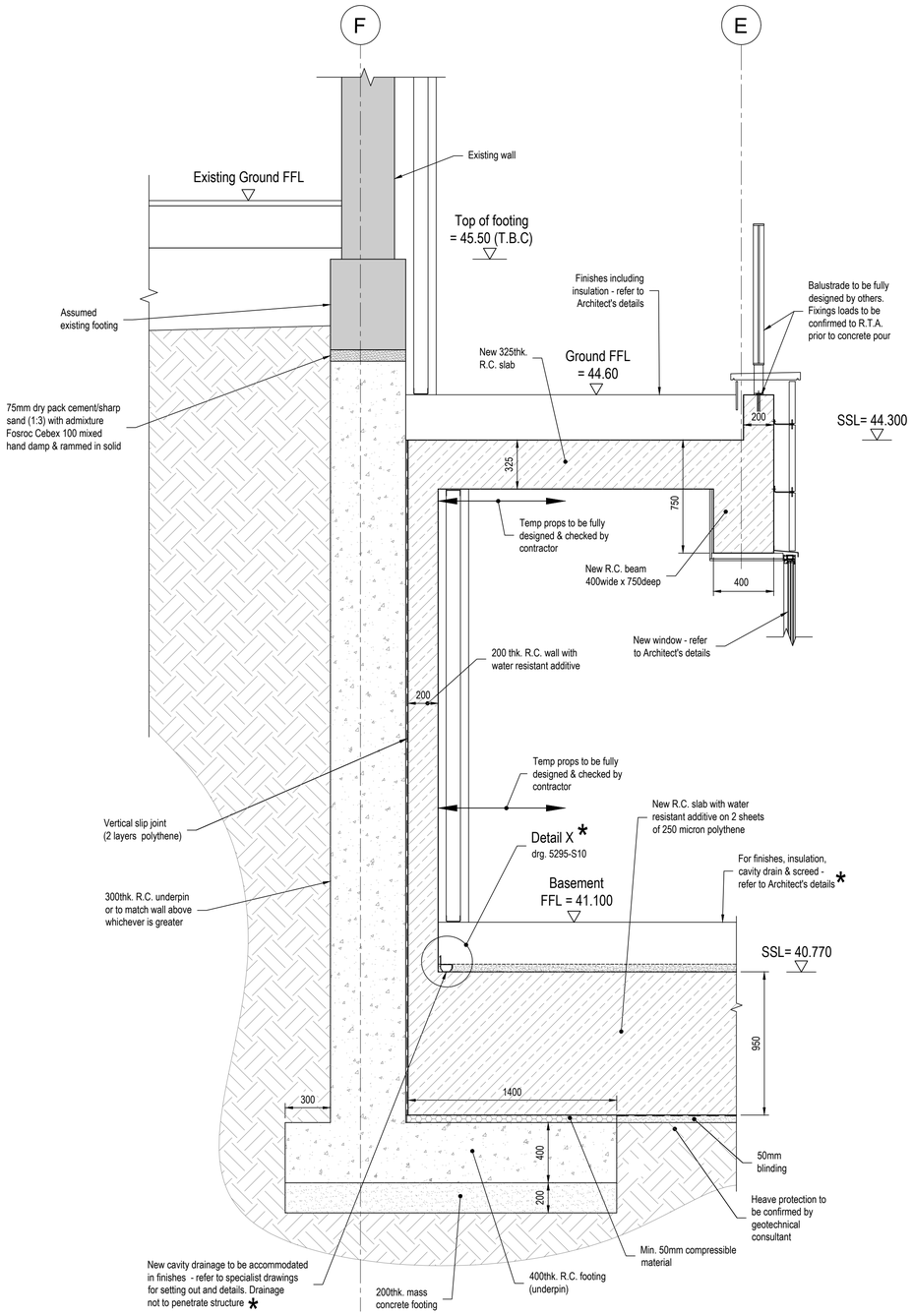
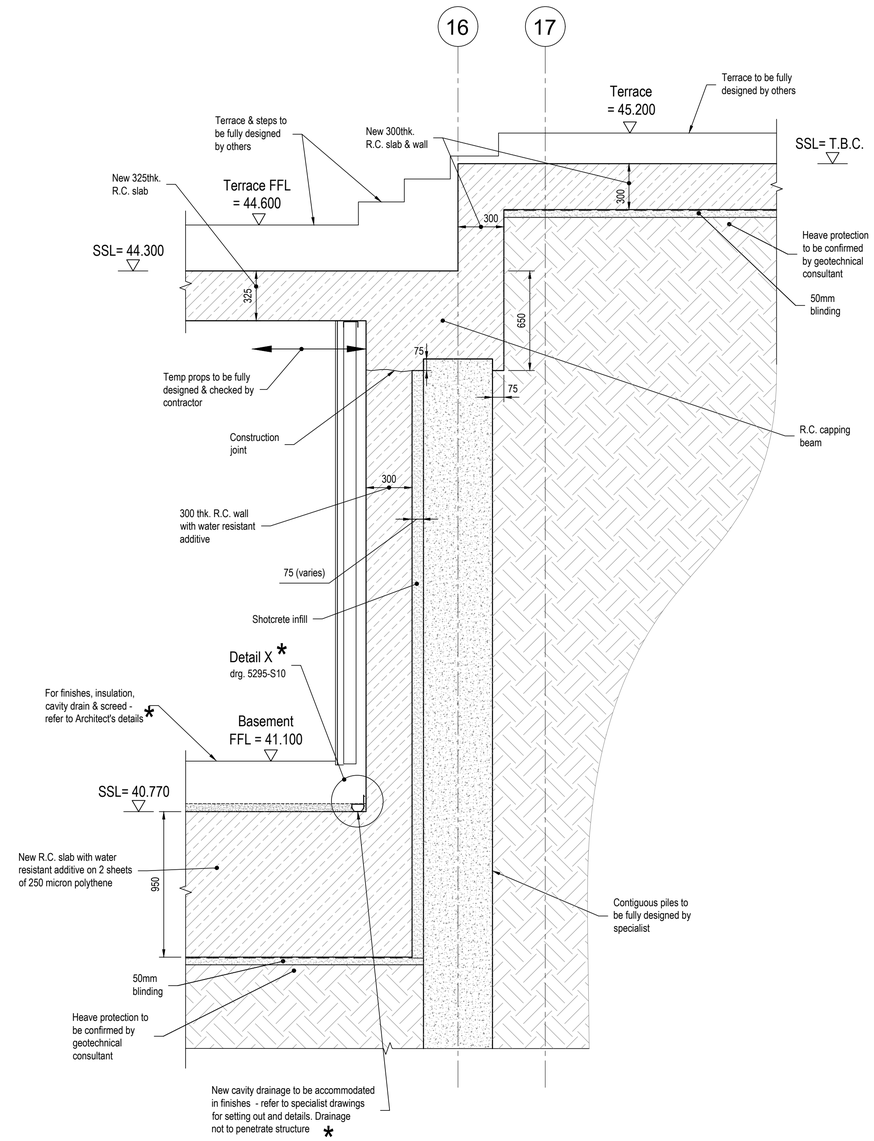


