22	0.00	0.67	13.83	-1.03	140.36	-1.93	63.77
23	-0.50	0.65	13.11	-0.39	109.88	-1.09	62.23
24	-0.90	0.63	12.68	-0.21	84.49	-6.56	62.85
25	-1.00	0.63	12.62	0.00	78.27	-4.82	61.12
26	-1.50	0.61	12.29	-7.69	48.26	-0.08	54.83
27	-2.00	0.60	11.97	-10.16	23.44	-0.87	41.97
28	-2.40	0.58	11.71	-9.33	9.72	-4.87	31.15
29	-2.70	0.57	11.53	-7.03	1.32	-2.83	21.36
30	-3.50	0.54	11.04	-10.45	0.23	-2.86	7.90
31	-4.00	0.53	10.75	-11.00	0.26	-6.29	0.13
32	-4.50	0.51	10.46	-7.06	0.10	-11.00	0.26
33	-5.00	0.49	10.18	0.00	0.00	0.00	0.00
34	-5.50	0.47	9.93	0.00	0.00	0.00	0.00
35	-6.00	0.45	9.68	0.00	0.00	0.00	0.00
36	-6.70	0.43	9.29	0.00	0.00	0.00	0.00
37	-7.10	0.41	9.10	0.00	0.00	0.00	0.00
38	-7.50	0.40	8.89	0.00	0.00	0.00	0.00
39	-8.00	0.38	8.62	0.00	0.00	0.00	0.00
40	-8.50	0.37	8.35	0.00	0.00	0.00	0.00
41	-9.00	0.35	8.09	0.00	0.00	0.00	0.00
42	-9.50	0.33	7.82	0.00	0.00	0.00	0.00
43	-10.00	0.32	7.56	0.00	0.00	0.00	0.00
44	-10.50	0.30	7.29	0.00	0.00	0.00	0.00
45	-11.00	0.28	7.01	0.00	0.00	0.00	0.00
46	-11.50	0.27	6.74	0.00	0.00	0.00	0.00
47	-12.00	0.25	6.46	0.00	0.00	0.00	0.00
48	-12.50	0.24	6.17	0.00	0.00	0.00	0.00
49	-13.00	0.22	5.88	0.00	0.00	0.00	0.00
50	-13.40	0.21	5.66	0.00	0.00	0.00	0.00
51	-14.00	0.19	5.28	0.00	0.00	0.00	0.00
52	-14.50	0.18	4.99	0.00	0.00	0.00	0.00
53	-15.00	0.16	4.67	0.00	0.00	0.00	0.00
54	-16.00	0.13	3.96	0.00	0.00	0.00	0.00
55	-17.00	0.10	3.22	0.00	0.00	0.00	0.00
56	-18.00	0.07	2.39	0.00	0.00	0.00	0.00
57	-19.00	0.04	1.37	0.00	0.00	0.00	0.00
58	-20.00	0.00	0.00	0.00	0.00	0.00	0.00

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INITIAL DATA

Notes
Water pressure in LT equal to hydrostatic on passive side. Additional surcharge to counteract heave pressure.

Soil properties

No.	Description	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients
1	London Clay- undrained	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
2	London Clay- drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	Terrace Gravel	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.00
2	24.00	0.67
3	25.00	0.67
4	33.00	0.67

Soil Strength Partial Factors
Document and case: **tan Phi'** c' Cu E
Unfactored 1.00 1.00 1.00 1.00
Note: Only the parameters in bold have been affected by Partial Factors, No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients
1	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
2	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.00
2	24.00	0.67
3	25.00	0.67
4	33.00	0.67

Surcharge properties

No.	Stage	Side	Level	Pressure	Partial Offset	Width	Ks
1	7	- Right	4.25	32.50	1.00		
2	1	- Left	9.00	112.50	1.00		

Note: Only the parameters in bold have been affected by Partial Factors.

Surcharge Design properties

No.	Stage	Side	Level	Pressure	Offset	Width	Ks
1	7	- Right	4.25	32.50			
2	1	- Left	9.00	112.50			

Strut properties

No.	Stage	Node	Level	Prestress	Stiffness	Angle	Lever arm
1	2	6	2	9.50	0.00	50000.00	0.00
2	5	7	12	5.00	0.00	140000.00	0.00
3	6	7	3	9.20	0.00	140000.00	0.00
4	7	-	12	5.00	0.00	100000.00	0.00
5	7	-	3	9.20	0.00	100000.00	0.00

STAGE 0 : INITIAL CONDITION

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed

Water data on LEFT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Analysis details
SAFE model with redistribution and with friction at wall/soil interface
E profile Generated
Boundary distances [m] : 30.00 30.00

Convergence control parameters
Maximum number of iterations : 900
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	a	yo
London Clay- undrained	5.00	4.75	0.00	0.00
London Clay-	5.00	4.75	0.00	0.00

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Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 0 : Initial condition

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	0.00	0.00	0.00

STAGE 1 : INSTALL WALL AND UNDRAINED

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed and wall EI changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
Max Shear	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 1 : Install wall and undrained

