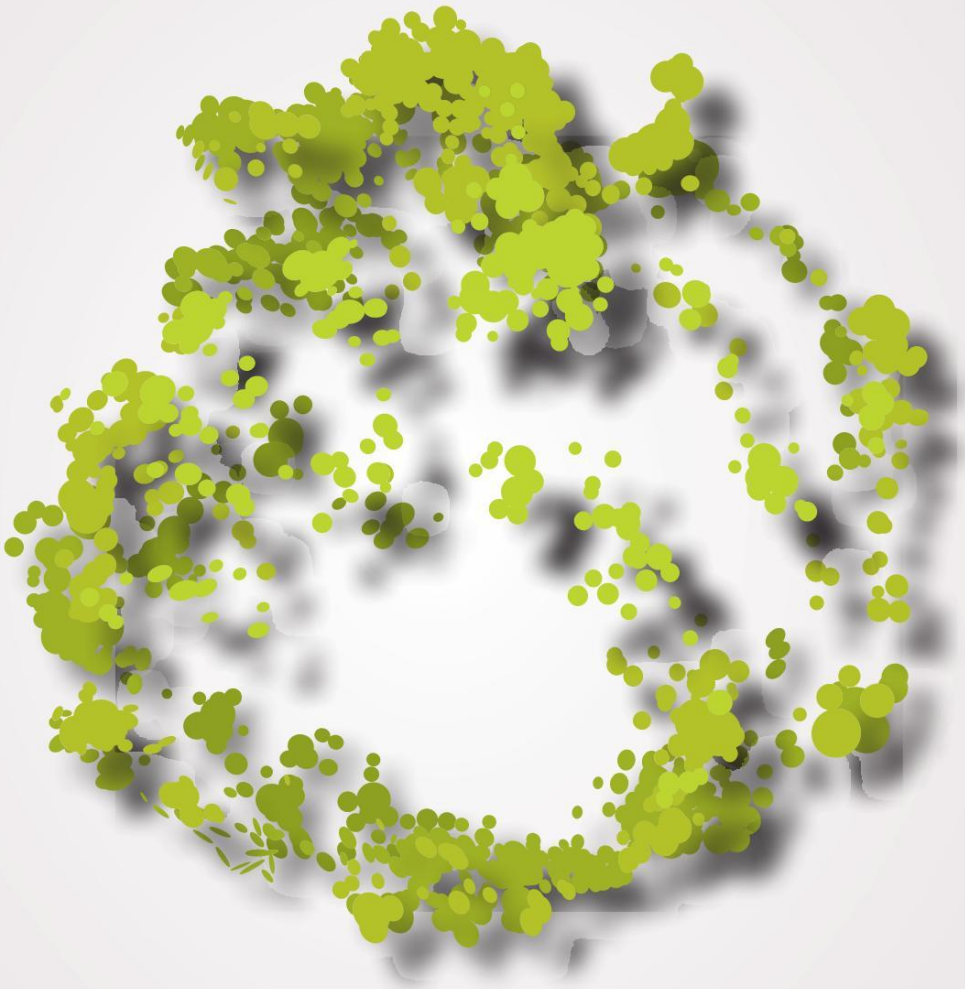


Project Number: 4409

St Pancras Campus |

Retaining Wall Preliminary Sizing

Document Ref: - Rev P1 | November 2019

Consulting Structural and Civil Engineers

Calculation Sheet

PROJECT TITLE	St. Pancras Campus		PROJECT No.	4409	
TITLE	750H x 750S Secant Piled Wall		DATE	Jun'18	SHEET No.
BY	HG	CHECKED BY	SHEET REF		REV

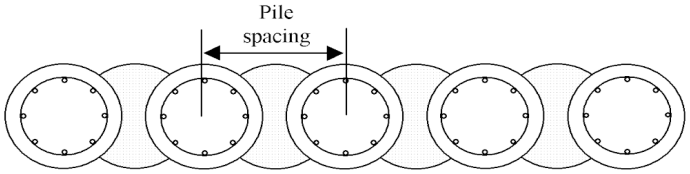
Reference	Calculations	Output

Secant Piled Wall Properties

Tolerance of Piles

Height of wall to formation Level		Hw	=	*5*	m
Positional Tolerance of Pile		Δ_1	=	*25*	mm
Vertical Tolerance of Pile		Δ_2	=	1/ *75*	
			=	67	mm
Total Tolerance	Δ_t =	$\Delta_1 + \Delta_2$	=	92	mm
		$2x\Delta_t$	=	183	mm

Pile Arrangement



Male Pile Diameter	D_m	=	*750*	mm
Female Pile Diameter	D_f	=	*750*	mm
Concrete modulus of elasticity	E	=	3.4E+07	kN/m2
Max Spacing Between Piles	D_f -(2xΔt)	=	567	mm
Max Pile Spacing	$S_{p,max}$	=	1317	mm
Proposed Pile Spacing	S_p	=	*1000*	mm *Pass*

Pile Properties

Second Moment				
Single Pile	I_{pile}	=	15531555477	mm^4
Piled Wall	I_{wall}	=	15531555477	mm^4/m
			0.0155	m^4/m
Wall Stiffness	E x I_{wall}	=	528073	$kN/m^2/m$
Short Term Stiffness	0.7 x E x I_{wall}	=	369651	$kN/m^2/m$
Long Term Stiffness	0.5 x E x I_{wall}	=	264036	$kN/m^2/m$

Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Left side	Soil types Right side
1	0.00	1 Made Ground	1 Made Ground
2	-5.00	3 LC (undrained)	3 LC (undrained)
3	-25.00	4 LC (drained)	4 LC (drained)

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	Made Ground	18.00	10000	0.500	OC (0.200)	0.376 (0.000)	2.663 (0.000)	
2	Not defined							
3	LC (undra..	20.00	80000	1.000	OC (0.490)	1.000 (2.000)	1.000 (2.002)	80.00u (5.300)
	(0.00)		(5300)					
4	LC (drain..	20.00	60000	1.000	OC (0.200)	0.472 (1.375)	2.117 (2.910)	5.000d (3.000)
	(0.00)		(3900)					

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	Made Ground	27.00	0.000	0.00	27.00	0.000	0.00
2	Not defined						
3	LC (undrained)	0.00	0.000	0.00	0.00	0.000	0.00
4	LC (drained)	21.02	0.000	0.00	21.00	0.000	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3
Initial water pressure profile = Profile number 1

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Left side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Right side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	0.00	0.00	0.0	1	0.00	0.00	0.0	WC
2	1	0.00	0.00	0.0	1	-4.00	-4.00	0.0	MC
3	1	0.00	0.00	0.0	1	-8.00	-8.00	0.0	MC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = -20.00
Maximum finite element length = 1.20 m
Youngs modulus of wall E = 1.7000E+07 kN/m2
Moment of inertia of wall I = 0.015532 m4/m run
E.I = 264044 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Prop no.	Elev.	Prop spacing m	Cross-section area sq.m	Youngs modulus kN/m2	Free length m	Inclin-ation (degs)	Pre-stress /prop kN	Strut or Anchor	Allow tension ?	L/R
1	0.00	1.00	0.014000	2.100E+08	1.00	0.00	0	Strut	No	R
2	Not defined									
3	-7.50	1.00	0.014000	3.400E+07	1.00	0.00	0	Strut	No	R

SURCHARGE LOADS

Surch-arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge kN/m2 Near edge	Surcharge kN/m2 Far edge	Equiv. soil type	Partial factor/ Category
1	0.00	0.00(L)	1.00	20.00	15.00	=	N/A	1.00 -
2	-8.00	-0.00(R)	1.00	20.00	100.00	=	N/A	1.00 -

Note: L = Left side, R = Right side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 0.00
2	Apply water pressure profile no.2 (Mod. Conserv.)
3	Excavate to elevation -1.00 on RIGHT side
4	Install strut or anchor no.1 at elevation 0.00
5	Excavate to elevation -4.00 on RIGHT side
6	Apply water pressure profile no.3 (Mod. Conserv.)
7	Excavate to elevation -8.00 on RIGHT side
8	Install strut or anchor no.3 at elevation -7.50
9	Apply surcharge no.2 at elevation -8.00
10	Change properties of soil type 3 to soil type 4 Ko pressures will be reset

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 Left side of wall = 20.00 m
Width of excavation on Right side of wall = 20.00 m

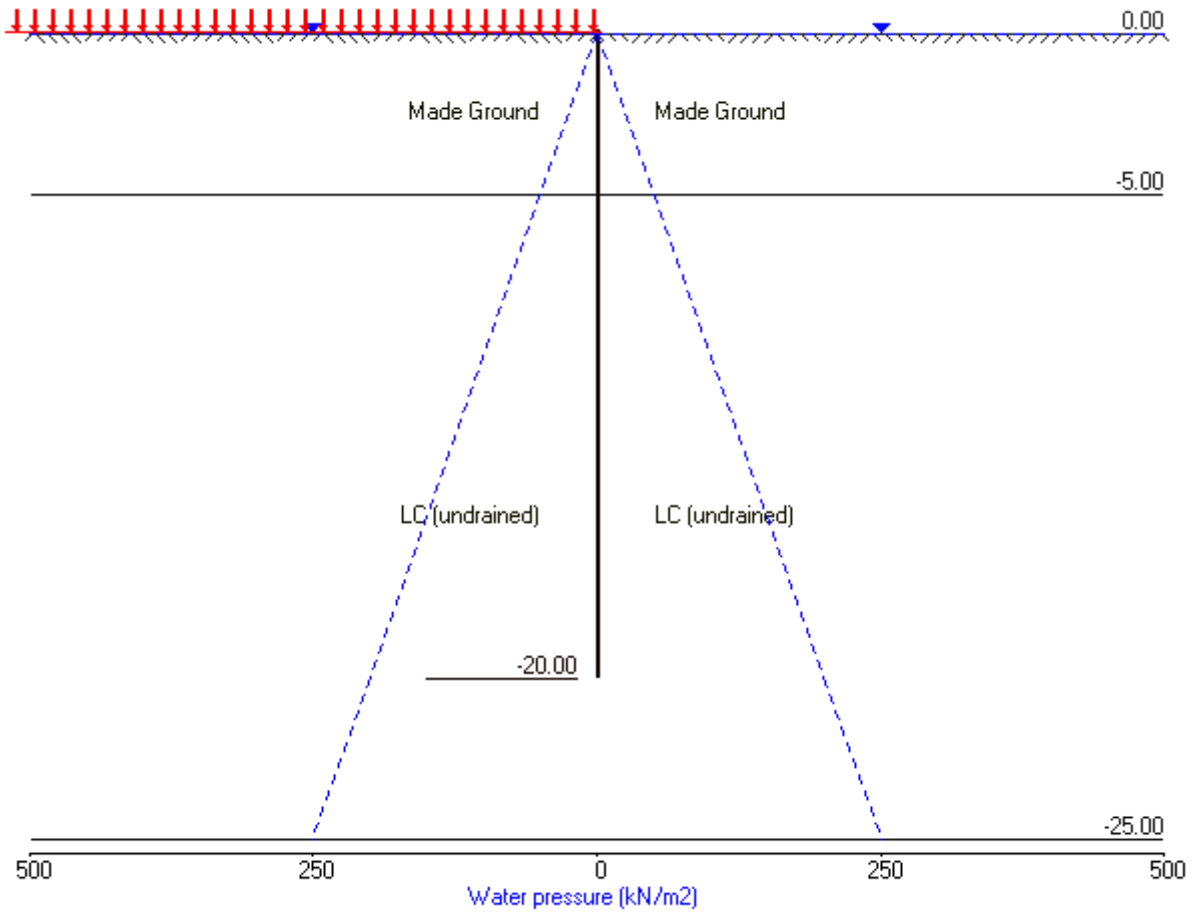
Distance to rigid boundary on Left side = 20.00 m
Distance to rigid boundary on Right side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 0.00	Yes	Yes	Yes
2	Apply water pressure profile no.2	Yes	Yes	Yes
3	Excav. to elev. -1.00 on RIGHT side	Yes	Yes	Yes
4	Install prop no.1 at elev. 0.00	Yes	Yes	Yes
5	Excav. to elev. -4.00 on RIGHT side	Yes	Yes	Yes
6	Apply water pressure profile no.3	Yes	Yes	Yes
7	Excav. to elev. -8.00 on RIGHT side	Yes	Yes	Yes
8	Install prop no.3 at elev. -7.50	Yes	Yes	Yes
9	Apply surcharge no.2 at elev. -8.00	Yes	Yes	Yes
10	Change soil type 3 to soil type 4	Yes	Yes	Yes
*	Summary output	Yes	-	Yes

Units: kN,m

Stage No.1 Apply surcharge no.1 at elev. 0.00



Units: kN,m

Stage No. 1 Apply surcharge no.1 at elevation 0.00

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
1	0.00	0.00	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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Prop forces kN/m
1	0.00	5.63	0.001	1.95E-04	0.0	0.0	
2	-1.00	0.59	0.001	1.91E-04	3.1	2.2	
3	-1.70	-0.92	0.001	1.82E-04	3.0	4.4	
4	-2.40	-0.96	0.000	1.68E-04	2.3	6.3	
5	-3.20	-0.66	0.000	1.47E-04	1.7	7.9	
6	-4.00	-0.34	0.000	1.21E-04	1.3	9.0	
7	-5.00	-0.02	0.000	8.54E-05	1.1	10.1	
		-5.61	0.000	8.54E-05	1.1	10.1	
8	-5.63	-2.98	0.000	6.20E-05	-1.6	9.7	
9	-6.25	-1.09	0.000	4.09E-05	-2.8	8.1	
10	-6.88	0.12	0.000	2.41E-05	-3.1	6.1	
11	-7.50	0.77	0.000	1.19E-05	-2.9	4.2	
12	-8.00	1.00	0.000	5.36E-06	-2.4	2.8	
13	-8.80	1.00	0.000	-7.05E-07	-1.6	1.2	
14	-9.60	0.79	0.000	-2.80E-06	-0.9	0.2	
15	-10.80	0.39	0.000	-2.45E-06	-0.2	-0.4	
16	-12.00	0.10	0.000	-8.84E-07	0.1	-0.3	
17	-13.20	-0.02	0.000	2.80E-07	0.1	-0.2	
18	-14.40	-0.05	0.000	7.60E-07	0.1	-0.0	
19	-15.60	-0.04	0.000	7.90E-07	0.0	0.0	
20	-16.80	-0.02	0.000	6.50E-07	0.0	0.0	
21	-18.00	-0.01	0.000	5.13E-07	-0.0	0.0	
22	-19.00	0.00	0.000	4.49E-07	-0.0	0.0	
23	-20.00	0.01	0.000	4.30E-07	-0.0	-0.0	

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Stage No.1 Apply surcharge no.1 at elevation 0.00