Waterproofing to specialists design.

Section 21-21
Scale 1 : 20



Waterproofing to specialists design.

Section 22-22
Scale 1 : 20

DO NOT CONSTRUCT FROM THIS DRAWING T.B.C. AFTER C.L.T. LOADS CONFIRMED

* : Details to be fully designed by water proofing specialist & refer to details proposed by water proofing specialist. No liability for water proofing is taken by R.T.A.

Heave protection to be confirmed by geotechnical consultant.

Tender Issue
(for QS purposes only)

Notes.

NOTES

1. This drawing is to be read in conjunction with the specification and all relevant Engineers and Architects drawings.
2. Work to figured dimensions only.
3. For general notes see drawing 5295 - S01.

REV.	AMENDMENTS	BY	DATE	CHECKED
-	-	-	-	-

PROJECT
Broxwood View
Barrie House

TITLE
Sections 21-21 & 22-22

ARCHITECTS
Carbogno Ceneda Architects

DRAWING No.
5295-S25

DATE	27.09.2022
SCALE	As shown @ A1
DRAWN	AR
CHECKED	RT
REVIEWED	-

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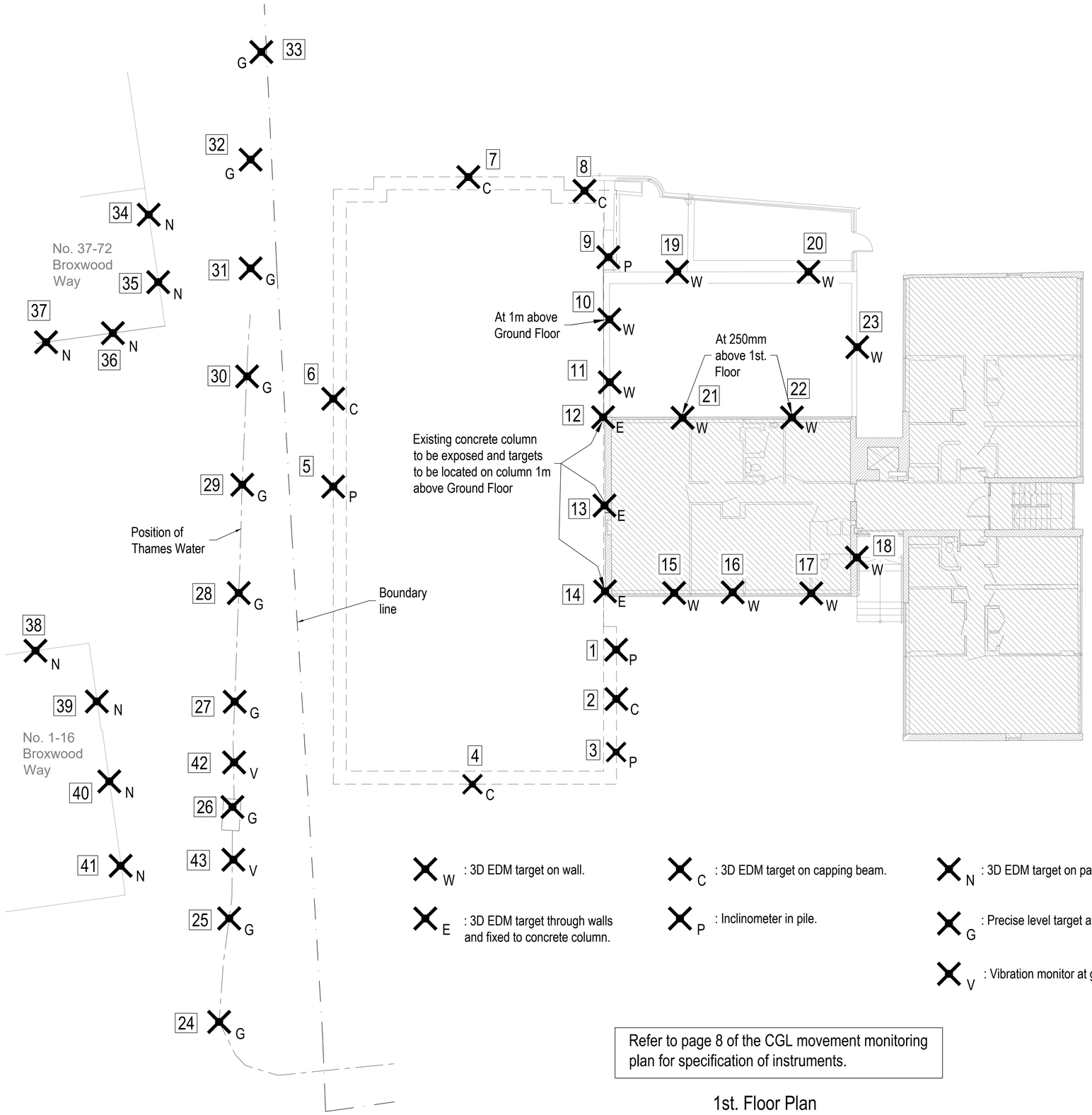

W : 3D EDM target on wall.

E : 3D EDM target through walls and fixed to concrete column.

C : 3D EDM target on capping beam.

P : Inclinometer in pile.

N : 3D EDM target on party wall.

G : Precise level target at ground level.

V : Vibration monitor at ground level.

Refer to page 8 of the CGL movement monitoring plan for specification of instruments.

1st. Floor Plan

Not to Scale

Monitoring works to be commenced 2 months before works start on site for targets 10 to 23 inclusive, to establish a baseline and record pre-construction movements. A minimum of 3 readings should be obtained during an initial 3 week period and then a reading every 2 weeks.

When demo and piling and ground works commence readings are to be taken on a weekly basis. This frequency of reading will be retained until 1 month after completion of the ground floor slab.

Except during pad underpinning, when readings are to be taken daily and continued for 1 week after the final dry pack has cured and except during excavation & prop removal when readings are to be taken twice weekly.