Surcharge or strut changes

Surcharge no. 2 applied at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	11.86	0.00	0.00
Max Shear	8	6.70	9.73	-12.46	20.52
Max BM	13	4.50	8.48	-36.28	-2.13
Wall toe	29	-2.70	6.58	0.00	0.00

STAGE 2 : EXCAVATE FOR TOP PROP

Ground level [m] LEFT: 10.00 RIGHT: 9.00 Soil zones changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 2 : Excavate for top prop

Surcharge or strut changes

Strut no 1 inserted at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	12.34	0.00	0.00
Above strut 1	2	9.50	12.14	-0.32	1.41
Below strut 1				-0.32	-28.16
Dig level (R)	5	8.90	11.89	15.60	-16.74
Max BM	13	4.50	9.75	-26.38	1.11
Wall toe	29	-2.70	7.68	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	29.57	29.57	0.00	29.57

STAGE 3 : INSTALL TOP PROP

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 3 : Install top Prop

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	12.34	0.00	0.00
Above strut 1	2	9.50	12.14	-0.32	1.41
Below strut 1				-0.32	-28.16
Dig level (R)	5	8.90	11.89	15.60	-16.74
Max BM	13	4.50	9.75	-26.38	1.11
Wall toe	29	-2.70	7.68	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	29.57	29.57	0.00	29.57

STAGE 4 : EXCAVATE TO FORMATION

Ground level [m] LEFT: 10.00 RIGHT: 4.25 Soil zones changed

Passive softening details

Left Right

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Left Right

Excavation level [m] 10.00 4.25
Depth below excavation level [m] 0.00 0.50
Global softening (%) 100.00 100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right
1	10.00	3	0	0.00
2	9.50	3	0	0.00
3	9.20	3	0	0.00
4	9.10	3	0	0.00
5	8.90	3	0	0.00
6	8.25	3	0	0.00
7	7.30	3	0	0.00
8	6.70	4	0	0.00
9	6.50	4	0	0.00
10	6.00	4	0	0.00
11	5.50	4	0	0.00
12	5.00	4	0	0.00
13	4.50	1	0	72.50
14	4.00	1	1	75.00
15	3.50	1	1	77.50
16	3.00	1	1	80.00
17	2.50	1	1	82.50
18	2.00	1	1	85.00
19	1.45	1	1	87.75
20	1.15	1	1	89.25
21	0.50	1	1	92.50
22	0.00	1	1	95.00
23	-0.50	1	1	97.50
24	-0.90	1	1	99.50
25	-1.00	1	1	100.00
26	-1.50	1	1	102.50
27	-2.00	1	1	105.00
28	-2.40	1	1	107.00
* 29	-2.70	1	1	108.50
30	-3.50	1	1	112.50
31	-4.00	1	1	115.00
32	-4.50	1	1	117.50
33	-5.00	1	1	120.00
34	-5.50	1	1	122.50
35	-6.00	1	1	125.00
36	-6.70	1	1	128.50
37	-7.10	1	1	130.50
38	-7.50	1	1	132.50
39	-8.00	1	1	135.00
40	-8.50	1	1	137.50
41	-9.00	1	1	140.00
42	-9.50	1	1	142.50
43	-10.00	1	1	145.00
44	-10.50	1	1	147.50
45	-11.00	1	1	150.00
46	-11.50	1	1	152.50
47	-12.00	1	1	155.00
48	-12.50	1	1	157.50
49	-13.00	1	1	160.00
50	-13.40	1	1	162.00
51	-14.00	1	1	165.00
52	-14.50	1	1	167.50
53	-15.00	1	1	170.00
54	-16.00	1	1	175.00
55	-17.00	1	1	180.00
56	-18.00	1	1	185.00
57	-19.00	1	1	190.00
58	-20.00	1	1	195.00

Water data on LEFT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	4.20	0.00	9.80

Analysis details

SAFE model with redistribution
and with friction at wall/soil interface
E profile Generated
Boundary distances [m] : 30.00 30.00
Wall relaxation 0%

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a [m]	yo [kN/m ² /m]	b [m]	yo [kN/m ² /m]
London Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00
Terrace				
Gravel				

RESULTS FOR STAGE 4 : Excavate to formation

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	13.41	0.00
Above strut 1	2	9.50	14.38	-1.01
Below strut 1	3	9.20	14.38	-135.42
Max BM	9	6.50	18.62	220.38
Dig level (R)	14	4.00	17.94	53.31
Wall toe	29	-2.70	13.37	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	141.57	141.57	0.00	141.57

STAGE 5 : INSTALL BASE SLAB

Passive softening details

Excavation level [m] 10.00 4.25
Depth below excavation level [m] 0.00 0.50
Global softening (%) 100.00 100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right