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	2127
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	2127
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	2127
4	-2.40	24.00	23.07	8.66	61.43	9.60	33.60	2127
5	-3.20	32.00	28.54	10.72	75.99	12.84	44.84	2127
6	-4.00	40.00	34.36	12.90	91.50	16.12	56.12	2127
7	-5.00	50.00	41.89	15.73	111.56	20.23	70.23	2127
		Total>	91.89	25.00m	305.11	88.11	88.11	32204
8	-5.63	Total>	104.19	28.13m	324.03	101.82	101.82	33206
9	-6.25	Total>	116.52	31.25m	342.99	115.18	115.18	34207
10	-6.88	Total>	128.88	34.38m	361.99	128.22	128.22	35209
11	-7.50	Total>	141.26	37.50m	381.00	140.99	140.99	36211
12	-8.00	Total>	151.18	40.00m	396.23	151.07	151.07	37012
13	-8.80	Total>	167.07	44.00m	420.60	167.02	167.02	38294
14	-9.60	Total>	182.98	48.00m	445.00	182.86	182.86	39576
15	-10.80	Total>	206.86	54.00m	481.62	206.61	206.61	41499
16	-12.00	Total>	230.77	60.00m	518.26	230.42	230.42	43423
17	-13.20	Total>	254.69	66.00m	554.91	254.32	254.32	45346
18	-14.40	Total>	278.63	72.00m	591.58	278.28	278.28	47269
19	-15.60	Total>	302.57	78.00m	628.26	302.26	302.26	49192
20	-16.80	Total>	326.52	84.00m	664.94	326.24	326.24	51115
21	-18.00	Total>	350.48	90.00m	701.63	350.23	350.23	53039
22	-19.00	Total>	370.45	95.00m	732.21	370.22	370.22	54641
23	-20.00	Total>	390.42	100.00m	762.79	390.21	390.21	56244

RIGHT side

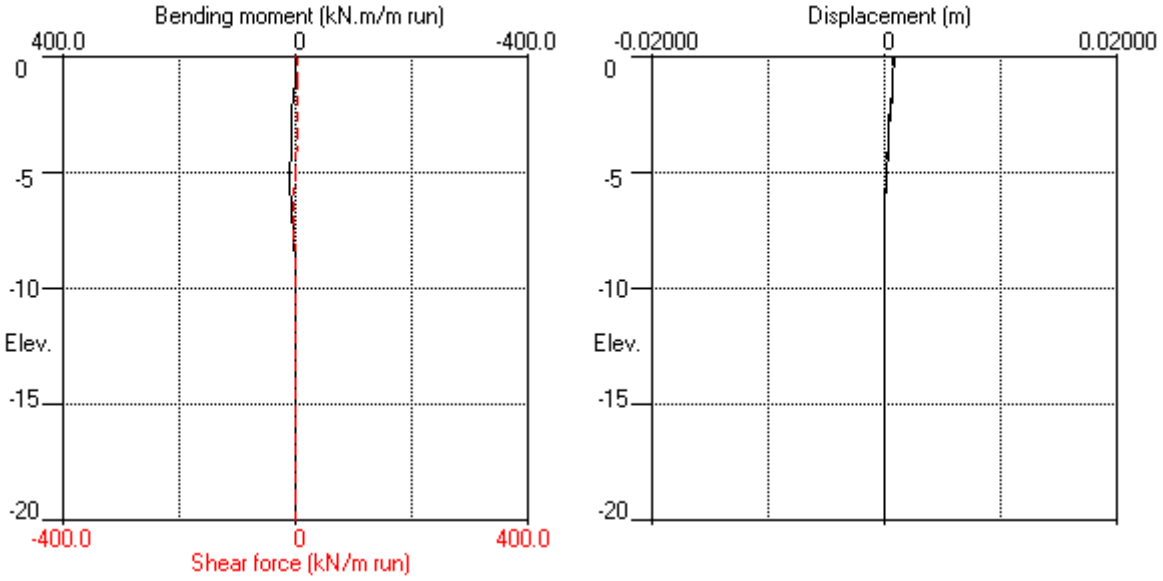
Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2127
2	-1.00	10.00	8.00	3.00	21.30	5.51	15.51	2127
3	-1.70	17.00	13.60	5.11	36.22	8.03	25.03	2127
4	-2.40	24.00	19.20	7.21	51.13	10.56	34.56	2127
5	-3.20	32.00	25.60	9.61	68.17	13.50	45.50	2127
6	-4.00	40.00	32.00	12.02	85.21	16.47	56.47	2127
7	-5.00	50.00	40.00	15.02	106.52	20.25	70.25	2127
		Total>	90.00	25.00m	303.21	93.71	93.71	32204
8	-5.63	Total>	102.50	28.13m	322.34	104.80	104.80	33206
9	-6.25	Total>	115.00	31.25m	341.48	116.27	116.27	34207
10	-6.88	Total>	127.50	34.38m	360.61	128.10	128.10	35209
11	-7.50	Total>	140.00	37.50m	379.74	140.22	140.22	36211
12	-8.00	Total>	150.00	40.00m	395.04	150.07	150.07	37012
13	-8.80	Total>	166.00	44.00m	419.53	166.01	166.01	38294
14	-9.60	Total>	182.00	48.00m	444.02	182.08	182.08	39576
15	-10.80	Total>	206.00	54.00m	480.75	206.22	206.22	41499
16	-12.00	Total>	230.00	60.00m	517.49	230.32	230.32	43423
17	-13.20	Total>	254.00	66.00m	554.22	254.35	254.35	45346
18	-14.40	Total>	278.00	72.00m	590.95	278.33	278.33	47269
19	-15.60	Total>	302.00	78.00m	627.69	302.29	302.29	49192
20	-16.80	Total>	326.00	84.00m	664.42	326.26	326.26	51115
21	-18.00	Total>	350.00	90.00m	701.15	350.23	350.23	53039
22	-19.00	Total>	370.00	95.00m	731.76	370.22	370.22	54641
23	-20.00	Total>	390.00	100.00m	762.37	390.20	390.20	56244

(continued)

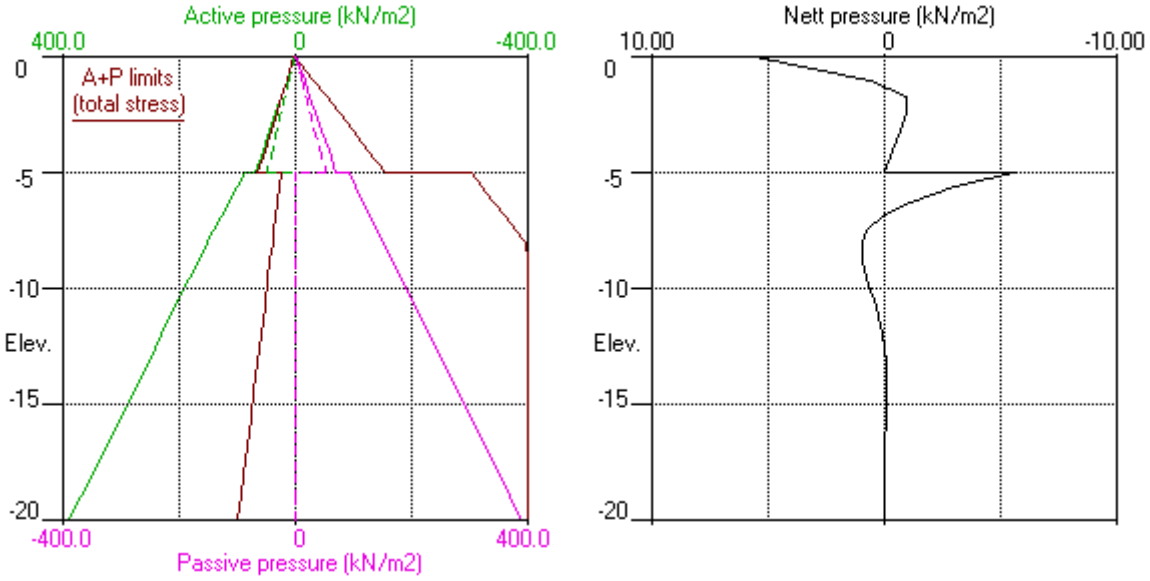
Stage No.1 Apply surcharge no.1 at elevation 0.00
Note: 24.10a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.1 Apply surcharge no.1 at elev. 0.00

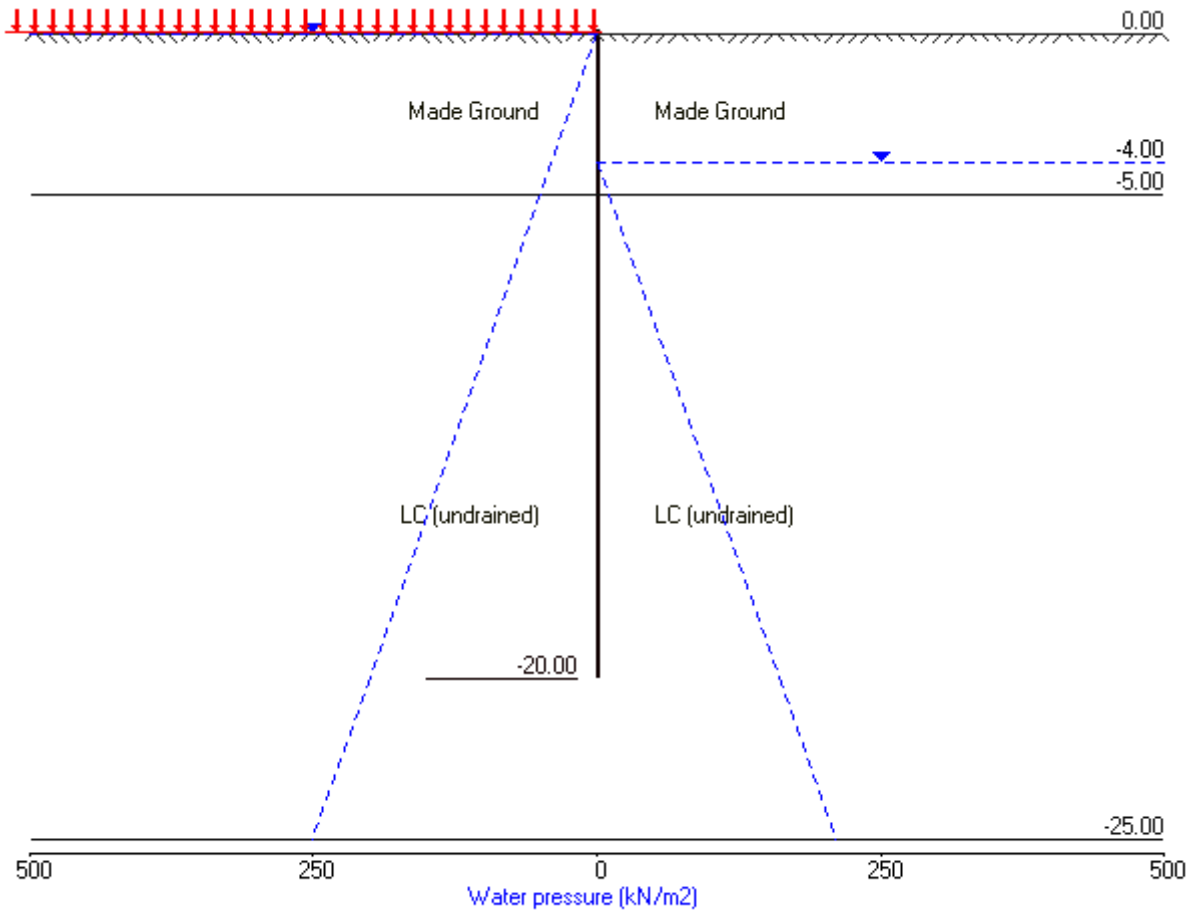


Stage No.1 Apply surcharge no.1 at elev. 0.00



Units: kN,m

Stage No.2 Apply water pressure profile no.2 (Mod. Conserv.)



Units: kN,m

Stage No. 2 Apply water pressure profile no.2 (Mod. Conserv.)

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
2	0.00	0.00	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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Prop forces kN/m
1	0.00	5.63	0.008	1.32E-03	0.0	0.0	
2	-1.00	-2.31	0.006	1.31E-03	1.7	3.5	
3	-1.70	2.85	0.006	1.30E-03	1.8	4.4	
4	-2.40	8.55	0.005	1.29E-03	5.8	6.8	
5	-3.20	15.29	0.004	1.25E-03	15.4	14.6	
6	-4.00	22.10	0.003	1.18E-03	30.3	32.3	
7	-5.00	24.93	0.002	9.85E-04	53.8	74.2	
		-81.38	0.002	9.85E-04	53.8	74.2	
8	-5.63	-51.91	0.001	7.88E-04	12.2	92.0	
9	-6.25	-28.32	0.001	5.73E-04	-12.9	89.5	
10	-6.88	-11.20	0.000	3.78E-04	-25.2	75.9	
11	-7.50	-0.06	0.000	2.19E-04	-28.7	57.9	
12	-8.00	5.43	-0.000	1.23E-04	-27.4	43.5	
13	-8.80	9.25	-0.000	2.27E-05	-21.5	23.3	
14	-9.60	9.06	-0.000	-2.63E-05	-14.2	9.0	
15	-10.80	5.70	-0.000	-4.33E-05	-5.4	-1.5	
16	-12.00	2.12	0.000	-3.11E-05	-0.7	-3.9	
17	-13.20	0.47	0.000	-1.51E-05	0.9	-3.2	
18	-14.40	-0.20	0.000	-3.96E-06	1.0	-1.8	
19	-15.60	-0.36	0.000	1.56E-06	0.7	-0.7	
20	-16.80	-0.29	0.000	3.28E-06	0.3	-0.1	
21	-18.00	-0.15	0.000	3.32E-06	0.1	0.1	
22	-19.00	-0.03	0.000	3.08E-06	-0.0	0.1	
23	-20.00	0.09	0.000	2.99E-06	0.0	-0.0	

(continued)

Stage No.2 Apply water pressure profile no.2 (Mod. Conserv.)

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	1817
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	1817
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	1817
4	-2.40	24.00	23.07	8.66	61.43	8.66	32.66a	1817
5	-3.20	32.00	28.54	10.72	75.99	10.72	42.72a	1817
6	-4.00	40.00	34.36	12.90	91.50	12.90	52.90a	1817
7	-5.00	50.00	41.89	15.73	111.56	17.70	67.70	1817
		Total>	91.89	25.00m	305.11	49.44	49.44	27784
8	-5.63	Total>	104.19	28.13m	324.03	76.57	76.57	28648
9	-6.25	Total>	116.52	31.25m	342.99	100.79	100.79	29513
10	-6.88	Total>	128.88	34.38m	361.99	121.78	121.78	30377
11	-7.50	Total>	141.26	37.50m	381.00	139.79	139.79	31241
12	-8.00	Total>	151.18	40.00m	396.23	152.50	152.50	33869
13	-8.80	Total>	167.07	44.00m	420.60	170.35	170.35	35042
14	-9.60	Total>	182.98	48.00m	445.00	186.22	186.22	36215
15	-10.80	Total>	206.86	54.00m	481.62	208.48	208.48	37975
16	-12.00	Total>	230.77	60.00m	518.26	230.65	230.65	39735
17	-13.20	Total>	254.69	66.00m	554.91	253.78	253.78	24959
18	-14.40	Total>	278.63	72.00m	591.58	277.42	277.42	26018
19	-15.60	Total>	302.57	78.00m	628.26	301.31	301.31	27076
20	-16.80	Total>	326.52	84.00m	664.94	325.32	325.32	28135
21	-18.00	Total>	350.48	90.00m	701.63	349.37	349.37	29193
22	-19.00	Total>	370.45	95.00m	732.21	369.42	369.42	30075
23	-20.00	Total>	390.42	100.00m	762.79	389.46	389.46	30957