Except during excavation and prop removal when reading are to be taken twice weekly.

1 month after the Ground Floor slab is cast, readings to be reduced to a monthly basis until completion of the main structure works.

Readings to be submitted to design team including structural engineer as soon as possible after the reading is taken.

The accuracy of the monitoring equipment for reading horizontal and vertical movements is to be 1.5mm or better.

For additional areas of monitoring refer to CGL Movement Monitoring Plan, drawing number: CG/28408B.

The monitoring locations shown above are suggested locations, to be confirmed. Monitoring points will be set 250mm above existing ground floor level where possible U.N.O.

Feasibility Scheme for Comment Only
Do not order materials from this drawing.

Notes.

NOTES

1. This drawing is to be read in conjunction with the specification and all relevant Engineers and Architects drawings.
2. Work to figured dimensions only.
3. For general notes see drawing 5295 - S01.

REV.	AMENDMENTS	BY	DATE	CHECKED
C	Vibration monitors 'V' added - No. 42 & 43.	AR	30.11.2022	RT
B	Monitoring points 'N' & 'G' added. Tables 1 & 2 moved to 5295-PM02.	AR	7.11.2022	RT
A	Monitoring points amended / added. Proposed trigger limits tables amended / added.	AR	28.10.2022	RT

PROJECT
Broxwood View
Barrie House

TITLE
Movement Monitoring 1/3

ARCHITECTS
Carbogno Ceneda Architects

DRAWING No.
5295-PM01C

DATE	13.10.2022
SCALE	As shown @ A1
DRAWN	AR
CHECKED	RT
REVIEWED	-

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Table 1: Proposed trigger limits for the existing facade or internal columns of Barrie House.

3D EDM targets at the external facade or internal columns of Barrie House		
Alert Status	Maximum vertical or horizontal displacement (mm)[a]	Actions in the event of a trigger limit being exceed
Green	<6	CP1 as Table 6 #
Amber I	6 to 10	CP2 as Table 6 #
Amber II	10 to 15	CP3 as Table 6 #
Red	>15	CP4 or CP5 as Table 6 #

a :Based on a typical predicted deflection of ~7mm

: For Table 6 refer to drg. 5295-PM03.