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Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
1	10.00	3	0	0.00	0.00
2	9.50	3	0	0.00	0.00
3	9.20	3	0	0.00	0.00
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	1	75.00	37.50
15	3.50	1	1	77.50	77.50
16	3.00	1	1	80.00	80.00
17	2.50	1	1	82.50	82.50
18	2.00	1	1	85.00	85.00
19	1.45	1	1	87.75	87.75
20	1.15	1	1	89.25	89.25
21	0.50	1	1	92.50	92.50
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
* 29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
London Clay-undrained	5.00	4.75	0.00	0.00	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00	0.00	0.00
Terrace Gravel						

RESULTS FOR STAGE 5 : Install Base Slab

Surcharge or strut changes

Strut no 2 inserted at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	13.41	0.00
Above strut 1	2	9.50	14.38	-1.01
Below strut 1				-135.42
Max BM	9	6.50	18.62	220.38
Above strut 2	12	5.00	18.63	163.56
Below strut 2				83.69
Dig level (R)	14	4.00	17.94	53.31
Wall toe	29	-2.70	13.37	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	141.57	141.57	0.00	141.57
2	12	0.00	0.00	0.00	0.00

STAGE 6 : INSTALL GF SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	4.25
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
1	10.00	3	0	0.00	0.00
2	9.50	3	0	0.00	0.00
3	9.20	3	0	0.00	0.00
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	1	75.00	37.50
15	3.50	1	1	77.50	77.50
16	3.00	1	1	80.00	80.00
17	2.50	1	1	82.50	82.50
18	2.00	1	1	85.00	85.00
19	1.45	1	1	87.75	87.75
20	1.15	1	1	89.25	89.25
21	0.50	1	1	92.50	92.50

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Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 6 : Install GF slab

Surcharge or strut changes

Strut no. 1 removed at this stage
Strut no 3 inserted at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	14.82	0.00
Above strut 3	3	9.20	15.98	-2.56
Below strut 3				-134.37
Max BM	9	6.50	18.81	195.80
Above strut 2	12	5.00	18.64	146.92
Below strut 2				146.92
Dig level (R)	14	4.00	17.90	43.32
Wall toe	29	-2.70	13.36	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				141.57
2	12	1.27	1.27	0.00	1.27
3	3	143.13	143.13	0.00	143.13

STAGE 7 : DRAINED

Ground level [m] LEFT: 10.00 RIGHT: 4.25 Soil zones changed and wall EI changed

Water data on LEFT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	4.20	0.00	9.80
2	3.75	32.50	9.80

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 7 : Drained

Surcharge or strut changes

Strut no. 2 removed at this stage
Strut no. 3 removed at this stage
Strut no 4 inserted at this stage
Strut no 5 inserted at this stage
Surcharge no. 1 applied at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	16.32	0.00
Above strut 5	3	9.20	17.46	-1.97
Below strut 5				-140.58
Max BM	10	6.00	20.05	220.42
Above strut 4	12	5.00	19.46	180.51

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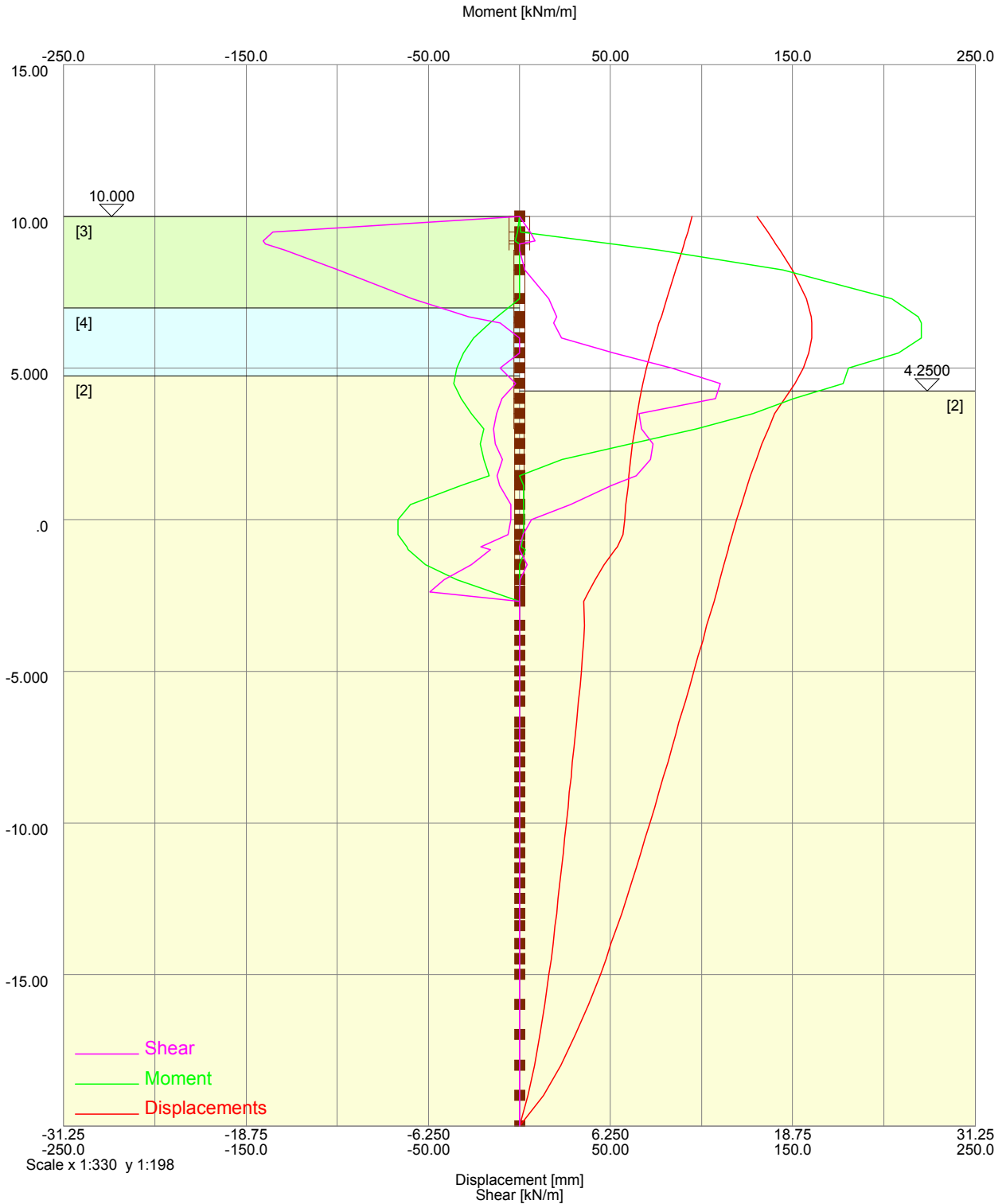
	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Below strut 4				180.51	-10.88
Dig level (R)	14	4.00	18.21	150.57	49.49
Wall toe	29	-2.70	4.43	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2				141.57
2	12				1.27
3	3				143.13
4	12	82.79	82.79	0.00	82.79
5	3	147.52	147.52	0.00	147.52