RIGHT side

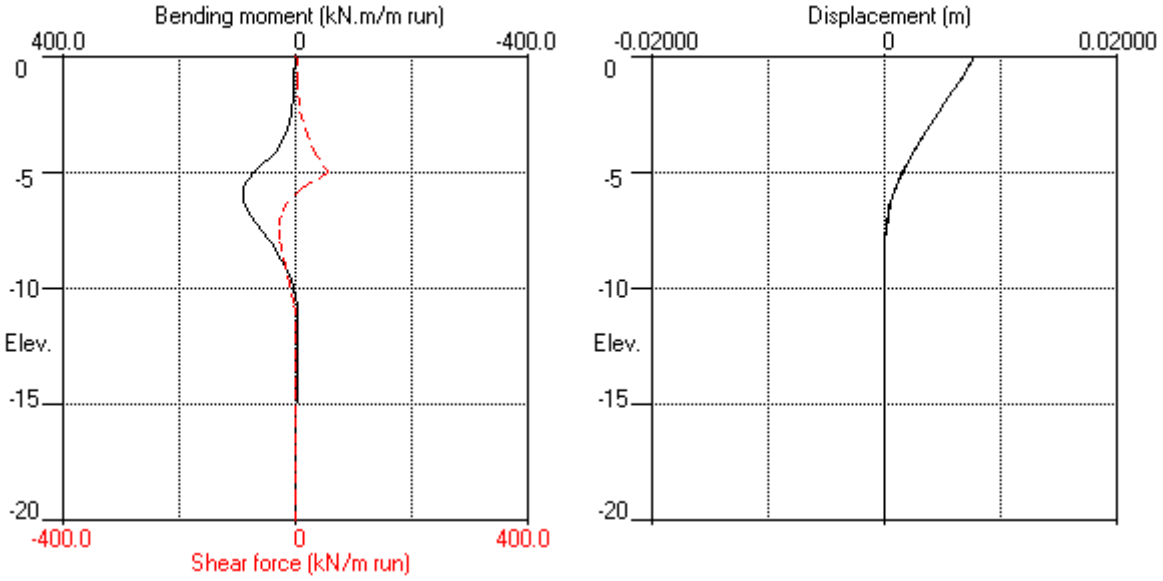
Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1817
2	-1.00	0.00	18.00	6.76	47.93	18.41	18.41	1817
3	-1.70	0.00	30.60	11.49	81.49	21.26	21.26	1817
4	-2.40	0.00	43.20	16.22	115.04	24.12	24.12	1817
5	-3.20	0.00	57.60	21.63	153.39	27.42	27.42	1817
6	-4.00	0.00	72.00	27.04	191.73	30.80	30.80	1817
7	-5.00	10.00	80.00	30.04	213.04	32.77	42.77	1817
		Total>	90.00	25.00m	303.21	130.82	130.82	27784
8	-5.63	Total>	102.50	28.13m	322.34	128.48	128.48	28648
9	-6.25	Total>	115.00	31.25m	341.48	129.10	129.10	29513
10	-6.88	Total>	127.50	34.38m	360.61	132.98	132.98	30377
11	-7.50	Total>	140.00	37.50m	379.74	139.85	139.85	31241
12	-8.00	Total>	150.00	40.00m	395.04	147.07	147.07	33869
13	-8.80	Total>	166.00	44.00m	419.53	161.11	161.11	35042
14	-9.60	Total>	182.00	48.00m	444.02	177.16	177.16	36215
15	-10.80	Total>	206.00	54.00m	480.75	202.78	202.78	37975
16	-12.00	Total>	230.00	60.00m	517.49	228.53	228.53	39735
17	-13.20	Total>	254.00	66.00m	554.22	253.31	253.31	24959
18	-14.40	Total>	278.00	72.00m	590.95	277.62	277.62	26018
19	-15.60	Total>	302.00	78.00m	627.69	301.67	301.67	27076
20	-16.80	Total>	326.00	84.00m	664.42	325.61	325.61	28135
21	-18.00	Total>	350.00	90.00m	701.15	349.52	349.52	29193
22	-19.00	Total>	370.00	95.00m	731.76	369.45	369.45	30075
23	-20.00	Total>	390.00	100.00m	762.37	389.37	389.37	30957

(continued)

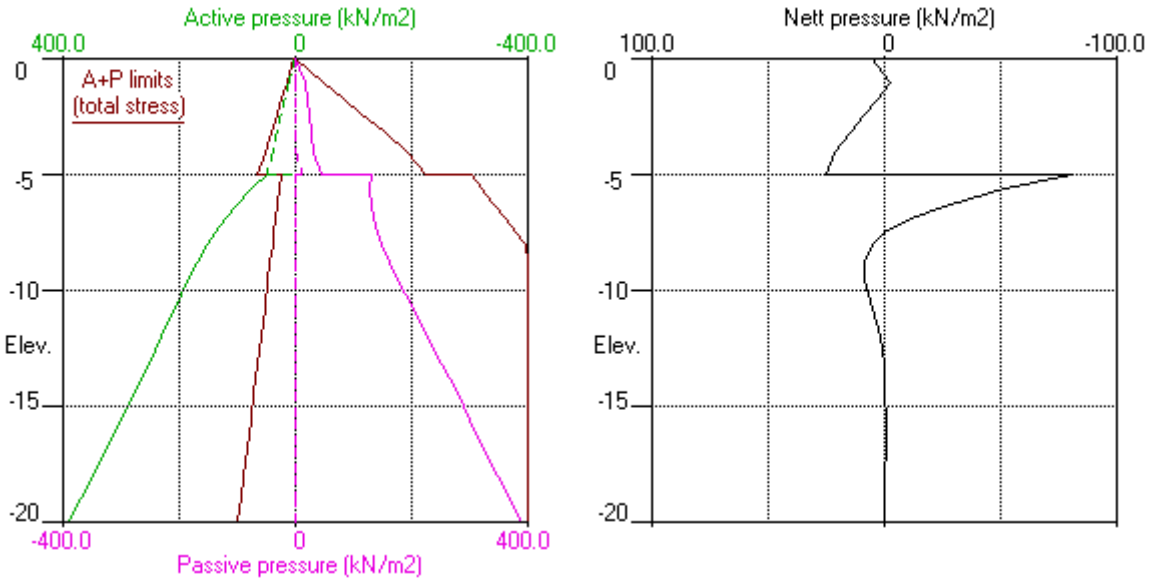
Stage No.2 Apply water pressure profile no.2 (Mod. Conserv.)
Note: 52.90a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.2 Apply water pressure profile no.2 (Mod. Conserv.)

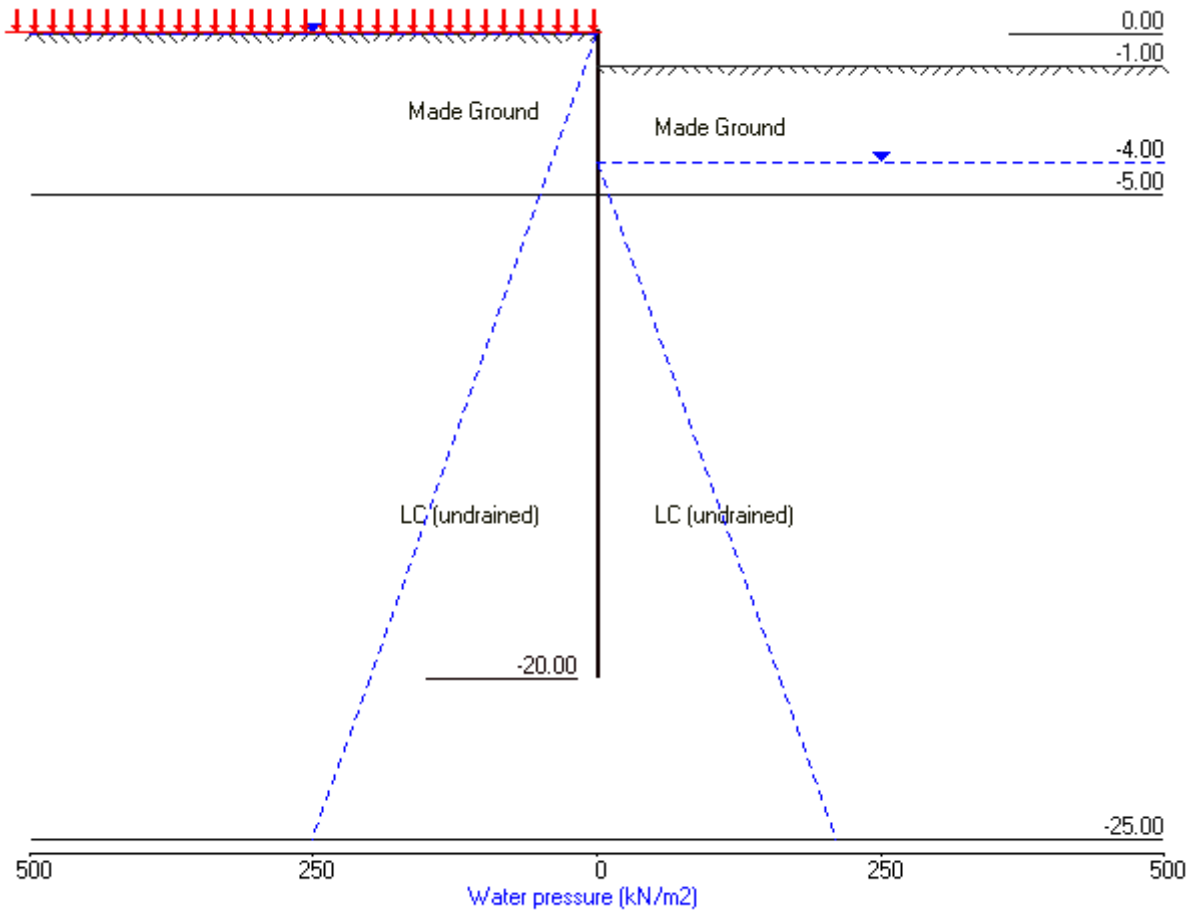


Stage No.2 Apply water pressure profile no.2 (Mod. Conserv.)



Units: kN,m

Stage No.3 Excav. to elev. -1.00 on RIGHT side



Units: kN,m

Stage No. 3 Excavate to elevation -1.00 on RIGHT side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr-ation	Direction of failure
3	0.00	-1.00	Cant.	14.295	-17.39	-3.68	2.68	L to R

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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Prop forces kN/m
1	0.00	5.63	0.013	2.29E-03	0.0	0.0	
2	-1.00	16.10	0.011	2.28E-03	10.9	6.5	
3	-1.70	-0.33	0.009	2.25E-03	16.4	17.2	
4	-2.40	6.81	0.007	2.19E-03	18.7	29.0	
5	-3.20	15.09	0.006	2.07E-03	27.4	46.6	
6	-4.00	23.25	0.004	1.89E-03	42.8	73.9	
7	-5.00	25.69	0.002	1.51E-03	67.2	128.8	
		-118.32	0.002	1.51E-03	67.2	128.8	
8	-5.63	-74.01	0.002	1.18E-03	7.1	149.3	
9	-6.25	-37.82	0.001	8.39E-04	-27.8	139.3	
10	-6.88	-12.35	0.000	5.39E-04	-43.5	114.5	
11	-7.50	3.57	0.000	3.03E-04	-46.2	84.9	
12	-8.00	10.92	0.000	1.64E-04	-42.6	62.2	
13	-8.80	15.30	0.000	2.23E-05	-32.1	31.5	
14	-9.60	14.04	0.000	-4.17E-05	-20.4	10.7	
15	-10.80	8.32	0.000	-5.76E-05	-7.0	-3.7	
16	-12.00	2.92	0.000	-3.50E-05	-0.2	-6.2	
17	-13.20	0.39	0.000	-1.08E-05	1.7	-4.5	
18	-14.40	-0.50	0.000	4.19E-06	1.7	-2.2	
19	-15.60	-0.60	0.000	1.04E-05	1.0	-0.6	
20	-16.80	-0.41	0.000	1.15E-05	0.4	0.1	
21	-18.00	-0.19	0.000	1.07E-05	0.0	0.2	
22	-19.00	-0.03	0.000	1.00E-05	-0.1	0.1	
23	-20.00	0.15	0.000	9.81E-06	0.0	-0.0	

(continued)

Stage No.3 Excavate to elevation -1.00 on RIGHT side

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	1973
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	1973
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	1973
4	-2.40	24.00	23.07	8.66	61.43	8.66	32.66a	1973
5	-3.20	32.00	28.54	10.72	75.99	10.72	42.72a	1973
6	-4.00	40.00	34.36	12.90	91.50	12.90	52.90a	1973
7	-5.00	50.00	41.89	15.73	111.56	15.95	65.95	1973
		Total>	91.89	25.00m	305.11	25.00	25.00a	30001
8	-5.63	Total>	104.19	28.13m	324.03	58.01	58.01	30934
9	-6.25	Total>	116.52	31.25m	342.99	88.19	88.19	31867
10	-6.88	Total>	128.88	34.38m	361.99	113.15	113.15	32801
11	-7.50	Total>	141.26	37.50m	381.00	133.45	133.45	33734
12	-8.00	Total>	151.18	40.00m	396.23	147.05	147.05	34480
13	-8.80	Total>	167.07	44.00m	420.60	165.22	165.22	35675
14	-9.60	Total>	182.98	48.00m	445.00	180.63	180.63	36869
15	-10.80	Total>	206.86	54.00m	481.62	201.87	201.87	38661
16	-12.00	Total>	230.77	60.00m	518.26	223.28	223.28	40452
17	-13.20	Total>	254.69	66.00m	554.91	246.12	246.12	42244
18	-14.40	Total>	278.63	72.00m	591.58	269.77	269.77	44035
19	-15.60	Total>	302.57	78.00m	628.26	293.83	293.83	45827
20	-16.80	Total>	326.52	84.00m	664.94	318.05	318.05	47619
21	-18.00	Total>	350.48	90.00m	701.63	342.28	342.28	49410
22	-19.00	Total>	370.45	95.00m	732.21	362.48	362.48	50903
23	-20.00	Total>	390.42	100.00m	762.79	382.68	382.68	52396

RIGHT side

Node no.	Y coord	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	2220
3	-1.70	0.00	12.60	4.73	33.55	24.43	24.43	2220
4	-2.40	0.00	25.20	9.46	67.11	25.85	25.85	2220
5	-3.20	0.00	39.61	14.87	105.48	27.63	27.63	2220
6	-4.00	0.00	54.03	20.29	143.87	29.66	29.66	2220
7	-5.00	10.00	62.06	23.30	165.26	30.26	40.26	2220
		Total>	72.06	20.00m	285.27	143.32	143.32	33531
8	-5.63	Total>	84.59	23.13m	304.43	132.02	132.02	34574
9	-6.25	Total>	97.13	26.25m	323.60	126.01	126.01	35617
10	-6.88	Total>	109.68	29.38m	342.78	125.50	125.50	36660
11	-7.50	Total>	122.23	32.50m	361.97	129.87	129.87	37703
12	-8.00	Total>	132.28	35.00m	377.33	136.13	136.13	38537
13	-8.80	Total>	148.38	39.00m	401.92	149.92	149.92	39872
14	-9.60	Total>	164.50	43.00m	426.52	166.59	166.59	41207
15	-10.80	Total>	188.69	49.00m	463.45	193.55	193.55	43210
16	-12.00	Total>	212.92	55.00m	500.41	220.36	220.36	45212
17	-13.20	Total>	237.18	61.00m	537.40	245.72	245.72	47215
18	-14.40	Total>	261.47	67.00m	574.42	270.28	270.28	49217
19	-15.60	Total>	285.77	73.00m	611.45	294.43	294.43	51220
20	-16.80	Total>	310.09	79.00m	648.51	318.46	318.46	53222
21	-18.00	Total>	334.42	85.00m	685.57	342.48	342.48	55224
22	-19.00	Total>	354.70	90.00m	716.46	362.50	362.50	56893

(continued)