Table 2: Proposed trigger limits for the party walls at 16 Kingsland and 72 Kingsland.

3D EDM targets at the party walls at 16 Kingsland and 72 Kingsland		
Alert Status	Maximum vertical or horizontal displacement (mm)[a]	Actions in the event of a trigger limit being exceed
Green	<5	CP1 as Table 6 #
Amber I	5 to 7	CP2 as Table 6 #
Amber II	7 to 10	CP3 as Table 6 #
Red	>10	CP4 or CP5 as Table 6 #

a :Based on CGL experience of similar works.

: For Table 6 refer to drg. 5295-PM03.

Table 3: Proposed trigger limits for the capping beam and inclinometers.

3D EDM targets on the face of the capping beam and inclinometers along piles		
Alert Status	Maximum horizontal displacement (mm)[a]	Actions in the event of a trigger limit being exceed
Green	<10	CP1 as Table 6 #
Amber I	10 to 15	CP2 as Table 6 #
Amber II	15 to 20	CP3 as Table 6 #
Red	>20	CP4 or CP5 as Table 6 #

a :Based on a typical predicted deflection of ~15mm

: For Table 6 refer to drg. 5295-PM03.

Table 4: Proposed trigger limits above the alignment of the Thames Water main at ground level.

Precise level targets above the Thames Water alignment at ground level		
Alert Status	Maximum vertical displacement (mm)	Actions in the event of a trigger limit being exceed
Green	<3	CP1 as Table 6 #
Amber I	3 to 7	CP2 as Table 6 #
Amber II	7 to 10	CP3 as Table 6 #
Red	>10	CP4 or CP5 as Table 6 #

: For Table 6 refer to drg. 5295-PM03.

Table 5: Proposed trigger limits above the alignment of the Thames Water main at ground level.

Vibration monitors above the Thames Water alignment at ground level		
Alert Status	Maximum PPV (mm/s)	Actions in the event of a trigger limit being exceed
Green	<7.5	CP1 as Table 6 #
Amber I	7.5 to 8.5	CP2 as Table 6 #
Amber II	8.5 to 10	CP3 as Table 6 #
Red	>10	CP4 or CP5 as Table 6 #

: For Table 6 refer to drg. 5295-PM03.

Notes.

NOTES

1. This drawing is to be read in conjunction with the specification and all relevant Engineers and Architects drawings.
2. Work to figured dimensions only.
3. For general notes see drawing 5295 - S01.

REV.	AMENDMENTS	BY	DATE	CHECKED
C	Tables renumbered. Table 4 amended & Table 5 added.	AR	30.11.2022	RT
B	Table 1 - maximum displacements amended.	AR	8.11.2022	RT
A	Table 6 moved to 5295-PM03. Tables 1 to 4 added.	AR	7.11.2022	RT

PROJECT
Broxwood View
Barrie House

TITLE
Movement Monitoring 2/3

ARCHITECTS
Carbogno Ceneda Architects

DRAWING No.
5295-PM02C

DATE	28.10.2022
SCALE	As shown @ A1
DRAWN	AR
CHECKED	RT
REVIEWED	-

Feasibility Scheme for Comment Only
Do not order materials from this drawing.

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Table 6: Basement construction contingency plan.

Ref.	Scenarios	Likely Probability	Contingency/Control Measure	Action by	Status
CP 1	All recorded movements are within the Green limit	VH	• Continue Standard monitoring as planned. • Carry out routine inspections of works and review monitoring data weekly. • Send readings to Structural Engineer as soon as possible after reading is taken.	PC/SC	OPEN
CP 2	Recorded movements fall within the Amber 1 limit	H	As CP 1 but ensure: • Review monitoring data to establish that real movement and trend is occurring rather than outliers having developed. • Review construction methodology and sequencing. • Increase monitoring frequency in the region of recorded increased movement and also consider providing extra monitoring points at max movement positions if appropriate. • Inspect internal and external building walls, adjoining party walls/constraints and exposed ground for any visual signs of movement or distress. • Send readings to Structural Engineer as soon as possible after reading is taken.	PC/SC	OPEN
CP 3	Recorded movements fall within the Amber 2 limit	L	As CP 2 but must ensure: • Review monitoring data to establish real movement and trends have developed rather than outliers have developed. • Review construction methodology and sequencing, and make refinements where appropriate and agreed with project team. • Install extra/check monitoring points at max movement positions and increase monitoring frequency. • Be prepared to cease works until movement cause(s) established. Alternatively, it may be prudent to speed up construction works. Seek advice of Engineers. • Additional contingency propping should also be considered where appropriate to limit further movement. • Send readings to Structural Engineer as soon as possible after reading is taken.	PC/SC	OPEN
CP 4	Recorded movements fall above the Red limit and have ceased	VL	As CP 3 but must ensure: • Implement changes to working methodology such as backfill/cease works in effected region/increase speed, changes in works procedure, install additional propping etc. To be agreed with project team. • Continue to monitor and review data at increased intervals and establish a safe way forward, to be discussed, developed and agreed with the project team and stakeholders as required. • Send readings to Structural Engineer as soon as possible after reading is taken.	PC/SC	OPEN
CP 5	Recorded movements fall above the Red limit and continue to move	VVL	As CP 4 but must ensure that: • Seek advice from Engineers and implement additional emergency works (additional propping, backfilling, increased sped of construction/support etc) or ceasing work in area affected and evacuate. • Inform adjoining party wall occupiers and asset owners. • Continue to monitor and review data at increased intervals and establish a safe way forward, to be discussed, developed and agreed with the project team and stakeholders as required. • Send readings to Structural Engineer as soon as possible after reading is taken.	PC/SC	OPEN