Results Envelope

Node	Level	Displacements	Moments	Shears	
		[mm]	[kNm/m]	[kN/m]	
		Min	Max	Min	
		Max	Min	Max	
1	10.00	11.86	16.32	0.00	0.00
2	9.50	11.55	17.03	-1.01	0.91
3	9.20	11.36	17.46	-2.56	38.37
4	9.10	11.30	17.60	0.00	51.22
5	8.90	11.17	17.88	0.00	76.77
6	8.25	10.76	18.75	0.00	144.77
7	7.30	10.13	19.70	0.00	204.39
8	6.70	9.73	20.01	-12.46	218.96
9	6.50	9.60	20.06	-16.30	220.38
10	6.00	9.29	20.05	-25.32	220.42
11	5.50	8.99	19.84	-30.70	208.08
12	5.00	8.72	19.46	-34.41	180.51
13	4.50	8.48	18.92	-36.28	177.56
14	4.00	8.27	18.21	-32.29	150.57
15	3.50	8.08	17.51	-26.64	128.07
16	3.00	7.92	17.07	-19.46	97.00
17	2.50	7.77	16.64	-21.50	60.99
18	2.00	7.65	16.25	-19.55	23.70
19	1.45	7.53	15.84	-16.58	0.00
20	1.15	7.47	15.64	-32.25	2.37
21	0.50	7.33	15.22	-59.93	2.35
22	0.00	7.22	14.91	-66.88	2.87
23	-0.50	7.11	14.61	-66.79	2.15
24	-0.90	6.75	14.38	-61.84	1.05
25	-1.00	6.59	14.32	-61.04	3.42
26	-1.50	5.84	14.03	-51.48	0.00
27	-2.00	5.20	13.75	-34.41	0.00
28	-2.40	4.75	13.54	-15.02	0.00
29	-2.70	4.43	13.37	0.00	0.00
30	-3.50	4.49	12.84	0.00	0.00
31	-4.00	4.44	12.58	0.00	0.00
32	-4.50	4.36	12.28	0.00	0.00
33	-5.00	4.26	11.99	0.00	0.00
34	-5.50	4.17	11.69	0.00	0.00
35	-6.00	4.07	11.40	0.00	0.00
36	-6.70	3.92	10.96	0.00	0.00
37	-7.10	3.85	10.75	0.00	0.00
38	-7.50	3.77	10.51	0.00	0.00
39	-8.00	3.66	10.19	0.00	0.00
40	-8.50	3.56	9.89	0.00	0.00
41	-9.00	3.45	9.58	0.00	0.00
42	-9.50	3.35	9.28	0.00	0.00
43	-10.00	3.24	8.97	0.00	0.00
44	-10.50	3.13	8.65	0.00	0.00
45	-11.00	3.02	8.33	0.00	0.00
46	-11.50	2.91	8.01	0.00	0.00
47	-12.00	2.79	7.68	0.00	0.00
48	-12.50	2.68	7.35	0.00	0.00
49	-13.00	2.56	7.02	0.00	0.00
50	-13.40	2.47	6.75	0.00	0.00
51	-14.00	2.31	6.31	0.00	0.00
52	-14.50	2.19	5.96	0.00	0.00
53	-15.00	2.05	5.59	0.00	0.00
54	-16.00	1.75	4.74	0.00	0.00
55	-17.00	1.43	3.87	0.00	0.00
56	-18.00	1.07	2.87	0.00	0.00
57	-19.00	0.62	1.65	0.00	0.00
58	-20.00	0.00	0.00	0.00	0.00



Envelope for stages 0 to 7

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INITIAL DATA

Notes
Water pressure in LT equal to hydrostatic on passive side. Additional surcharge to counteract heave pressure.