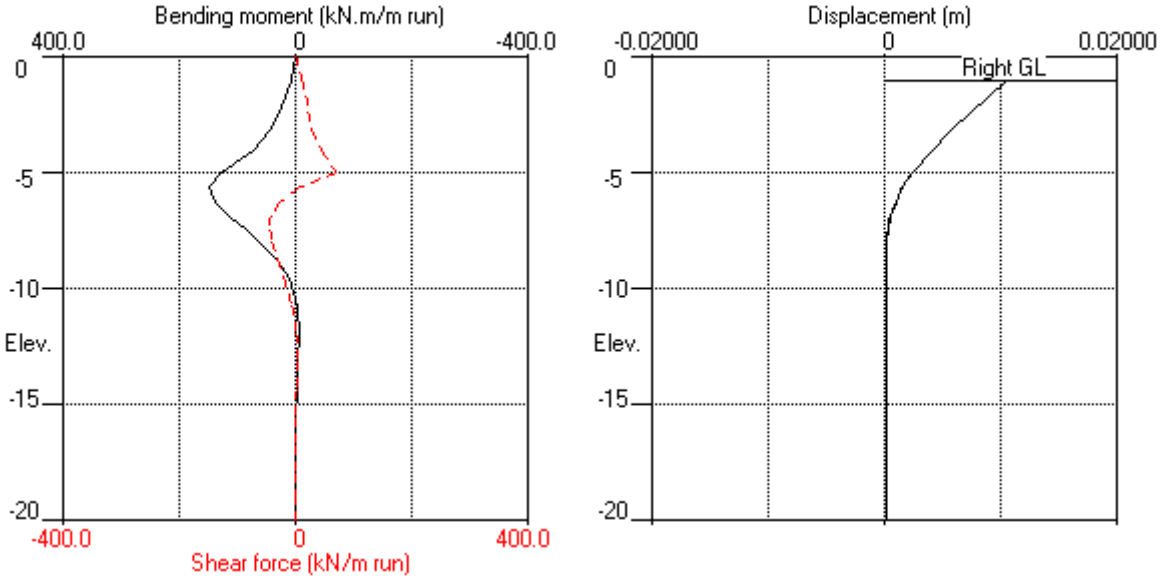
Stage No.3 Excavate to elevation -1.00 on RIGHT side

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
23	-20.00	Total>	374.98	95.00m	747.36	382.53	382.53	58562

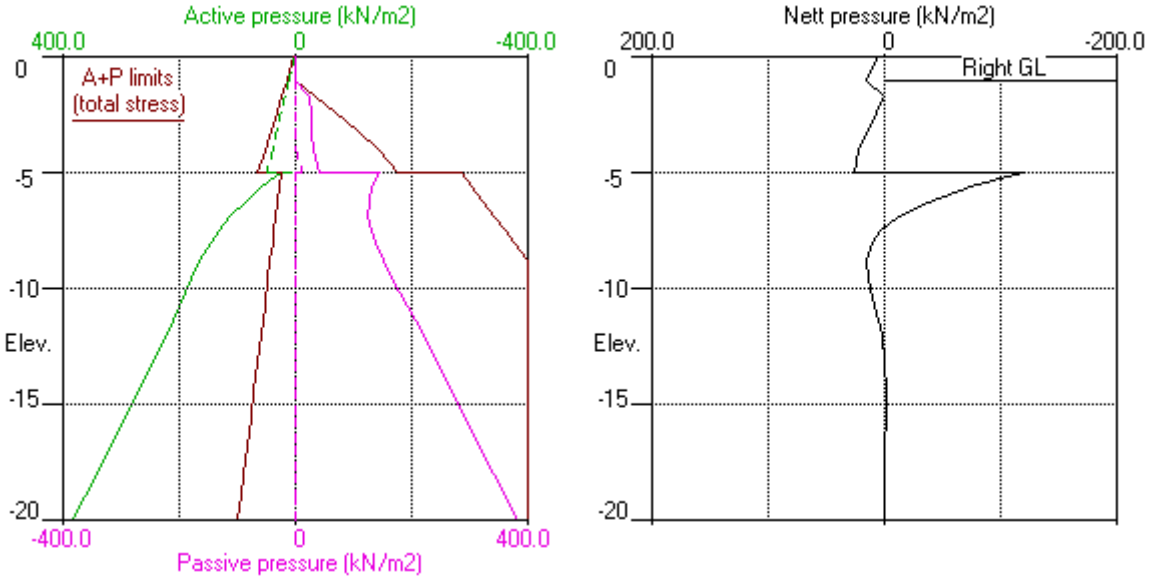
Note: 25.00a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.3 Excav. to elev. -1.00 on RIGHT side

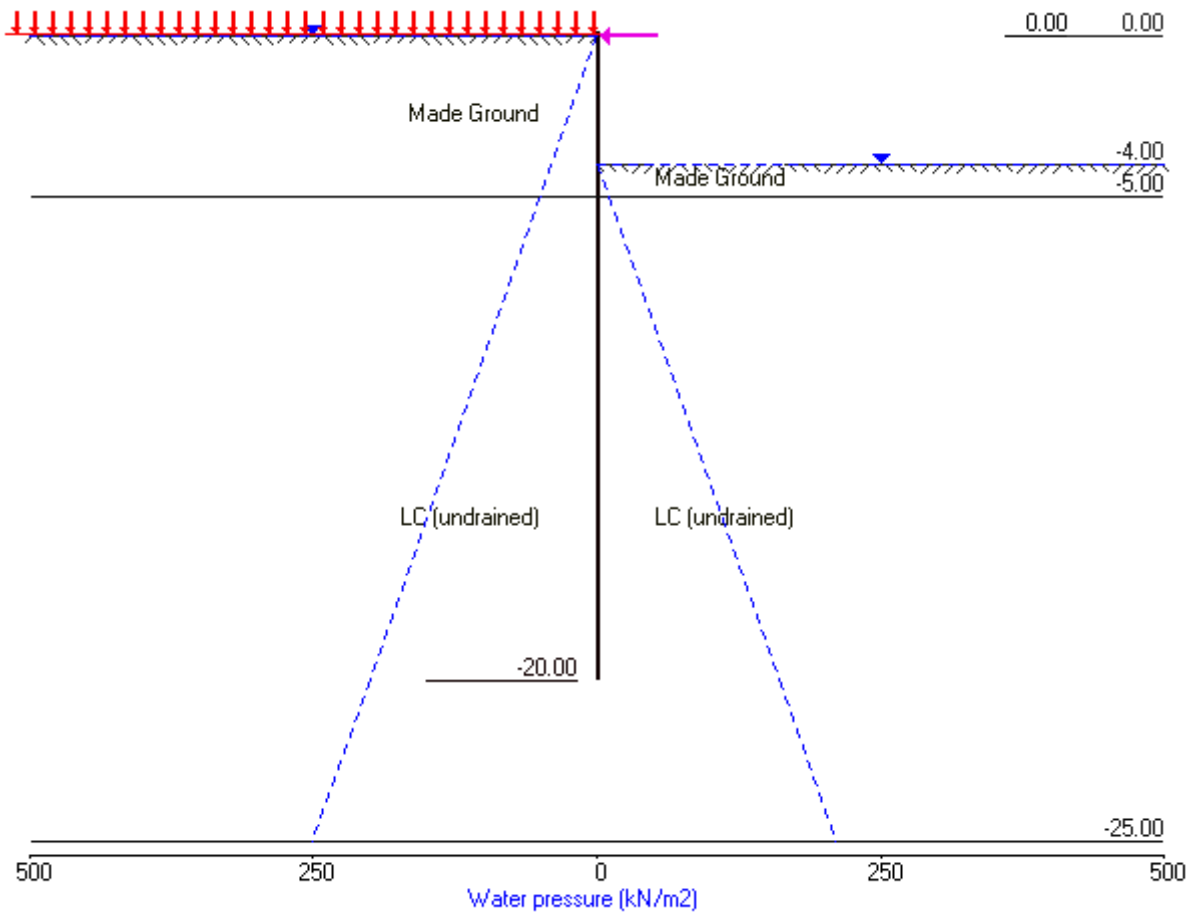


Stage No.3 Excav. to elev. -1.00 on RIGHT side



Units: kN,m

Stage No.5 Excav. to elev. -4.00 on RIGHT side



Units: kN,m

Stage No. 5 Excavate to elevation -4.00 on RIGHT side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr-ation	Direction of failure
5	0.00	-4.00	0.00	8.470	n/a	-5.43	1.43	L to R

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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Wall disp.	Wall rotation	Shear force	Bending moment	Prop forces
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m
1	0.00	5.63	0.013	1.30E-03	-43.6	0.0	-43.6
2	-1.00	16.10	0.012	1.37E-03	-32.7	-37.1	
3	-1.70	24.10	0.011	1.49E-03	-18.7	-54.9	
4	-2.40	32.66	0.009	1.65E-03	1.2	-61.5	
5	-3.20	42.72	0.008	1.81E-03	31.3	-49.5	
6	-4.00	52.90	0.007	1.90E-03	69.6	-10.0	
7	-5.00	35.95	0.005	1.76E-03	114.0	83.8	
		-114.20	0.005	1.76E-03	114.0	83.8	
8	-5.63	-97.19	0.004	1.51E-03	48.0	132.4	
9	-6.25	-61.71	0.003	1.18E-03	-1.7	145.4	
10	-6.88	-29.87	0.002	8.55E-04	-30.3	132.2	
11	-7.50	-8.13	0.002	5.72E-04	-42.2	107.4	
12	-8.00	3.16	0.001	3.89E-04	-43.4	85.3	
13	-8.80	12.31	0.001	1.82E-04	-37.2	51.6	
14	-9.60	14.03	0.001	6.52E-05	-26.7	25.7	
15	-10.80	10.16	0.001	-1.23E-06	-12.2	3.6	
16	-12.00	4.79	0.001	-5.36E-07	-3.2	-3.9	
17	-13.20	1.62	0.001	1.85E-05	0.6	-4.5	
18	-14.40	0.06	0.001	3.50E-05	1.6	-2.8	
19	-15.60	-0.48	0.001	4.37E-05	1.4	-1.0	
20	-16.80	-0.51	0.001	4.60E-05	0.8	0.0	
21	-18.00	-0.35	0.001	4.52E-05	0.3	0.3	
22	-19.00	-0.16	0.001	4.42E-05	0.0	0.2	
23	-20.00	0.12	0.001	4.37E-05	0.0	-0.0	

At elev. 0.00 Prop force = 43.6 kN/m run

(continued)

Stage No.5 Excavate to elevation -4.00 on RIGHT side

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	1043
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	1043
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	1043
4	-2.40	24.00	23.07	8.66	61.43	8.66	32.66a	1043
5	-3.20	32.00	28.54	10.72	75.99	10.72	42.72a	1043
6	-4.00	40.00	34.36	12.90	91.50	12.90	52.90a	1043
7	-5.00	50.00	41.89	15.73	111.56	15.73	65.73a	1043
		Total>	91.89	25.00m	305.11	25.00	25.00a	16951
8	-5.63	Total>	104.19	28.13m	324.03	28.13	28.13a	17478
9	-6.25	Total>	116.52	31.25m	342.99	54.20	54.20	18005
10	-6.88	Total>	128.88	34.38m	361.99	82.01	82.01	18532
11	-7.50	Total>	141.26	37.50m	381.00	104.92	104.92	19060
12	-8.00	Total>	151.18	40.00m	396.23	120.30	120.30	19481
13	-8.80	Total>	167.07	44.00m	420.60	140.64	140.64	20156
14	-9.60	Total>	182.98	48.00m	445.00	157.42	157.42	20831
15	-10.80	Total>	206.86	54.00m	481.62	179.60	179.60	21843
16	-12.00	Total>	230.77	60.00m	518.26	201.17	201.17	22856
17	-13.20	Total>	254.69	66.00m	554.91	223.92	223.92	23868
18	-14.40	Total>	278.63	72.00m	591.58	247.53	247.53	24880
19	-15.60	Total>	302.57	78.00m	628.26	271.69	271.69	25893
20	-16.80	Total>	326.52	84.00m	664.94	296.13	296.13	26905
21	-18.00	Total>	350.48	90.00m	701.63	320.70	320.70	27917
22	-19.00	Total>	370.45	95.00m	732.21	341.23	341.23	28761
23	-20.00	Total>	390.42	100.00m	762.79	361.82	361.82	29604

RIGHT side

Node no.	Y coord	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	-1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	1329
7	-5.00	10.00	8.00	3.01	21.31	19.79	29.79	1329
		Total>	18.00	5.00m	231.22	139.20	139.20	20877
8	-5.63	Total>	30.52	8.13m	250.36	125.32	125.32	21526
9	-6.25	Total>	43.04	11.25m	269.52	115.91	115.91	22176
10	-6.88	Total>	55.59	14.38m	288.70	111.88	111.88	22825
11	-7.50	Total>	68.16	17.50m	307.90	113.05	113.05	23474
12	-8.00	Total>	78.23	20.00m	323.28	117.15	117.15	23994
13	-8.80	Total>	94.39	24.00m	347.93	128.33	128.33	24825
14	-9.60	Total>	110.61	28.00m	372.63	143.39	143.39	25656
15	-10.80	Total>	135.05	34.00m	409.81	169.43	169.43	26903
16	-12.00	Total>	159.64	40.00m	447.12	196.38	196.38	28150
17	-13.20	Total>	184.36	46.00m	484.58	222.31	222.31	29396
18	-14.40	Total>	209.22	52.00m	522.17	247.47	247.47	30643
19	-15.60	Total>	234.20	58.00m	559.88	272.16	272.16	31890
20	-16.80	Total>	259.28	64.00m	597.70	296.64	296.64	33137
21	-18.00	Total>	284.46	70.00m	635.61	321.05	321.05	34383
22	-19.00	Total>	305.49	75.00m	667.26	341.39	341.39	35422

(continued)

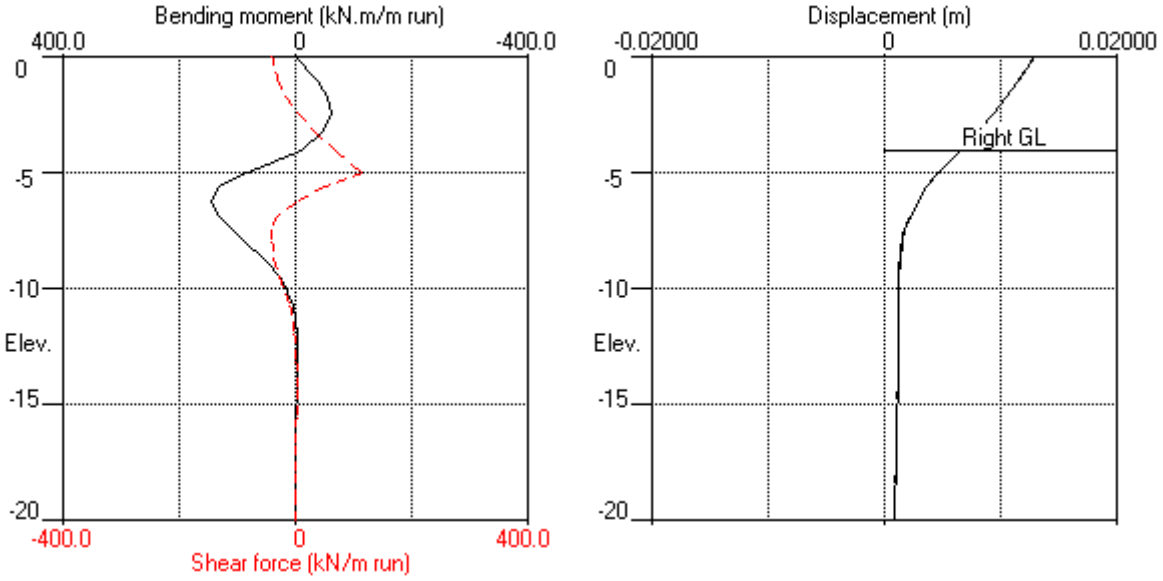
Stage No.5 Excavate to elevation -4.00 on RIGHT side