PC: Principal contractor; SC: Specialist subcontractor; PD: Principal design; SD: specialist designer.

Feasibility Scheme for Comment Only
Do not order materials from this drawing.

Notes.

NOTES

1. This drawing is to be read in conjunction with the specification and all relevant Engineers and Architects drawings.
2. Work to figured dimensions only.
3. For general notes see drawing 5295 - S01.

REV.	AMENDMENTS	BY	DATE	CHECKED
A	Table renumbered.	AR	30.11.2022	RT

PROJECT
Broxwood View
Barrie House

TITLE
Movement Monitoring 3/3

ARCHITECTS
Carbogno Ceneda Architects

DRAWING No.
5295-PM03A

DATE	7.11.2022
SCALE	As shown @ A1
DRAWN	AR
CHECKED	RT
REVIEWED	-

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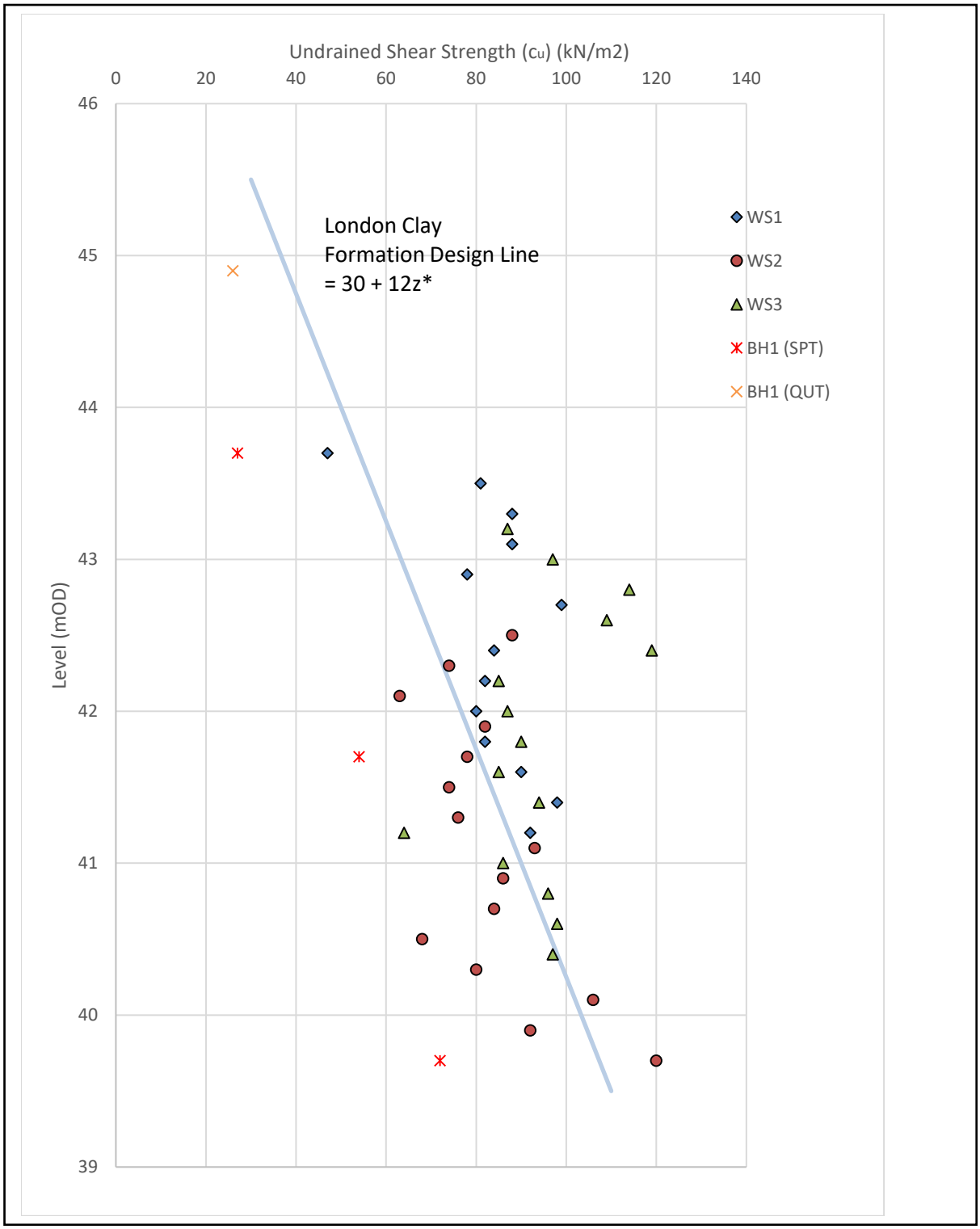
Reference Exploratory Hole Logs & Clay Strength Plot