Soil properties

No.	Description	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients
1	London Clay- undrained	20.00	1.00	1.00	2.45	2.45	1.00	Calculated	
2	London Clay- drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	Terrace Gravel	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.50
2	24.00	0.00
3	25.00	0.00
4	33.00	0.00

Soil Strength Partial Factors
Document and case: **tan Phi'** c' E
Unfactored 1.00 1.00 1.00
Note: Only the parameters in bold have been affected by Partial Factors, No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients
1	20.00	1.00	1.00	2.45	2.45	1.00	Calculated	
2	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
3	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
4	20.00	0.40	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0	y0	Gradient of c	E0	Gradient of E	Drained/ Undrained
1	70.00	5.00	5.00	70000.	5000.00	Undrained
2	0.00	0.00	0.00	52500.	3750.00	Drained
3	0.00	0.00	0.00	8000.0	0.00	Drained
4	0.00	0.00	0.00	30000.	0.00	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi Delta/Phi Beta	Cw/C
1	0.00	0.50
2	24.00	0.00
3	25.00	0.00
4	33.00	0.00

Surcharge properties

No.	Stage	Side	Level	Pressure	Partial Offset	Width	Ks
1	7	Right	4.25	32.50	1.00		
2	1	Left	9.00	112.50	1.00		

Note: Only the parameters in bold have been affected by Partial Factors.

Surcharge Design properties

No.	Stage	Side	Level	Pressure	Offset	Width	Ks
1	7	Right	4.25	32.50			
2	1	Left	9.00	112.50			

Strut properties

No.	Stage	Node	Level	Prestress	Stiffness	Angle	Lever arm
1	2	6	2	9.50	0.00	50000.00	0.00
2	5	7	12	5.00	0.00	140000.00	0.00
3	6	7	3	9.20	0.00	140000.00	0.00
4	7	-	12	5.00	0.00	100000.00	0.00
5	7	-	3	9.20	0.00	100000.00	0.00

STAGE 0 : INITIAL CONDITION

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed

Water data on LEFT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level	Pressure	Unit wt.
1	7.00	0.00	9.80

Analysis details
SAFE model with redistribution and with friction at wall/soil interface
E profile Generated
Boundary distances [m] : 30.00 30.00

Convergence control parameters
Maximum number of iterations : 900
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	yo	a	yo
London Clay- undrained	5.00	4.75	0.00	0.00
London Clay-	5.00	4.75	0.00	0.00

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Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 0 : Initial condition

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	0.00	0.00	0.00

STAGE 1 : INSTALL WALL AND UNDRAINED

Ground level [m] LEFT: 10.00 RIGHT: 10.00 Soil zones changed and wall EI changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
Max Shear	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 1 : Install wall and undrained

Surcharge or strut changes

Surcharge no. 2 applied at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	11.86	0.00	0.00
Max Shear	8	6.70	9.73	-12.46	20.52
Max BM	13	4.50	8.48	-36.28	-2.13
Wall toe	29	-2.70	6.58	0.00	0.00

STAGE 2 : EXCAVATE FOR TOP PROP

Ground level [m] LEFT: 10.00 RIGHT: 9.00 Soil zones changed

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 2 : Excavate for top prop

Surcharge or strut changes

Strut no 1 inserted at this stage

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	12.34	0.00	0.00
Above strut 1	2	9.50	12.14	-0.32	1.41
Below strut 1				-0.32	-28.16
Dig level (R)	5	8.90	11.89	15.60	-16.74
Max BM	13	4.50	9.75	-26.38	1.11
Wall toe	29	-2.70	7.68	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	29.57	29.57	0.00	29.57

STAGE 3 : INSTALL TOP PROP

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[m]	[m]	[m]	[m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 3 : Install top Prop

Summary Results

	Node	Level	Displacement	Moment	Shear
		[m]	[mm]	[kNm/m]	[kN/m]
Top wall node	1	10.00	12.34	0.00	0.00
Above strut 1	2	9.50	12.14	-0.32	1.41
Below strut 1				-0.32	-28.16
Dig level (R)	5	8.90	11.89	15.60	-16.74
Max BM	13	4.50	9.75	-26.38	1.11
Wall toe	29	-2.70	7.68	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	29.57	29.57	0.00	29.57