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
23	-20.00	Total>	326.57	80.00m	698.94	361.70	361.70	36461

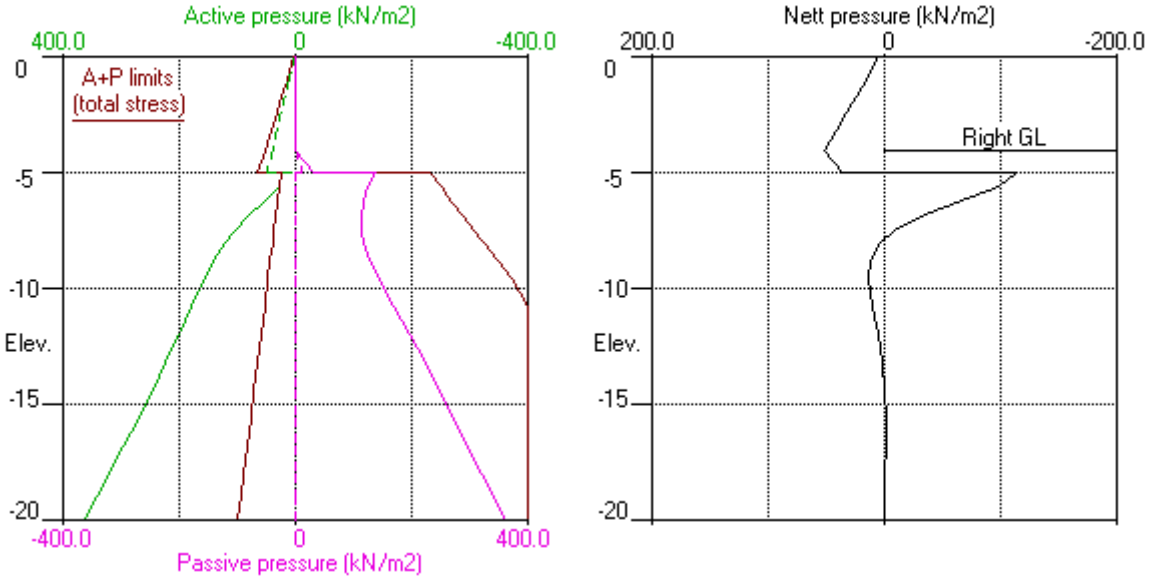
Note: 28.13a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.5 Excav. to elev. -4.00 on RIGHT side

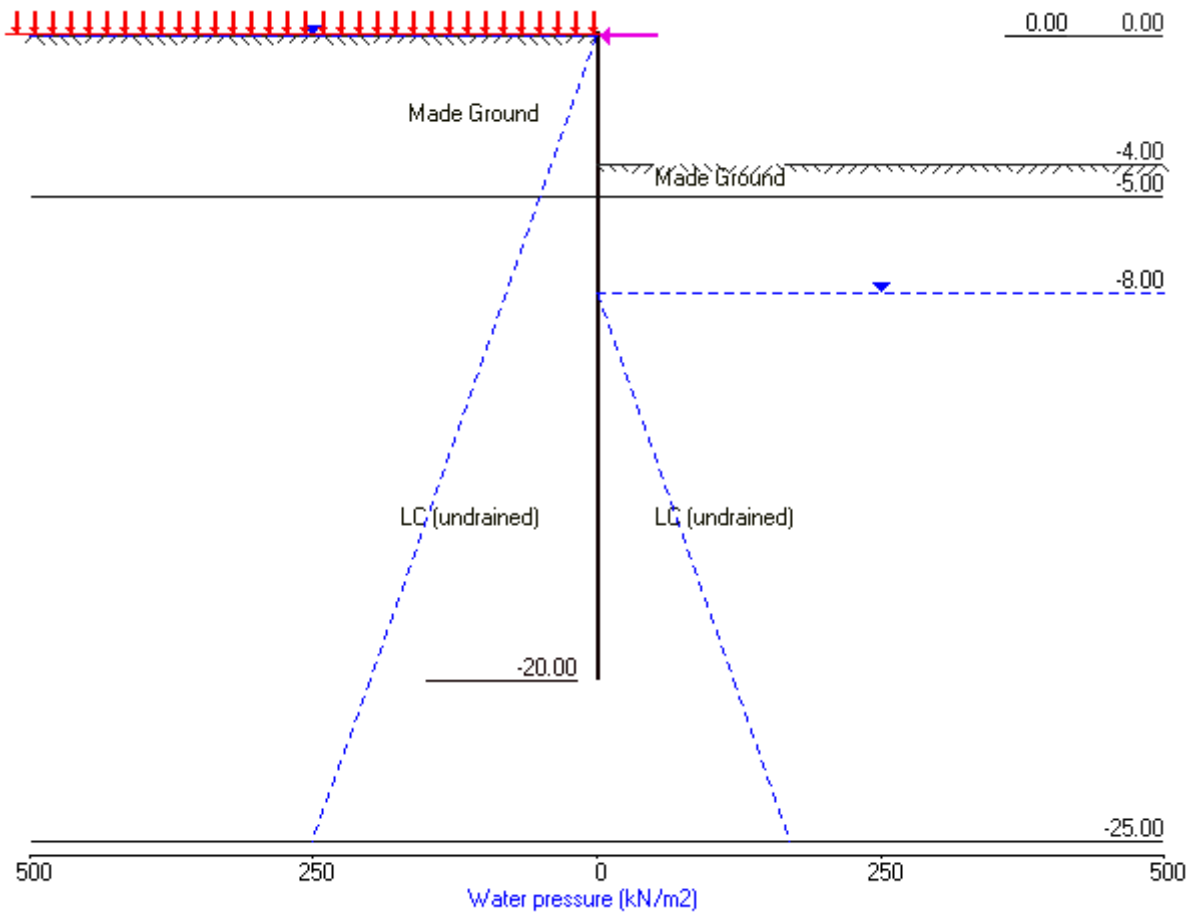


Stage No.5 Excav. to elev. -4.00 on RIGHT side



Units: kN,m

Stage No.6 Apply water pressure profile no.3 (Mod. Conserv.)



Units: kN,m

Stage No. 6 Apply water pressure profile no.3 (Mod. Conserv.)

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr-ation	Direction of failure
6	0.00	-4.00	0.00	8.473	n/a	-5.39	1.39	L to R

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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Wall disp.	Wall rotation	Shear force	Bending moment	Prop forces
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m
1	0.00	5.63	0.013	1.27E-03	-44.4	0.0	-44.4
2	-1.00	16.10	0.012	1.34E-03	-33.5	-37.8	
3	-1.70	24.10	0.011	1.47E-03	-19.5	-56.2	
4	-2.40	32.66	0.010	1.63E-03	0.4	-63.4	
5	-3.20	42.72	0.008	1.80E-03	30.6	-51.9	
6	-4.00	52.90	0.007	1.90E-03	68.8	-13.1	
7	-5.00	43.34	0.005	1.77E-03	116.9	81.2	
		-115.44	0.005	1.77E-03	116.9	81.2	
8	-5.63	-98.09	0.004	1.52E-03	50.2	131.4	
9	-6.25	-63.33	0.003	1.19E-03	-0.2	145.6	
10	-6.88	-30.97	0.002	8.67E-04	-29.7	133.1	
11	-7.50	-8.74	0.002	5.81E-04	-42.1	108.4	
12	-8.00	2.90	0.002	3.97E-04	-43.6	86.3	
13	-8.80	12.24	0.001	1.87E-04	-37.5	52.4	
14	-9.60	14.06	0.001	6.83E-05	-27.0	26.2	
15	-10.80	10.25	0.001	6.99E-08	-12.4	3.8	
16	-12.00	4.87	0.001	6.00E-08	-3.3	-3.8	
17	-13.20	1.66	0.001	1.89E-05	0.6	-4.5	
18	-14.40	0.08	0.001	3.56E-05	1.6	-2.8	
19	-15.60	-0.48	0.001	4.44E-05	1.4	-1.0	
20	-16.80	-0.51	0.001	4.67E-05	0.8	0.0	
21	-18.00	-0.36	0.001	4.60E-05	0.3	0.3	
22	-19.00	-0.16	0.001	4.49E-05	0.0	0.2	
23	-20.00	0.13	0.001	4.45E-05	0.0	-0.0	

At elev. 0.00 Prop force = 44.4 kN/m run

(continued)

Stage No.6 Apply water pressure profile no.3 (Mod. Conserv.)

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	1099
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	1099
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	1099
4	-2.40	24.00	23.07	8.66	61.43	8.66	32.66a	1099
5	-3.20	32.00	28.54	10.72	75.99	10.72	42.72a	1099
6	-4.00	40.00	34.36	12.90	91.50	12.90	52.90a	1099
7	-5.00	50.00	41.89	15.73	111.56	15.73	65.73a	1099
		Total>	91.89	25.00m	305.11	25.00	25.00a	17704
8	-5.63	Total>	104.19	28.13m	324.03	28.13	28.13a	18254
9	-6.25	Total>	116.52	31.25m	342.99	53.09	53.09	18805
10	-6.88	Total>	128.88	34.38m	361.99	81.02	81.02	19356
11	-7.50	Total>	141.26	37.50m	381.00	104.04	104.04	19906
12	-8.00	Total>	151.18	40.00m	396.23	119.50	119.50	20347
13	-8.80	Total>	167.07	44.00m	420.60	139.91	139.91	21052
14	-9.60	Total>	182.98	48.00m	445.00	156.74	156.74	21756
15	-10.80	Total>	206.86	54.00m	481.62	178.94	178.94	22814
16	-12.00	Total>	230.77	60.00m	518.26	200.51	200.51	23871
17	-13.20	Total>	254.69	66.00m	554.91	223.25	223.25	24928
18	-14.40	Total>	278.63	72.00m	591.58	246.84	246.84	25985
19	-15.60	Total>	302.57	78.00m	628.26	270.99	270.99	27043
20	-16.80	Total>	326.52	84.00m	664.94	295.43	295.43	28100
21	-18.00	Total>	350.48	90.00m	701.63	320.00	320.00	29157
22	-19.00	Total>	370.45	95.00m	732.21	340.54	340.54	30038
23	-20.00	Total>	390.42	100.00m	762.79	361.13	361.13	30919

RIGHT side

Node no.	Y coord	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	-1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	1424
7	-5.00	0.00	18.00	6.76	47.94	22.39	22.39	1424
		Total>	18.00	5.00m	231.22	140.44	140.44	22207
8	-5.63	Total>	30.52	8.13m	250.36	126.21	126.21	22898
9	-6.25	Total>	43.04	11.25m	269.52	116.42	116.42	23589
10	-6.88	Total>	55.59	14.38m	288.70	111.99	111.99	24279
11	-7.50	Total>	68.16	17.50m	307.90	112.78	112.78	24970
12	-8.00	Total>	78.23	20.00m	323.28	116.59	116.59	25523
13	-8.80	Total>	94.39	24.00m	347.93	127.67	127.67	26407
14	-9.60	Total>	110.61	28.00m	372.63	142.68	142.68	27291
15	-10.80	Total>	135.05	34.00m	409.81	168.69	168.69	28617
16	-12.00	Total>	159.64	40.00m	447.12	195.64	195.64	29943
17	-13.20	Total>	184.36	46.00m	484.58	221.59	221.59	31270
18	-14.40	Total>	209.22	52.00m	522.17	246.77	246.77	32596
19	-15.60	Total>	234.20	58.00m	559.88	271.47	271.47	33922
20	-16.80	Total>	259.28	64.00m	597.70	295.94	295.94	35248
21	-18.00	Total>	284.46	70.00m	635.61	320.36	320.36	36574
22	-19.00	Total>	305.49	75.00m	667.26	340.70	340.70	37679

(continued)

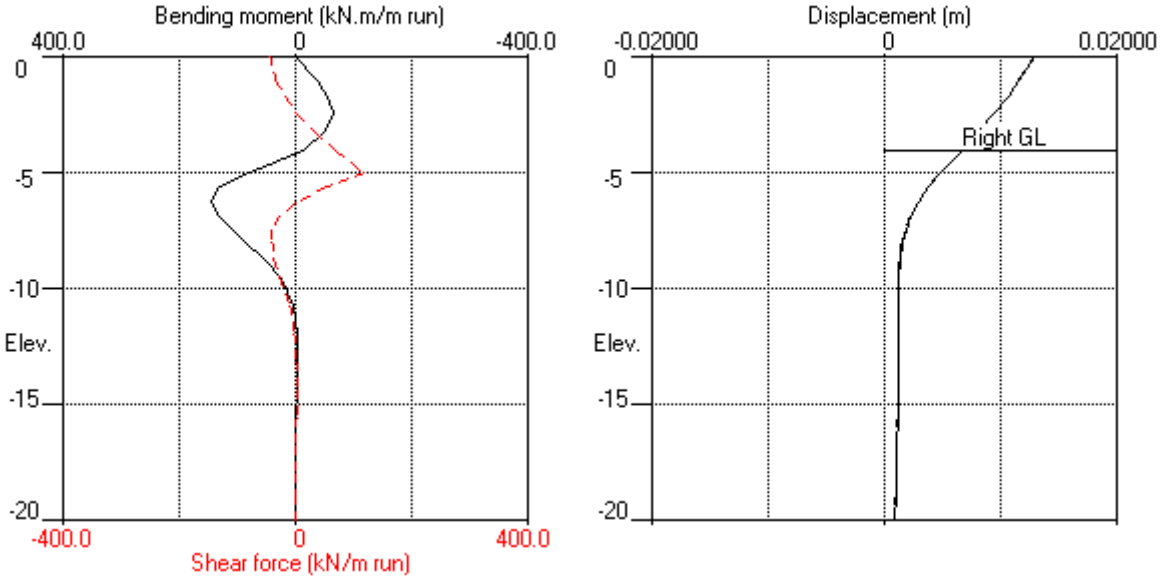
Stage No.6 Apply water pressure profile no.3 (Mod. Conserv.)

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
23	-20.00	Total>	326.57	80.00m	698.94	361.00	361.00	38785

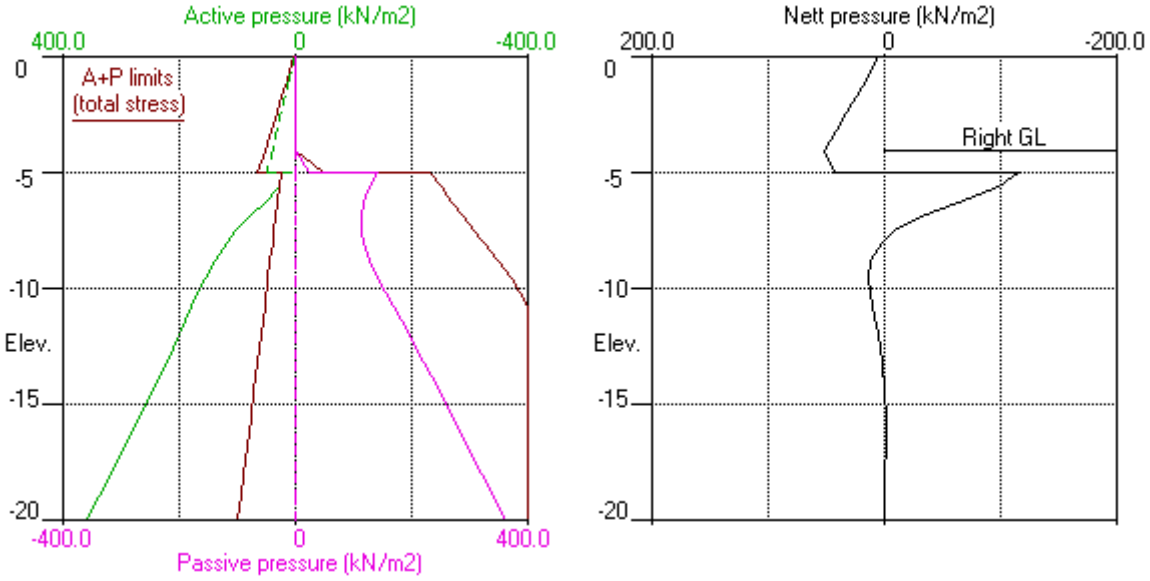
Note: 28.13a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.6 Apply water pressure profile no.3 (Mod. Conserv.)