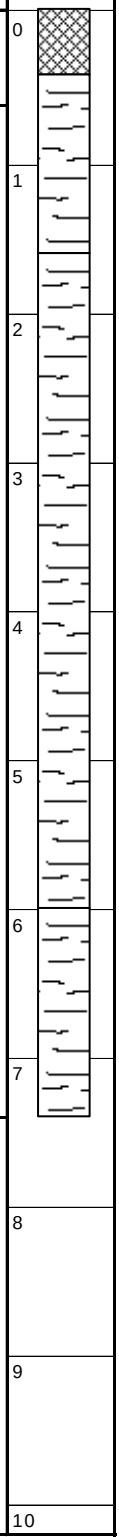
z = depth below top of strata

Client	Project	Job No
Parmarbrook	**Barrie House**	**CG/28408**
CGL	Title **Undrained Shear Strength (c_u) vs Level**	**Figure 3**

Site	**Barrie House**	Borehole No:	**BH1**
Location	**29 St Edmund's Terrace, London NW8 7QH**		
Client:	**Robert Morley, Kaleminster Ltd**	Sheet	**1 of 1**
Engineer:	**StructureMode Ltd**	Report No:	**9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]	Strata Level[mOD]	Strata Description
BH constructed 17 Sep 2012				0.00	+46.00	MADE GROUND: asphalt [100mm] over grey/black mixture of ashy sand with asphalt, clinker and flint gravel; below about 0.35m becoming grey/brown clay with some ash and clinker
BH dia: 150mm				0.50	+45.50	
Cased to: 1.50m	D	0.60				Soft brown CLAY with grey patches
	U	1.10				
Groundwater not observed						
	D	1.60				...below about 1.6m becoming firm brown CLAY with occasional grey gleying
	S/D	2.30	6			
	D	2.70				
	U	3.00				
	D	3.50				
	S/D	4.30	12			
	D	4.60				
	U	5.00				
	D	5.50				
	S/D	6.30	16			...becoming stiff below about 6.0m
	D	6.60				
	U	7.00				
	D	7.50		7.50	+38.50	END OF BOREHOLE

Legend



Constructed using cable percussive techniques

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Backfilled with arisings and surface reinstated on completion
Ground level interpolated from topographical survey

Borehole No: **BH1**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**Barrie House**	Borehole No: **WS1**
Location	**29 St Edmund's Terrace, London NW8 7QH**	
Client:	**Robert Morley, Kaleminster Ltd**	Sheet **1 of 2**
Engineer:	**StructureMode Ltd**	Report No: **9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
BH constructed 17 Sep 2012				0.00	0	+45.60	MADE GROUND: [trial pit] - brown topsoil and clay with occasional building rubble	0
BH dia: 60mm reducing with depth								
Groundwater at 0.95m on				0.90	1	+44.70	Concrete foundation [no reinforcement observed]	1
Groundwater at 1.4m on								
				1.75		+43.85	Stiff brown CLAY with occasional grey gleying, selenite crystals and rare orange sand partings	
Some disturbance in upper 200mm of clay due to coring operations and HV testing	HV	1.90	47		2		...incipient claystone at 2.05m	2
	HV/D	2.10	81					
	HV	2.30	88					
	D	2.40						
	HV	2.50	88					
	D	2.60						
	HV	2.70	78					
	D	2.80						
	HV	2.90	99		3			3
	D	3.10						
	HV	3.20	84					
	HV/D	3.40	82					
	HV	3.60	80					
	D	3.70						
	HV	3.80	82					
	HV/D	4.00	90		4			4
	HV	4.20	98					
	D	4.30						
	HV	4.40	92					
	D	4.60						
				5.00	5	+40.60	END OF BOREHOLE	5

Constructed using hand held window sample equipment

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Borehole constructed through an open trial pit which exposed the top of a footing and cored to base of footing at 75mm dia
Standpipe installed to 5.0m depth
Ground level interpolated from topographical survey