STAGE 4 : EXCAVATE TO FORMATION

Ground level [m] LEFT: 10.00 RIGHT: 4.25 Soil zones changed

Passive softening details

Left Right

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Left Right

Excavation level [m] 10.00 4.25
Depth below excavation level [m] 0.00 0.50
Global softening (%) 100.00 100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right
1	10.00	3	0	0.00
2	9.50	3	0	0.00
3	9.20	3	0	0.00
4	9.10	3	0	0.00
5	8.90	3	0	0.00
6	8.25	3	0	0.00
7	7.30	3	0	0.00
8	6.70	4	0	0.00
9	6.50	4	0	0.00
10	6.00	4	0	0.00
11	5.50	4	0	0.00
12	5.00	4	0	0.00
13	4.50	1	0	72.50
14	4.00	1	1	75.00
15	3.50	1	1	77.50
16	3.00	1	1	80.00
17	2.50	1	1	82.50
18	2.00	1	1	85.00
19	1.45	1	1	87.75
20	1.15	1	1	89.25
21	0.50	1	1	92.50
22	0.00	1	1	95.00
23	-0.50	1	1	97.50
24	-0.90	1	1	99.50
25	-1.00	1	1	100.00
26	-1.50	1	1	102.50
27	-2.00	1	1	105.00
28	-2.40	1	1	107.00
* 29	-2.70	1	1	108.50
30	-3.50	1	1	112.50
31	-4.00	1	1	115.00
32	-4.50	1	1	117.50
33	-5.00	1	1	120.00
34	-5.50	1	1	122.50
35	-6.00	1	1	125.00
36	-6.70	1	1	128.50
37	-7.10	1	1	130.50
38	-7.50	1	1	132.50
39	-8.00	1	1	135.00
40	-8.50	1	1	137.50
41	-9.00	1	1	140.00
42	-9.50	1	1	142.50
43	-10.00	1	1	145.00
44	-10.50	1	1	147.50
45	-11.00	1	1	150.00
46	-11.50	1	1	152.50
47	-12.00	1	1	155.00
48	-12.50	1	1	157.50
49	-13.00	1	1	160.00
50	-13.40	1	1	162.00
51	-14.00	1	1	165.00
52	-14.50	1	1	167.50
53	-15.00	1	1	170.00
54	-16.00	1	1	175.00
55	-17.00	1	1	180.00
56	-18.00	1	1	185.00
57	-19.00	1	1	190.00
58	-20.00	1	1	195.00

Water data on LEFT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	4.20	0.00	9.80

Analysis details

SAFE model with redistribution
and with friction at wall/soil interface
E profile Generated
Boundary distances [m] : 30.00 30.00
Wall relaxation 0%

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a [m]	yo [kN/m ²]	b [m]	yo [kN/m ²]
London Clay-undrained	5.00	4.75	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00
Made Ground Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 4 : Excavate to formation

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	13.41	0.00
Above strut 1	2	9.50	14.38	-1.01
Below strut 1	9	6.50	18.62	220.38
Max BM	14	4.00	17.94	53.31
Dig level (R)	29	-2.70	13.37	0.00
Wall toe				0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	141.57	141.57	0.00	141.57

STAGE 5 : INSTALL BASE SLAB

Passive softening details

Excavation level [m] 10.00 4.25
Depth below excavation level [m] 0.00 0.50
Global softening (%) 100.00 100.00

Undrained Shear Strength details

Node	Level [m]	Soil	Cohesion [kN/m ²]	
			Left	Right

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Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
1	10.00	3	0	0.00	0.00
2	9.50	3	0	0.00	0.00
3	9.20	3	0	0.00	0.00
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	1	75.00	37.50
15	3.50	1	1	77.50	77.50
16	3.00	1	1	80.00	80.00
17	2.50	1	1	82.50	82.50
18	2.00	1	1	85.00	85.00
19	1.45	1	1	87.75	87.75
20	1.15	1	1	89.25	89.25
21	0.50	1	1	92.50	92.50
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
* 29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Minimum equivalent fluid pressure parameters

Material	Left			Right		
	a	yo	b	a	yo	b
London Clay-undrained	5.00	4.75	0.00	0.00	0.00	0.00
London Clay-drained	5.00	10.00	0.00	0.00	0.00	0.00
Made Ground	5.00	7.00	0.00	0.00	0.00	0.00
Terrace Gravel						

RESULTS FOR STAGE 5 : Install Base Slab

Surcharge or strut changes

Strut no 2 inserted at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	13.41	0.00
Above strut 1	2	9.50	14.38	-1.01
Below strut 1				-135.42
Max BM	9	6.50	18.62	220.38
Above strut 2	12	5.00	18.63	163.56
Below strut 2				83.69
Dig level (R)	14	4.00	17.94	53.31
Wall toe	29	-2.70	13.37	0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	141.57	141.57	0.00	141.57
2	12	0.00	0.00	0.00	0.00

STAGE 6 : INSTALL GF SLAB

Passive softening details

	Left	Right
Excavation level [m]	10.00	4.25
Depth below excavation level [m]	0.00	0.50
Global softening (%)	100.00	100.00