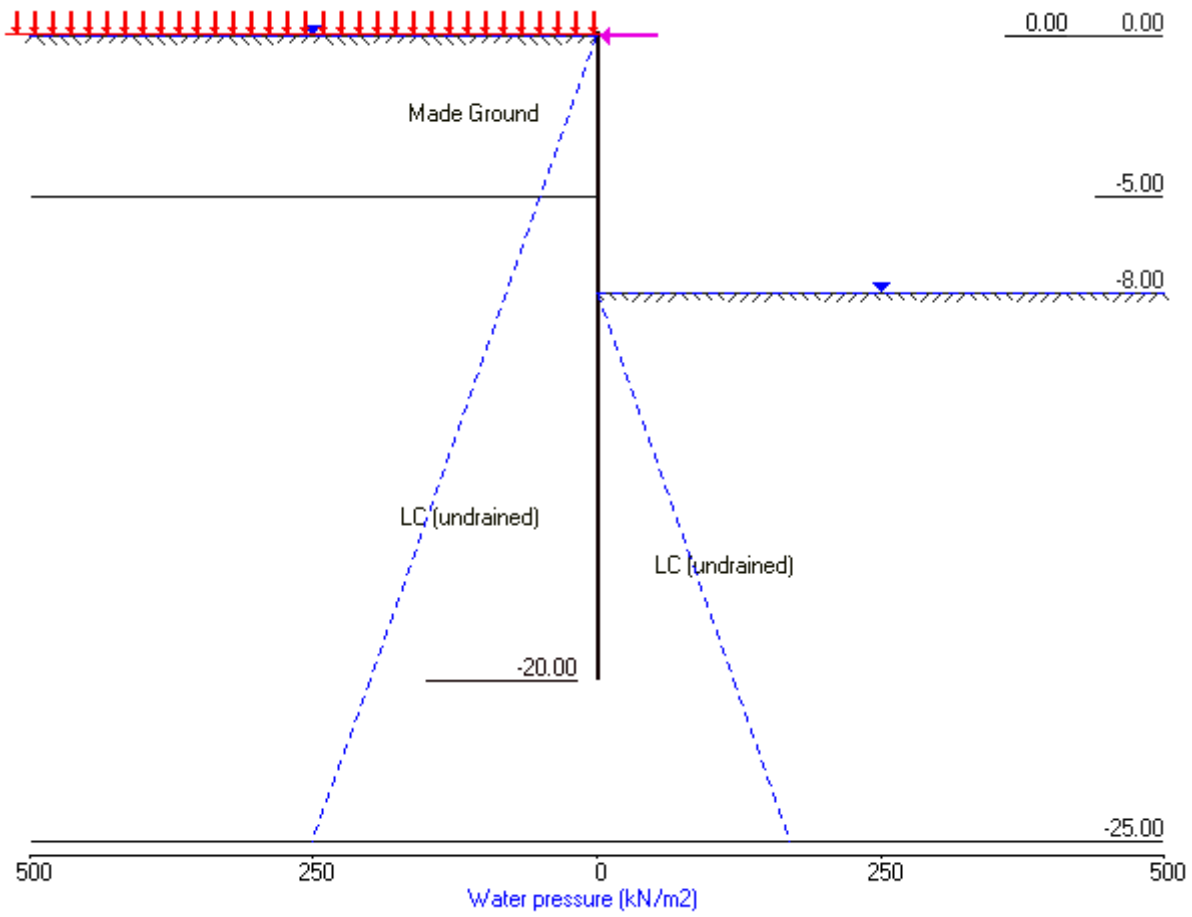


Stage No.6 Apply water pressure profile no.3 (Mod. Conserv.)



Units: kN,m

Stage No.7 Excav. to elev. -8.00 on RIGHT side



Units: kN,m

Stage No. 7 Excavate to elevation -8.00 on RIGHT side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	FoS for toe elev. = -20.00 Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
7	0.00	-8.00	0.00	3.989	n/a	-8.67	0.67	L to R

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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Prop forces kN/m
1	0.00	5.63	0.013	-1.33E-03	-101.5	0.0	-101.5
2	-1.00	16.10	0.014	-1.15E-03	-90.6	-95.0	
3	-1.70	24.10	0.015	-8.27E-04	-76.6	-153.3	
4	-2.40	32.66	0.015	-3.58E-04	-56.7	-200.5	
5	-3.20	42.72	0.015	3.00E-04	-26.5	-234.7	
6	-4.00	52.90	0.015	1.02E-03	11.7	-241.6	
7	-5.00	65.73	0.013	1.85E-03	71.0	-200.6	
		25.00	0.013	1.85E-03	71.0	-200.6	
8	-5.63	28.13	0.012	2.27E-03	87.6	-152.6	
9	-6.25	31.25	0.011	2.56E-03	106.2	-92.5	
10	-6.88	34.38	0.009	2.70E-03	126.7	-21.9	
11	-7.50	37.50	0.007	2.65E-03	149.1	62.7	
12	-8.00	40.00	0.006	2.46E-03	168.5	141.6	
		-205.04	0.006	2.46E-03	168.5	141.6	
13	-8.80	-143.06	0.004	1.88E-03	29.3	241.0	
14	-9.60	-54.27	0.003	1.18E-03	-49.7	218.6	
15	-10.80	13.19	0.002	4.16E-04	-74.3	119.9	
16	-12.00	27.60	0.002	5.28E-05	-49.8	40.1	
17	-13.20	20.21	0.002	-3.84E-05	-21.1	0.1	
18	-14.40	9.20	0.002	-1.36E-05	-3.5	-11.0	
19	-15.60	1.89	0.002	3.12E-05	3.2	-8.8	
20	-16.80	-1.12	0.002	6.04E-05	3.6	-4.0	
21	-18.00	-1.55	0.002	7.15E-05	2.0	-0.9	
22	-19.00	-1.08	0.002	7.29E-05	0.7	0.1	
23	-20.00	-0.34	0.002	7.27E-05	0.0	-0.0	

At elev. 0.00 Prop force = 101.5 kN/m run

(continued)

Stage No.7 Excavate to elevation -8.00 on RIGHT side

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	1159
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	1159
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	1159
4	-2.40	24.00	23.07	8.66	61.43	8.66	32.66a	1159
5	-3.20	32.00	28.54	10.72	75.99	10.72	42.72a	1159
6	-4.00	40.00	34.36	12.90	91.50	12.90	52.90a	1159
7	-5.00	50.00	41.89	15.73	111.56	15.73	65.73a	1159
		Total>	91.89	25.00m	305.11	25.00	25.00a	18518
8	-5.63	Total>	104.19	28.13m	324.03	28.13	28.13a	19094
9	-6.25	Total>	116.52	31.25m	342.99	31.25	31.25a	19670
10	-6.88	Total>	128.88	34.38m	361.99	34.38	34.38a	20246
11	-7.50	Total>	141.26	37.50m	381.00	37.50	37.50a	20822
12	-8.00	Total>	151.18	40.00m	396.23	40.00	40.00a	21283
13	-8.80	Total>	167.07	44.00m	420.60	77.41	77.41	22020
14	-9.60	Total>	182.98	48.00m	445.00	117.76	117.76	22757
15	-10.80	Total>	206.86	54.00m	481.62	159.20	159.20	23863
16	-12.00	Total>	230.77	60.00m	518.26	186.06	186.06	24969
17	-13.20	Total>	254.69	66.00m	554.91	207.62	207.62	26075
18	-14.40	Total>	278.63	72.00m	591.58	228.65	228.65	27181
19	-15.60	Total>	302.57	78.00m	628.26	251.00	251.00	28287
20	-16.80	Total>	326.52	84.00m	664.94	274.73	274.73	29392
21	-18.00	Total>	350.48	90.00m	701.63	299.27	299.27	30498
22	-19.00	Total>	370.45	95.00m	732.21	320.03	320.03	31420
23	-20.00	Total>	390.42	100.00m	762.79	340.93	340.93	32341

RIGHT side

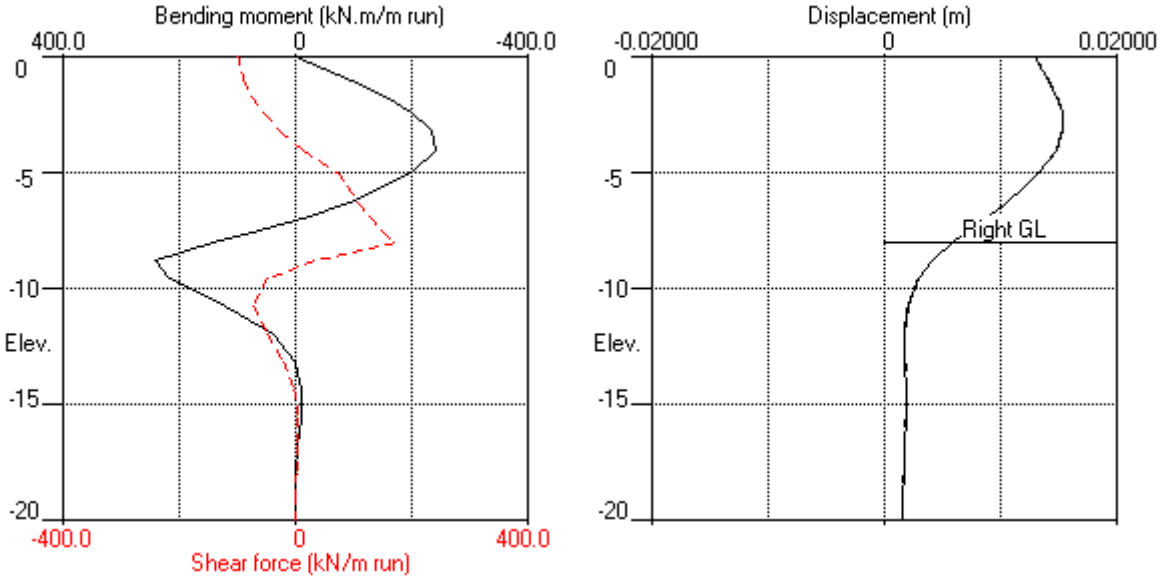
Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	-1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-5.63	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-6.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	245.04	245.04	245.04p	57252
13	-8.80	Total>	16.00	4.00m	269.54	220.47	220.47	59236
14	-9.60	Total>	32.03	8.00m	294.05	172.03	172.03	61219
15	-10.80	Total>	56.17	14.00m	330.93	146.01	146.01	64194
16	-12.00	Total>	80.49	20.00m	367.97	158.46	158.46	67169
17	-13.20	Total>	105.03	26.00m	405.25	187.41	187.41	70144
18	-14.40	Total>	129.86	32.00m	442.81	219.45	219.45	73119
19	-15.60	Total>	154.97	38.00m	480.65	249.11	249.11	76093
20	-16.80	Total>	180.38	44.00m	518.80	275.84	275.84	79068
21	-18.00	Total>	206.08	50.00m	557.23	300.82	300.82	82043
22	-19.00	Total>	227.69	55.00m	589.46	321.11	321.11	84522
23	-20.00	Total>	249.48	60.00m	621.85	341.27	341.27	87001

(continued)

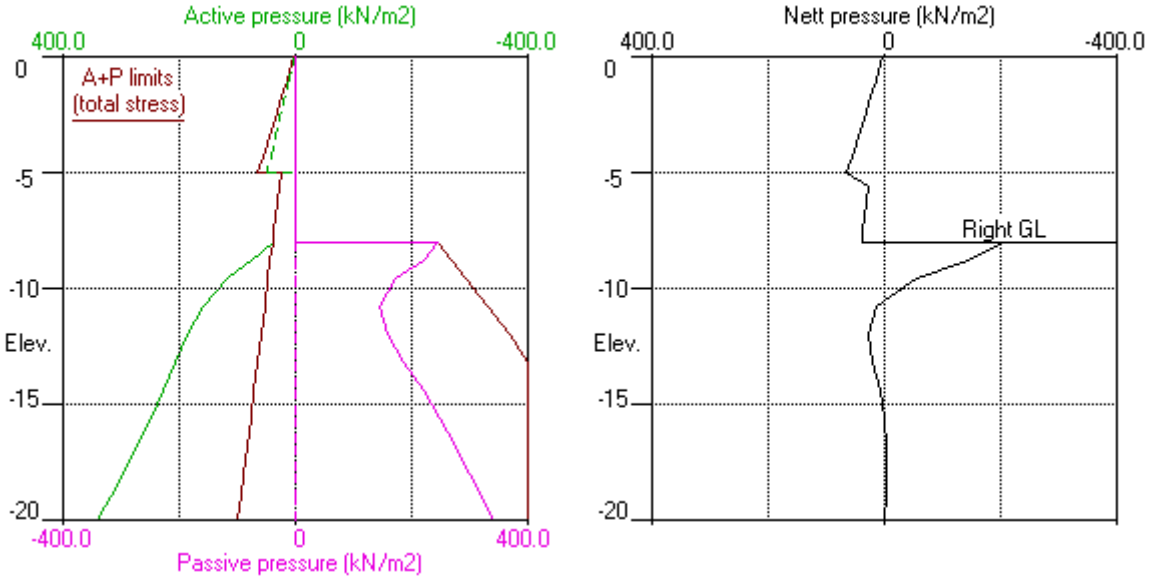
Stage No.7 Excavate to elevation -8.00 on RIGHT side
Note: 40.00a Soil pressure at active limit
245.04p Soil pressure at passive limit