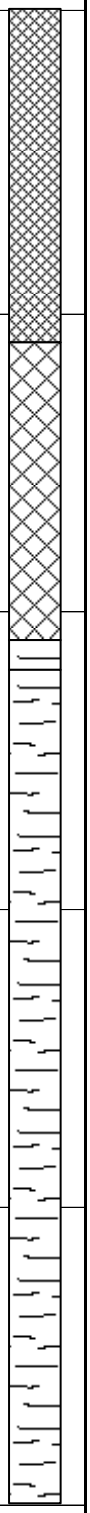
Borehole No: **WS1**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**Barrie House**	Borehole No:	**WS2**
Location	**29 St Edmund's Terrace, London NW8 7QH**		
Client:	**Robert Morley, Kaleminster Ltd**	Sheet	**1 of 2**
Engineer:	**StructureMode Ltd**	Report No:	**9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]	Strata Level[mOD]	Strata Description
BH constructed 17 Sep 2012 BH dia: 60mm reducing with depth				0.00	+44.60	MADE GROUND: [trial pit] - brown topsoil and clay with occasional building rubble
				1.13	+43.47	MADE GROUND: soft to firm brown clay with occasional flint gravel and dark brown sand/silt lenses
	HV/D	2.10	88	2.10	+42.50	Stiff, locally firm brown CLAY with orange patches and scattered selenite crystals
	HV/D	2.30	74			
	HV	2.50	63			...below 2.25m becoming brown with occasional grey gleying and selenite crystals
	D	2.60				
	HV	2.70	82			
	HV/D	2.90	78			
	HV/D	3.10	74			
	HV	3.30	76			
	D	3.40				
Groundwater at 3.5m on 15/10/12	HV	3.50	93			
	HV/D	3.70	86			
	HV	3.90	84			
	HV/D	4.10	68			
	HV	4.30	80			
	HV/D	4.50	106			
	HV	4.70	92			
	HV	4.90	120			
				5.00	+39.60	END OF BOREHOLE



Constructed using hand held window sample equipment

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Borehole constructed off edge of pad footing
Standpipe installed to 5.0m depth
Ground level interpolated from topographical survey

Borehole No: **WS2**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**Barrie House**	Borehole No:	**WS3**
Location	**29 St Edmund's Terrace, London NW8 7QH**		
Client:	**Robert Morley, Kaleminster Ltd**	Sheet	**1 of 1**
Engineer:	**StructureMode Ltd**	Report No:	**9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
BH constructed 17 Sep 2012				0.00	0	+45.30	MADE GROUND: [trial pit] - brown topsoil and clay with occasional building rubble	0
BH dia: 60mm reducing with depth								
				0.90	1	+44.40	Concrete foundation [single reinforcement bar, c.10mm dia, observed at 0.5m in core]	1
Groundwater not observed								
				1.62		+43.68	Stiff brown CLAY with occasional grey gleying, selenite crystals and rare orange sand partings	
Some disturbance in upper 200mm of clay due to coring operations and HV testing					2		...incipient claystone at 2.05m	2
	HV	2.10	87					
	D	2.20						
	HV	2.30	97					
	HV	2.50	114					
	HV	2.70	109					
	D	2.80						
	HV	2.90	119					
					3			3
	HV/D	3.10	85					
	HV	3.30	87					
	HV	3.50	90					
	D	3.60						
	HV	3.70	85					
	HV	3.90	94					
					4			4
	HV	4.10	64					
	D	4.20						
	HV	4.30	86					
	HV	4.50	96					
	HV	4.70	98					
	D	4.80						
	HV	4.90	97					
				5.00	5	+40.30	END OF BOREHOLE	5

Constructed using hand held window sample equipment

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Borehole constructed through an open trial pit which exposed the top of a footing and cored to base of footing at 75mm dia
Standpipe installed to 5.0m depth
Ground level interpolated from topographical survey

Borehole No: **WS3**

[* = extrapolated SPT 'N' value]

Soil Consultants

SCL Chart Generator Ver_1_5_11

TQ28SE409

TQ 28 SE 4

GROUND LEVEL: 164·5 A.O.D. 50·14m
NOMINAL B.H. DIA.: 6" Casing to 140ft.

BOREHOLE No. 27

DATE OF BORING: 21 Feb. to 14 March '60 N.G.R. 2755, 8360

GROUNDWATER LEVEL	GROUNDWATER DATE	SAMPLE DEPTH	B.H.	DEPTH 0'-0"	R.L.		DESCRIPTION OF STRATA
							Fairly firm fissured brown clay becoming stiffer with increasing depth
				34'-0" +130·8 10·36m +39·86m			
							Stiff grey - blue fissured clay
		Contd.		39·32m +10·82m			Mudstone, boulder

REMARKS:
No water in borehole

SAMPLES
■ Undisturbed
• Disturbed

SCALE:
1/8" to 1'-0"

METROPOLITAN WATER BOARD.
MAIN IN TUNNEL BETWEEN THAMES AND LEA VALLEYS.

SOILS No. S/371

DRWG. No. S/R/526

GEORGE WIMPEY & CO. LTD., CENTRAL LABORATORY, SOUTHALL.