Undrained Shear Strength details

Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
1	10.00	3	0	0.00	0.00
2	9.50	3	0	0.00	0.00
3	9.20	3	0	0.00	0.00
4	9.10	3	0	0.00	0.00
5	8.90	3	0	0.00	0.00
6	8.25	3	0	0.00	0.00
7	7.30	3	0	0.00	0.00
8	6.70	4	0	0.00	0.00
9	6.50	4	0	0.00	0.00
10	6.00	4	0	0.00	0.00
11	5.50	4	0	0.00	0.00
12	5.00	4	0	0.00	0.00
13	4.50	1	0	72.50	0.00
14	4.00	1	1	75.00	37.50
15	3.50	1	1	77.50	77.50
16	3.00	1	1	80.00	80.00
17	2.50	1	1	82.50	82.50
18	2.00	1	1	85.00	85.00
19	1.45	1	1	87.75	87.75
20	1.15	1	1	89.25	89.25
21	0.50	1	1	92.50	92.50

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Node	Level [m]	Soil		Cohesion [kN/m ²]	
		Left	Right	Left	Right
22	0.00	1	1	95.00	95.00
23	-0.50	1	1	97.50	97.50
24	-0.90	1	1	99.50	99.50
25	-1.00	1	1	100.00	100.00
26	-1.50	1	1	102.50	102.50
27	-2.00	1	1	105.00	105.00
28	-2.40	1	1	107.00	107.00
29	-2.70	1	1	108.50	108.50
30	-3.50	1	1	112.50	112.50
31	-4.00	1	1	115.00	115.00
32	-4.50	1	1	117.50	117.50
33	-5.00	1	1	120.00	120.00
34	-5.50	1	1	122.50	122.50
35	-6.00	1	1	125.00	125.00
36	-6.70	1	1	128.50	128.50
37	-7.10	1	1	130.50	130.50
38	-7.50	1	1	132.50	132.50
39	-8.00	1	1	135.00	135.00
40	-8.50	1	1	137.50	137.50
41	-9.00	1	1	140.00	140.00
42	-9.50	1	1	142.50	142.50
43	-10.00	1	1	145.00	145.00
44	-10.50	1	1	147.50	147.50
45	-11.00	1	1	150.00	150.00
46	-11.50	1	1	152.50	152.50
47	-12.00	1	1	155.00	155.00
48	-12.50	1	1	157.50	157.50
49	-13.00	1	1	160.00	160.00
50	-13.40	1	1	162.00	162.00
51	-14.00	1	1	165.00	165.00
52	-14.50	1	1	167.50	167.50
53	-15.00	1	1	170.00	170.00
54	-16.00	1	1	175.00	175.00
55	-17.00	1	1	180.00	180.00
56	-18.00	1	1	185.00	185.00
57	-19.00	1	1	190.00	190.00
58	-20.00	1	1	195.00	195.00

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 6 : Install GF slab

Surcharge or strut changes

Strut no. 1 removed at this stage
Strut no 3 inserted at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	14.82	0.00
Above strut 3	3	9.20	15.98	-2.56
Below strut 3				8.76
Max BM	9	6.50	18.81	-2.56
Above strut 2	12	5.00	18.64	-134.37
Below strut 2				-3.77
Dig level (R)	14	4.00	17.90	146.92
Wall toe	29	-2.70	13.36	78.19
				146.92
				76.92
				101.45
				0.00

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				141.57
2	12	1.27	1.27	0.00	1.27
3	3	143.13	143.13	0.00	143.13

STAGE 7 : DRAINED

Ground level [m] LEFT: 10.00 RIGHT: 4.25 Soil zones changed and wall EI changed

Water data on LEFT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	7.00	0.00	9.80

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m ²]	Unit wt. [kN/m ³]
1	4.20	0.00	9.80
2	3.75	32.50	9.80

Minimum equivalent fluid pressure parameters

Material	Left		Right	
	a	b	a	b
	[kN/m ² /m]	[m]	[kN/m ²]	[kN/m ² /m]
London	5.00	4.75	0.00	0.00
Clay-undrained				
London	5.00	4.75	0.00	0.00
Clay-drained				
Made	5.00	10.00	0.00	0.00
Ground				
Terrace	5.00	7.00	0.00	0.00
Gravel				

RESULTS FOR STAGE 7 : Drained

Surcharge or strut changes

Strut no. 2 removed at this stage
Strut no. 3 removed at this stage
Strut no 4 inserted at this stage
Strut no 5 inserted at this stage
Surcharge no. 1 applied at this stage

Summary Results

Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	10.00	16.32	0.00
Above strut 5	3	9.20	17.46	-1.97
Below strut 5				6.94
Max BM	10	6.00	20.05	-1.97
Above strut 4	12	5.00	19.46	-140.58
				11.17
				220.42
				180.51
				71.91

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Node	Level	Displacement	Moment	Shear
		[mm]	[kNm/m]	[kN/m]
[m]				
Below strut 4			180.51	-10.88
Dig level (R)	14	4.00	150.57	49.49
Wall toe	29	-2.70	0.00	0.00