Units: kN,m

Stage No.7 Excav. to elev. -8.00 on RIGHT side

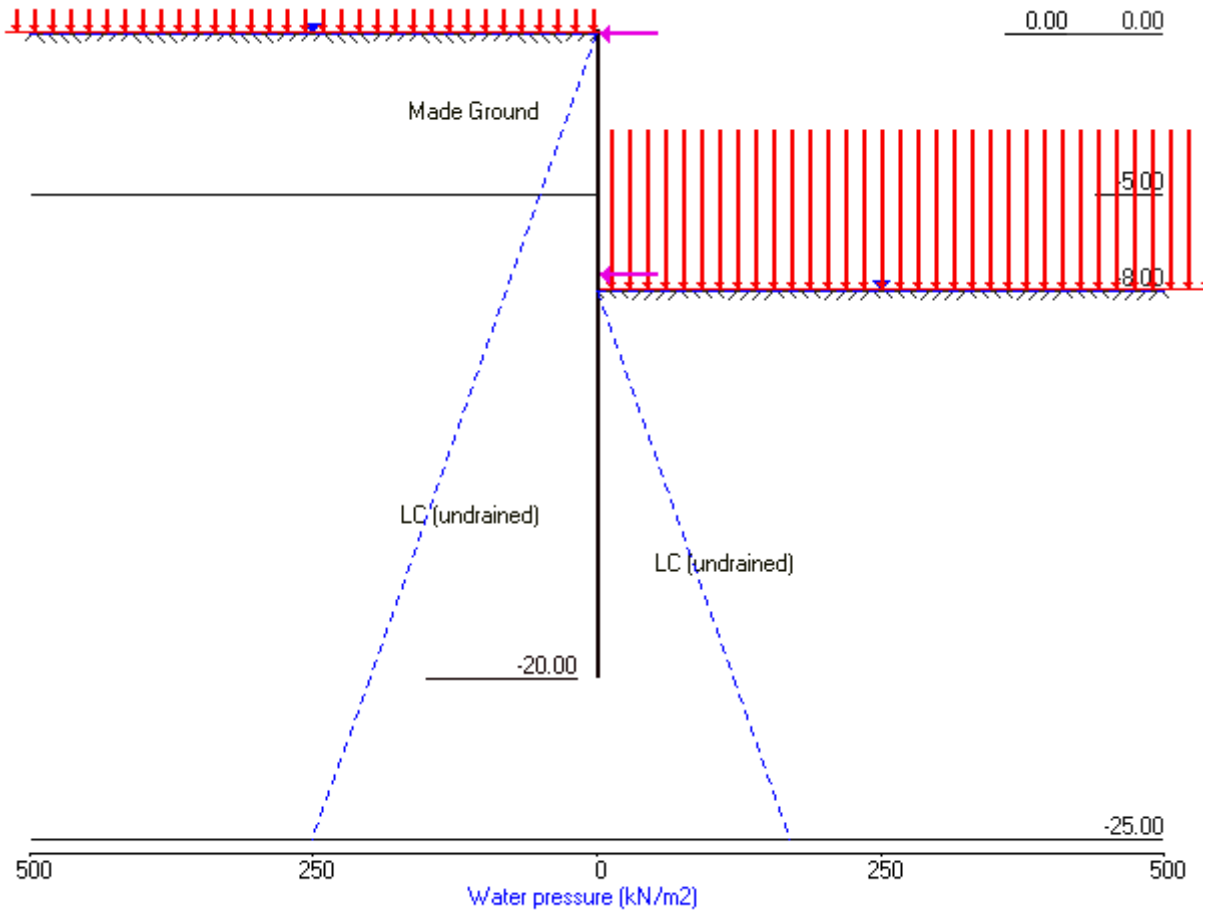


Stage No.7 Excav. to elev. -8.00 on RIGHT side



Units: kN,m

Stage No.9 Apply surcharge no.2 at elev. -8.00



Units: kN,m

Stage No. 9 Apply surcharge no.2 at elevation -8.00

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
9	0.00	-8.00		More than one prop.		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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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	Prop forces kN/m
1	0.00	5.63	0.013	-1.30E-03	-103.2	0.0	-103.2
2	-1.00	16.14	0.014	-1.11E-03	-92.3	-96.7	
3	-1.70	24.18	0.015	-7.83E-04	-78.2	-156.2	
4	-2.40	32.77	0.015	-3.05E-04	-58.3	-204.5	
5	-3.20	42.88	0.015	3.68E-04	-28.0	-240.0	
6	-4.00	53.14	0.015	1.10E-03	10.4	-247.9	
7	-5.00	66.08	0.013	1.97E-03	70.0	-208.2	
		30.53	0.013	1.97E-03	70.0	-208.2	
8	-5.63	35.23	0.012	2.40E-03	90.5	-159.8	
9	-6.25	40.20	0.010	2.70E-03	114.1	-96.4	
10	-6.88	45.36	0.008	2.84E-03	140.9	-19.1	
11	-7.50	50.52	0.007	2.77E-03	170.8	76.5	0.0
12	-8.00	54.41	0.005	2.54E-03	197.1	167.9	
		-268.29	0.005	2.54E-03	197.1	167.9	
13	-8.80	-169.09	0.003	1.87E-03	22.1	273.5	
14	-9.60	-55.30	0.002	1.10E-03	-67.7	239.8	
15	-10.80	20.82	0.001	2.77E-04	-88.3	122.3	
16	-12.00	33.72	0.001	-7.46E-05	-55.6	32.7	
17	-13.20	23.13	0.002	-1.28E-04	-21.5	-9.1	
18	-14.40	9.82	0.002	-6.67E-05	-1.7	-17.9	
19	-15.60	1.46	0.002	3.31E-06	5.0	-12.9	
20	-16.80	-1.74	0.002	4.58E-05	4.9	-5.9	
21	-18.00	-2.00	0.002	6.25E-05	2.6	-1.5	
22	-19.00	-1.36	0.002	6.54E-05	0.9	-0.0	
23	-20.00	-0.50	0.001	6.55E-05	0.0	-0.0	

At elev. 0.00 Prop force = 103.2 kN/m run
At elev. -7.50 The prop is slack

(continued)

Stage No.9 Apply surcharge no.2 at elevation -8.00

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	7866
2	-1.00	10.00	16.25	6.10	43.26	6.14	16.14	1125
3	-1.70	17.00	18.92	7.10	50.37	7.18	24.18	1125
4	-2.40	24.00	23.07	8.66	61.43	8.77	32.77	1125
5	-3.20	32.00	28.54	10.72	75.99	10.88	42.88	1125
6	-4.00	40.00	34.36	12.90	91.50	13.14	53.14	1125
7	-5.00	50.00	41.89	15.73	111.56	16.08	66.08	1125
		Total>	91.89	25.00m	305.11	30.53	30.53	18057
8	-5.63	Total>	104.19	28.13m	324.03	35.23	35.23	18619
9	-6.25	Total>	116.52	31.25m	342.99	40.20	40.20	19181
10	-6.88	Total>	128.88	34.38m	361.99	45.36	45.36	19742
11	-7.50	Total>	141.26	37.50m	381.00	50.52	50.52	20304
12	-8.00	Total>	151.18	40.00m	396.23	54.41	54.41	20753
13	-8.80	Total>	167.07	44.00m	420.60	93.05	93.05	21472
14	-9.60	Total>	182.98	48.00m	445.00	133.08	133.08	22191
15	-10.80	Total>	206.86	54.00m	481.62	171.94	171.94	23270
16	-12.00	Total>	230.77	60.00m	518.26	195.39	195.39	24348
17	-13.20	Total>	254.69	66.00m	554.91	214.03	214.03	25426
18	-14.40	Total>	278.63	72.00m	591.58	233.09	233.09	26505
19	-15.60	Total>	302.57	78.00m	628.26	254.31	254.31	27583
20	-16.80	Total>	326.52	84.00m	664.94	277.46	277.46	28661
21	-18.00	Total>	350.48	90.00m	701.63	301.71	301.71	29740
22	-19.00	Total>	370.45	95.00m	732.21	322.29	322.29	30638
23	-20.00	Total>	390.42	100.00m	762.79	343.03	343.03	31537

RIGHT side

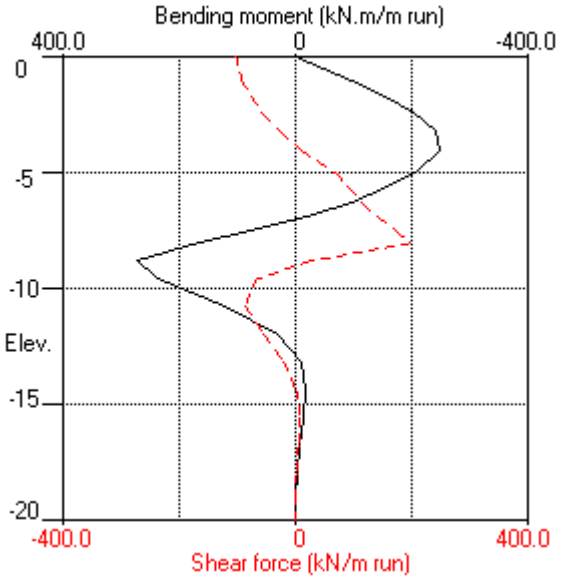
Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	-1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-5.63	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-6.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	100.00	0.00	345.04	322.70	322.70	26531
13	-8.80	Total>	80.18	4.00m	333.71	262.14	262.14	27450
14	-9.60	Total>	69.44	8.00m	331.46	188.39	188.39	28369
15	-10.80	Total>	78.43	14.00m	353.19	151.12	151.12	29748
16	-12.00	Total>	96.23	20.00m	383.72	161.67	161.67	31127
17	-13.20	Total>	117.18	26.00m	417.40	190.90	190.90	32505
18	-14.40	Total>	139.73	32.00m	452.68	223.27	223.27	33884
19	-15.60	Total>	163.27	38.00m	488.95	252.85	252.85	35262
20	-16.80	Total>	187.52	44.00m	525.94	279.21	279.21	36641
21	-18.00	Total>	212.33	50.00m	563.48	303.71	303.71	38020
22	-19.00	Total>	233.35	55.00m	595.11	323.65	323.65	39168
23	-20.00	Total>	254.62	60.00m	626.99	343.53	343.53	40317

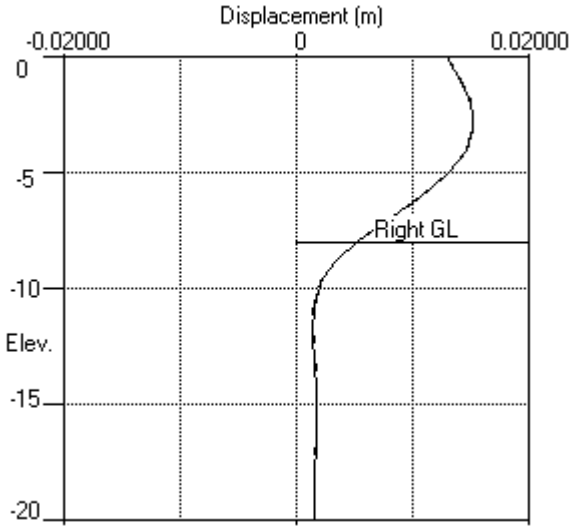
(continued)

Stage No.9 Apply surcharge no.2 at elevation -8.00
Note: 5.63a Soil pressure at active limit
123.45p Soil pressure at passive limit

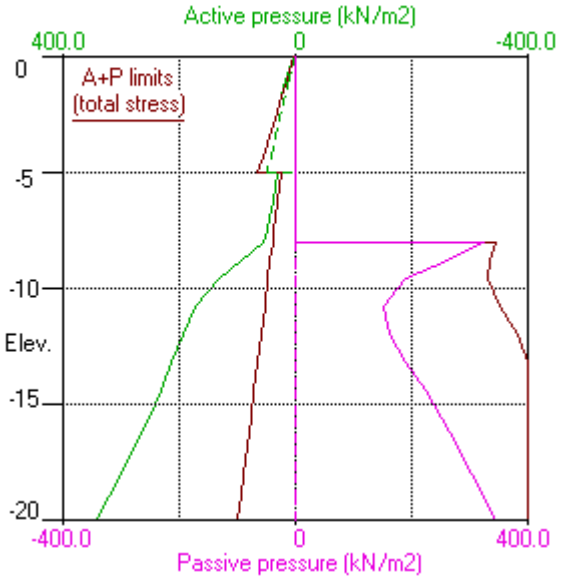
Units: kN,m

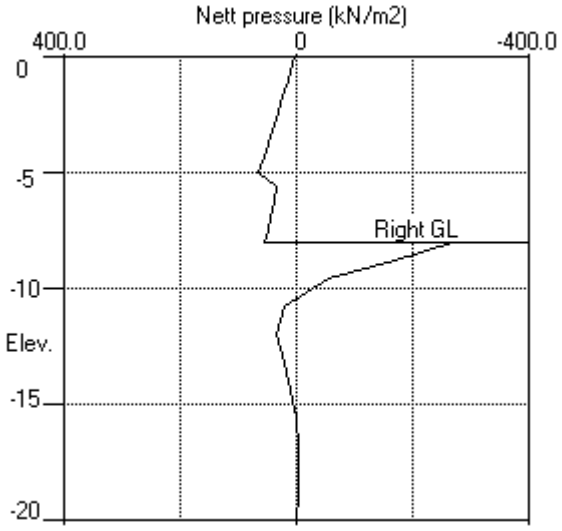
Stage No.9 Apply surcharge no.2 at elev. -8.00





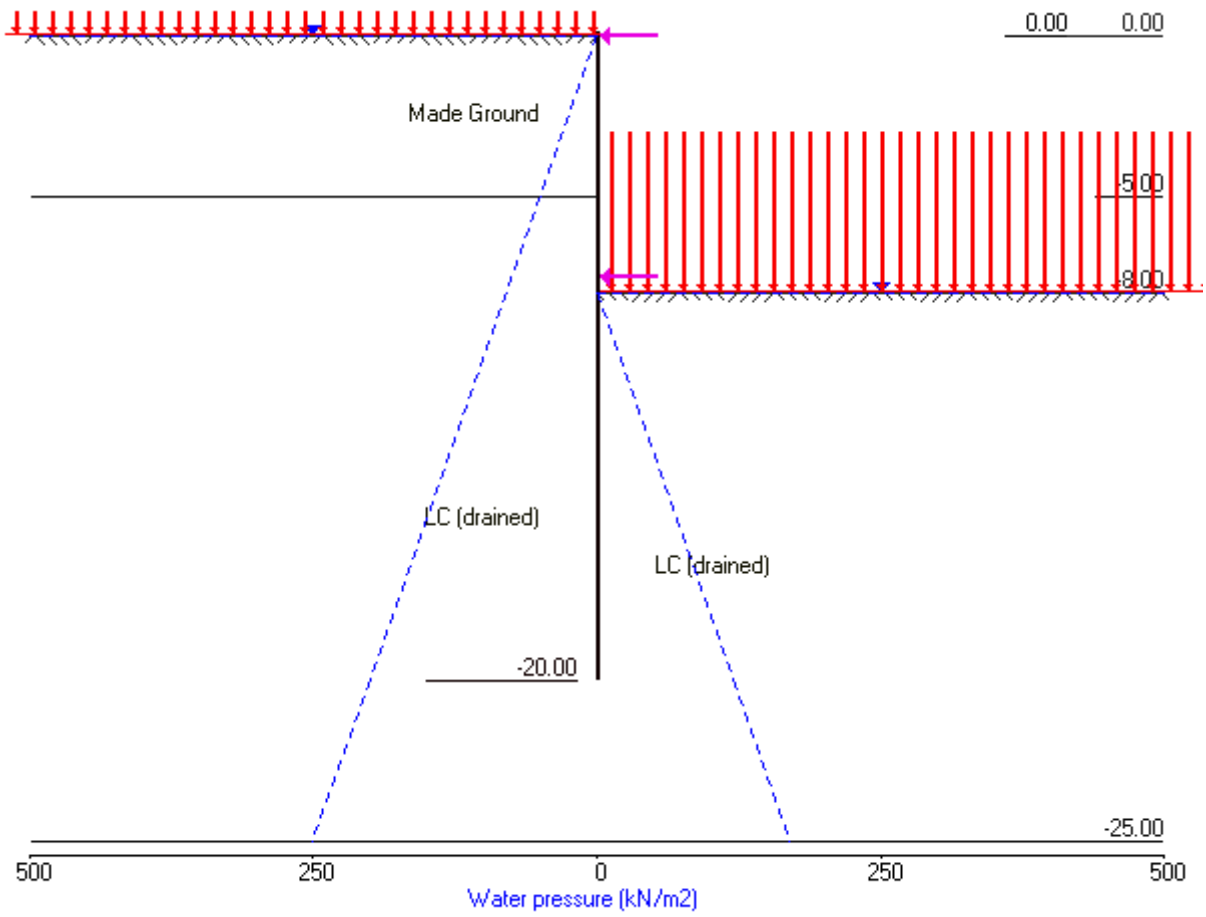
Stage No.9 Apply surcharge no.2 at elev. -8.00





Units: kN,m

Stage No.10 Change soil type 3 to soil type 4



Units: kN,m

Stage No. 10 Change properties of soil type 3 to soil type 4
Ko pressures will be reset

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

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -20.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
10	0.00	-8.00		More than one prop. 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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State
Calculated Bending Moments and Prop 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	Prop forces kN/m
1	0.00	5.63	0.013	-1.74E-03	-112.2	0.0	-112.2
2	-1.00	16.10	0.015	-1.54E-03	-101.3	-105.7	
3	-1.70	24.10	0.016	-1.18E-03	-87.3	-171.5	
4	-2.40	32.66	0.016	-6.54E-04	-67.4	-226.2	
5	-3.20	42.72	0.016	9.57E-05	-37.3	-269.0	
6	-4.00	52.90	0.016	9.34E-04	1.0	-284.4	
7	-5.00	65.73	0.015	1.95E-03	60.3	-254.2	
		82.84	0.015	1.95E-03	60.3	-254.2	
8	-5.63	94.99	0.013	2.49E-03	115.9	-201.1	
9	-6.25	107.54	0.011	2.86E-03	179.2	-109.8	
10	-6.88	120.23	0.010	2.96E-03	250.4	21.8	
11	-7.50	132.53	0.008	2.70E-03	329.3	201.0	-319.1
		132.53	0.008	2.70E-03	10.3	201.0	
12	-8.00	141.67	0.007	2.30E-03	78.8	222.5	
		-154.42	0.007	2.30E-03	78.8	222.5	
13	-8.80	-96.61	0.005	1.56E-03	-21.6	265.8	
14	-9.60	-34.47	0.004	8.29E-04	-74.0	216.7	
15	-10.80	20.98	0.004	1.03E-04	-82.1	102.9	
16	-12.00	29.98	0.004	-1.77E-04	-51.5	21.0	
17	-13.20	21.26	0.004	-1.86E-04	-20.8	-17.3	
18	-14.40	10.16	0.004	-8.88E-05	-2.0	-25.5	
19	-15.60	2.57	0.004	1.41E-05	5.7	-19.8	
20	-16.80	-1.05	0.004	8.40E-05	6.6	-11.0	
21	-18.00	-2.21	0.004	1.18E-04	4.6	-4.1	
22	-19.00	-2.38	0.004	1.27E-04	2.4	-0.8	
23	-20.00	-2.33	0.004	1.29E-04	0.0	-0.0	

At elev. 0.00 Prop force = 112.2 kN/m run
At elev. -7.50 Prop force = 319.1 kN/m run

(continued)

Stage No.10 Change properties of soil type 3 to soil type 4
Ko pressures will be reset

LEFT side

Node no.	Y coord	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	0.00	0.00	15.00	5.63	39.94	5.63	5.63a	746
2	-1.00	10.00	16.25	6.10	43.26	6.10	16.10a	746
3	-1.70	17.00	18.92	7.10	50.37	7.10	24.10a	746
4	-2.40	24.00	23.07	8.66	61.43	8.66	32.66a	746
5	-3.20	32.00	28.54	10.72	75.99	10.72	42.72a	746
6	-4.00	40.00	34.36	12.90	91.50	12.90	52.90a	746
7	-5.00	50.00	41.89	15.73	111.56	15.73	65.73a	746
		50.00	41.89	0.00	146.89	32.84	82.84	5930
8	-5.63	56.25	47.94	0.00	165.14	38.74	94.99	6112
9	-6.25	62.50	54.02	0.00	183.47	45.04	107.54	6294
10	-6.88	68.75	60.13	0.00	201.86	51.48	120.23	6476
11	-7.50	75.00	66.26	0.00	220.30	57.53	132.53	6657
12	-8.00	80.00	71.18	0.00	235.08	61.67	141.67	6803
13	-8.80	88.00	79.07	0.00	258.77	67.56	155.56	7036
14	-9.60	96.00	86.98	0.00	282.49	73.36	169.36	7268
15	-10.80	108.00	98.86	0.00	318.13	82.57	190.57	7617
16	-12.00	120.00	110.77	0.00	353.81	92.44	212.44	7967
17	-13.20	132.00	122.69	0.00	389.53	102.77	234.77	8316
18	-14.40	144.00	134.63	0.00	425.27	113.45	257.45	8665
19	-15.60	156.00	146.57	0.00	461.03	124.48	280.48	9014
20	-16.80	168.00	158.52	0.00	496.81	135.86	303.86	9363
21	-18.00	180.00	170.48	0.00	532.60	147.53	327.53	9712
22	-19.00	190.00	180.45	0.00	562.43	157.41	347.41	10003
23	-20.00	200.00	190.42	0.50	592.27	167.36	367.36	10294

RIGHT side

Node no.	Y coord	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	-1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-5.63	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-6.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	100.00	7.33	296.09	296.09	296.09p	7717
13	-8.80	8.00	72.18	0.00	244.17	244.17	252.17p	7981
14	-9.60	16.00	53.44	0.00	211.49	187.83	203.83	8245
15	-10.80	28.00	50.43	0.00	215.60	141.60	169.60	8641
16	-12.00	40.00	56.23	0.00	238.35	142.46	182.46	9037
17	-13.20	52.00	65.18	0.00	267.78	161.50	213.50	9433
18	-14.40	64.00	75.73	0.00	300.58	183.29	247.29	9829
19	-15.60	76.00	87.27	0.00	335.49	201.91	277.91	10225
20	-16.80	88.00	99.52	0.00	371.91	216.91	304.91	10621
21	-18.00	100.00	112.33	0.00	409.49	229.75	329.75	11017
22	-19.00	110.00	123.35	0.00	441.54	239.79	349.79	11347

(continued)

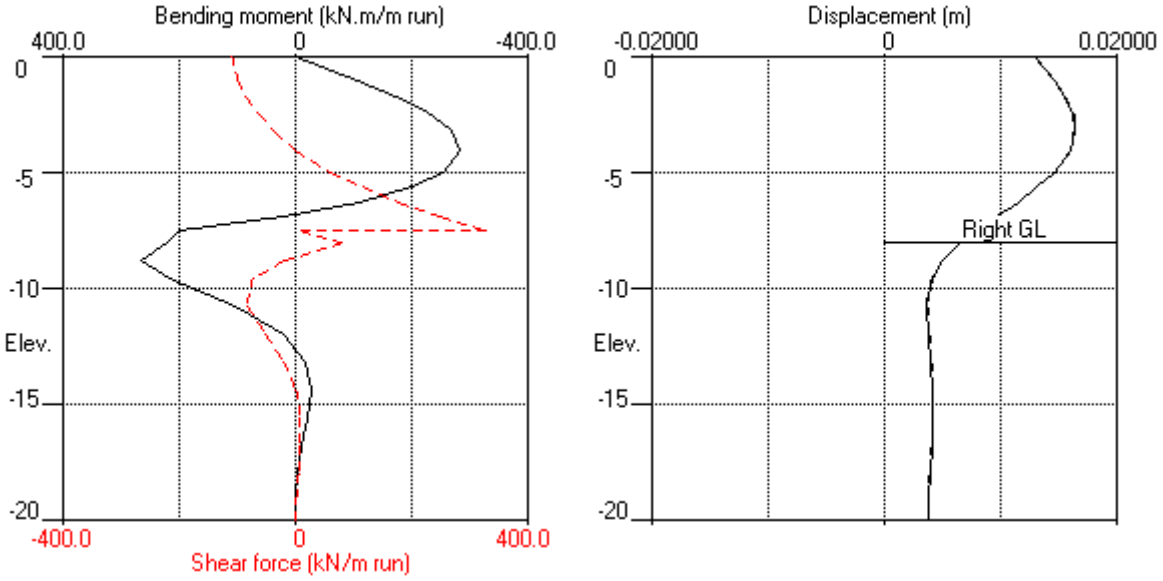
Stage No.10 Change properties of soil type 3 to soil type 4
Ko pressures will be reset

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
23	-20.00	120.00	134.62	0.00	474.14	249.69	369.69	11677

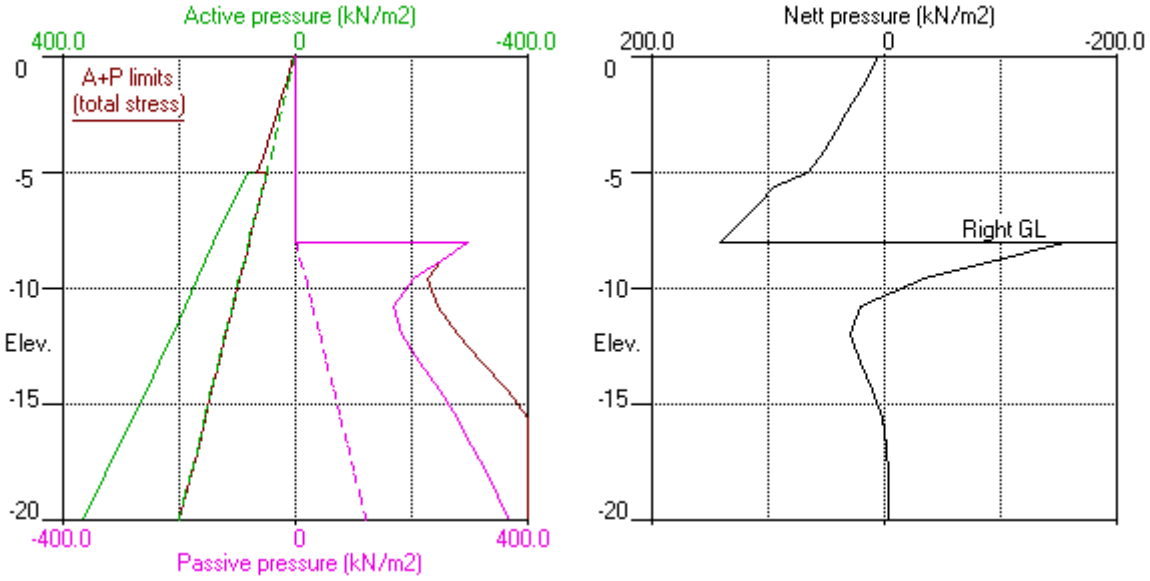
Note: 65.73a Soil pressure at active limit
252.17p Soil pressure at passive limit

Units: kN,m

Stage No.10 Change soil type 3 to soil type 4



Stage No.10 Change soil type 3 to soil type 4



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.	Ground level Act.	Pass.	Prop Elev.	**FoS for toe elev. = -20.00** Factor of Safety	Moment equilib. at elev.	**Toe elev. for FoS = 1.000** Toe elev.	Wall Penetr -ation	Direction of failure
1	0.00	0.00	Cant.	Conditions not suitable for FoS calc.				
2	0.00	0.00	Cant.	Conditions not suitable for FoS calc.				
3	0.00	-1.00	Cant.	14.295	-17.39	-3.68	2.68	L to R
4	0.00	-1.00		No analysis at this stage				
5	0.00	-4.00	0.00	8.470	n/a	-5.43	1.43	L to R
6	0.00	-4.00	0.00	8.473	n/a	-5.39	1.39	L to R
7	0.00	-8.00	0.00	3.989	n/a	-8.67	0.67	L to R
8	0.00	-8.00		No analysis at this stage				

All remaining stages have more than one prop - 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: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Prop 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				Shear force			
				Calculated		Factored		Calculated		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	0.00	0.013	0.000	0	0	0	0	0	-112	0	-151
2	-1.00	0.015	0.000	7	-106	9	-143	11	-101	15	-137
3	-1.70	0.016	0.000	17	-172	23	-232	16	-87	22	-118
4	-2.40	0.016	0.000	29	-226	39	-305	19	-67	25	-91
5	-3.20	0.016	0.000	47	-269	63	-363	31	-37	42	-50
6	-4.00	0.016	0.000	74	-284	100	-384	70	0	94	0
7	-5.00	0.015	0.000	129	-254	174	-343	117	0	158	0
8	-5.63	0.013	0.000	149	-201	202	-272	116	-2	156	-2
9	-6.25	0.011	0.000	146	-110	197	-148	179	-28	242	-38
10	-6.88	0.010	0.000	133	-22	180	-30	250	-44	338	-59
11	-7.50	0.008	0.000	201	0	271	0	329	-46	445	-62
12	-8.00	0.007	-0.000	223	0	300	0	197	-44	266	-59
13	-8.80	0.005	-0.000	274	0	369	0	29	-38	40	-51
14	-9.60	0.004	-0.000	240	0	324	0	0	-74	0	-100
15	-10.80	0.004	-0.000	122	-4	165	-5	0	-88	0	-119
16	-12.00	0.004	0.000	40	-6	54	-8	0	-56	0	-75
17	-13.20	0.004	0.000	0	-17	0	-23	2	-22	2	-29
18	-14.40	0.004	0.000	0	-26	0	-34	2	-4	2	-5
19	-15.60	0.004	0.000	0	-20	0	-27	6	0	8	0
20	-16.80	0.004	0.000	0	-11	0	-15	7	0	9	0
21	-18.00	0.004	0.000	0	-4	0	-6	5	-0	6	-0
22	-19.00	0.004	0.000	0	-1	0	-1	2	-0	3	-0
23	-20.00	0.004	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						Shear force					
	Calculated				Factored		Calculated				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	10	-5.00	-0	-10.80	14	-0	3	-1.00	-3	-6.88	4	-4
2	92	-5.63	-4	-12.00	124	-5	54	-5.00	-29	-7.50	73	-39
3	149	-5.63	-6	-12.00	202	-8	67	-5.00	-46	-7.50	91	-62
4	No calculation at this stage											
5	145	-6.25	-62	-2.40	196	-83	114	-5.00	-44	0.00	154	-59
6	146	-6.25	-63	-2.40	197	-86	117	-5.00	-44	0.00	158	-60
7	241	-8.80	-242	-4.00	325	-326	169	-8.00	-102	0.00	227	-137
8	No calculation at this stage											
9	274	-8.80	-248	-4.00	369	-335	197	-8.00	-103	0.00	266	-139
10	266	-8.80	-284	-4.00	359	-384	329	-7.50	-112	0.00	445	-151

Summary of results (continued)

Maximum and minimum displacement at each stage

Stage no.	Displacement maximum (m)	elev.	minimum (m)	elev.	Stage description
1	0.001	0.00	0.000	0.00	Apply surcharge no.1 at elev. 0.00
2	0.008	0.00	-0.000	-8.80	Apply water pressure profile no.2
3	0.013	0.00	0.000	0.00	Excav. to elev. -1.00 on RIGHT side
4	No calculation at this stage				Install prop no.1 at elev. 0.00
5	0.013	0.00	0.000	0.00	Excav. to elev. -4.00 on RIGHT side
6	0.013	0.00	0.000	0.00	Apply water pressure profile no.3
7	0.015	-3.20	0.000	0.00	Excav. to elev. -8.00 on RIGHT side
8	No calculation at this stage				Install prop no.3 at elev. -7.50
9	0.015	-2.40	0.000	0.00	Apply surcharge no.2 at elev. -8.00
10	0.016	-3.20	0.000	0.00	Change soil type 3 to soil type 4

Prop forces at each stage (horizontal components)

Stage no.	Prop no. 1 at elev. 0.00 --Calculated-- kN per m run	Factored kN per prop	Factored kN per prop	Prop no. 3 at elev.-7.50 --Calculated-- kN per m run	Factored kN per prop	Factored kN per prop
5	44	44	59	---	---	---
6	44	44	60	---	---	---
7	102	102	137	---	---	---
9	103	103	139	slack	slack	slack
10	112	112	151	319	319	431

Units: kN,m

Bending moment, shear force, displacement envelopes