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2				141.57
2	12				1.27
3	3				143.13
4	12	82.79	82.79	0.00	82.79
5	3	147.52	147.52	0.00	147.52

Results Envelope

Node	Level	Displacements	Moments	Shears				
		[mm]	[kNm/m]	[kN/m]				
[m]								
		Min	Max	Min				
		Max	Min	Max				
1	10.00	11.86	16.32	0.00	0.00	0.00	0.00	0.00
2	9.50	11.55	17.03	-1.01	0.91	-135.42	6.15	
3	9.20	11.36	17.46	-2.56	38.37	-140.58	8.76	
4	9.10	11.30	17.60	0.00	51.22	-139.47	0.00	
5	8.90	11.17	17.88	0.00	76.77	-128.67	0.00	
6	8.25	10.76	18.75	0.00	144.77	-99.42	3.19	
7	7.30	10.13	19.70	0.00	204.39	-58.79	16.45	
8	6.70	9.73	20.01	-12.46	218.96	-27.98	20.52	
9	6.50	9.60	20.06	-16.30	220.38	-10.65	18.89	
10	6.00	9.29	20.05	-25.32	220.42	0.00	23.30	
11	5.50	8.99	19.84	-30.70	208.08	0.00	51.95	
12	5.00	8.72	19.46	-34.41	180.51	-10.88	83.69	
13	4.50	8.48	18.92	-36.28	177.56	-2.13	110.25	
14	4.00	8.27	18.21	-32.29	150.57	-9.64	107.70	
15	3.50	8.08	17.51	-26.64	128.07	-12.83	65.87	
16	3.00	7.92	17.07	-19.46	97.00	-14.25	67.08	
17	2.50	7.77	16.64	-21.50	60.99	-13.24	73.30	
18	2.00	7.65	16.25	-19.55	23.70	-9.49	72.11	
19	1.45	7.53	15.84	-16.58	0.00	-12.33	64.23	
20	1.15	7.47	15.64	-32.25	2.37	-11.16	50.71	
21	0.50	7.33	15.22	-59.93	2.35	-4.93	28.24	
22	0.00	7.22	14.91	-66.88	2.87	-4.73	6.86	
23	-0.50	7.11	14.61	-66.79	2.15	-6.28	2.10	
24	-0.90	6.75	14.38	-61.84	1.05	-21.20	0.00	
25	-1.00	6.59	14.32	-61.04	3.42	-16.05	0.00	
26	-1.50	5.84	14.03	-51.48	0.00	-26.64	4.61	
27	-2.00	5.20	13.75	-34.41	0.00	-41.31	0.42	
28	-2.40	4.75	13.54	-15.02	0.00	-49.27	0.00	
29	-2.70	4.43	13.37	0.00	0.00	0.00	0.00	
30	-3.50	4.49	12.84	0.00	0.00	0.00	0.00	
31	-4.00	4.44	12.58	0.00	0.00	0.00	0.00	
32	-4.50	4.36	12.28	0.00	0.00	0.00	0.00	
33	-5.00	4.26	11.99	0.00	0.00	0.00	0.00	
34	-5.50	4.17	11.69	0.00	0.00	0.00	0.00	
35	-6.00	4.07	11.40	0.00	0.00	0.00	0.00	
36	-6.70	3.92	10.96	0.00	0.00	0.00	0.00	
37	-7.10	3.85	10.75	0.00	0.00	0.00	0.00	
38	-7.50	3.77	10.51	0.00	0.00	0.00	0.00	
39	-8.00	3.66	10.19	0.00	0.00	0.00	0.00	
40	-8.50	3.56	9.89	0.00	0.00	0.00	0.00	
41	-9.00	3.45	9.58	0.00	0.00	0.00	0.00	
42	-9.50	3.35	9.28	0.00	0.00	0.00	0.00	
43	-10.00	3.24	8.97	0.00	0.00	0.00	0.00	
44	-10.50	3.13	8.65	0.00	0.00	0.00	0.00	
45	-11.00	3.02	8.33	0.00	0.00	0.00	0.00	
46	-11.50	2.91	8.01	0.00	0.00	0.00	0.00	
47	-12.00	2.79	7.68	0.00	0.00	0.00	0.00	
48	-12.50	2.68	7.35	0.00	0.00	0.00	0.00	
49	-13.00	2.56	7.02	0.00	0.00	0.00	0.00	
50	-13.40	2.47	6.75	0.00	0.00	0.00	0.00	
51	-14.00	2.31	6.31	0.00	0.00	0.00	0.00	
52	-14.50	2.19	5.96	0.00	0.00	0.00	0.00	
53	-15.00	2.05	5.59	0.00	0.00	0.00	0.00	
54	-16.00	1.75	4.74	0.00	0.00	0.00	0.00	
55	-17.00	1.43	3.87	0.00	0.00	0.00	0.00	
56	-18.00	1.07	2.87	0.00	0.00	0.00	0.00	
57	-19.00	0.62	1.65	0.00	0.00	0.00	0.00	
58	-20.00	0.00	0.00	0.00	0.00	0.00	0.00	