TQ28SE409

276-836 256 TQ 20 SE/409 2 of 2

GROUND LEVEL: 164·5 A.O.D. 50·14m
NOMINAL B.H. DIA. 6" Casing to 140 ft.
DATE OF BORING: 21 Feb. to 14 March '50

BOREHOLE No. 27

N. & E. 2755·8360 (Contd.)

GROUNDWATER LEVEL	GROUNDWATER DATE	SAMPLE DEPTH	B.H.	DEPTH	R.L.	DESCRIPTION OF STRATA
				129'-0" 89.32m	+35·5 +10·82m	
		140'-0" to 141'-6"				Stiff grey - blue fissured clay
						(Sand in fissures below 155 ft. depth)
		157'-0" to 158'-0"				
		165'-0" to 166'-6"				
				54·5m	-4·42m	
				179'-0"	-14·5	Mudstone with siliceous intrusion
				180'-0" 54·86m	-15·5 -4·72m	
						Stiff grey - blue fissured clay becoming increasingly silty and sandy below 181'-0" depth. Traces of shell fragments and lignite at 218 ft.
				67·68 220'-0"	-16·82m -65·5	Bottom of borehole

REMARKS:

SAMPLES
■ Undisturbed
● Disturbed

SCALE: 1" to 1'-0"

METROPOLITAN WATER BOARD
MAIN IN TUNNEL BETWEEN THAMES AND LEA VALLEYS.

SOILS No. S/371

DRWG. No. S/R/526

GEORGE WIMPEY & CO. LTD., CENTRAL LABORATORY, SOUTHALL.

TQ28 SE /1230

Contract Name AVENUE ROAD — **Borehole No.** 1

2740, 8347 — **Sheet** 1 **of** 3

Method of boring Shell and Auger
Diameter 200 mm nominal

Ground level 38.02 m OD
Start 5.9.78
Finish 6.9.78

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
5/9			U			1.40	Soft grey-brown silty clay with chalk and brick fragments — Made ground
				1.40	36.62		
			U				2
			U				4
5/9			U				Firm to stiff brown silty clay with selenite crystals becoming fissured with depth with occasional yellow-brown silt partings and blue grey mottlings (London Clay) 6
			U				8
			U				Contd/.. 10
			U				

Notes

Terresearch Limited | **Report No.** S.28/591 | **Appendix 1 Sheet** 1

TQ28 SE / 1230

Contract Name AVENUE ROAD

Borehole No. 1

Sheet 2 **of** 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
						9.40	Firm to stiff brown silty clay with selenite crystals becoming fissured with depth with occasional yellow-brown silt partings and blue grey mottlings(London Clay)
			U	10.80	27.22		
			U				
			U				
			U				
			U				
			U				Very stiff fissured dark grey silty clay (London Clay)

12 14 16 18 Contd/.. 20

Notes

Terresearch Limited | **Report No.** S.28/591 | **Appendix 1 Sheet** 2

TQ28SE/1230

Contract Name AVENUE ROAD | **Borehole No.** 1

Sheet 3 **of** 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			U			14.20	Very stiff fissured dark grey silty clay (London Clay)
			U				
			U				
6/9				25.00	13.02		Bottom ofBorehole

22
24
26

Notes

Terresearch Limited | **Report No.** S.28/591 | **Appendix 1 Sheet** 3

TQ28SE/1231

Contract Name AVENUE ROAD 2739, 8347	**Borehole No.** 2
	Sheet 1 **of** 3

Method of boring	Shell and Auger	**Ground level**	38.18 m OD
Diameter	200 mm nominal	**Start**	7.9.78
		Finish	8.9.78

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
				0.06	38.12	0.06	Tarmac
			B			2.44	Soft dark brown and black silty clay with chalk lumps and bricks Made ground
			B				
7/9				2.50	35.68		
7/9			U				Stiff to very stiff brown silty clay with occasional yellow-brown silt partings(London Clay)
			U				
			U				
			U				
			U				

Contd/.. 10

Notes Borehole backfilled to 10.00 m on 8.9.78 and casing pulled back 1.50m
SWL then 10.20 (11.9.78)
Not enough of water to get sample

Terresearch Limited	**Report No.** S.28/591	**Appendix 1 Sheet** 4

TQ 28SE/123/

Contract Name	AVENUE ROAD	Borehole No. 2
		Sheet 2 of 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			U			8.70	Stiff to very stiff brown silty clay with occasional yellow-brown-silt partings(London Clay)
				11.20	26.98		
7/9			U				12
			U				
							14
			U				Stiff to very stiff fissured dark grey silty clay with some carbonaceous impurities(London Clay)
			U				16
			U				18
			U				Contd/..20

Notes

Terresearch Limited | Report No. S.28/591 | Appendix 1 Sheet 5

TQ 28 SE / 123

Contract Name	AVENUE ROAD	Borehole No. 2
		Sheet 3 of 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			U				
						13.80	Stiff to very stiff fissured dark grey silty clay with some carbonaceous impurities (London Clay)
			U				
			U				
8/9				25.00	13.18		Bottom of Borehole

Notes

Terresearch Limited	Report No. S.28/591	Appendix 1 Sheet 6

MS Excel Spreadsheet – Pile Vertical Capacities in Compression

CALCULATION SHEET

Deep Foundations Specialists Tel: 01628 670982
21 Brambling Way
Maidenhead
Berkshire www.deep-foundations.co.uk
SL6 8PQ

Sheet No. of
Enq. No. Con. No.
Calculated by : AR Date : 30/11/2022
Checked by : AA Date : 30/11/2022

BROXWOOD VIEW, 29 ST. EDMUND'S TERRACE LONDON NW8 7QH
300mm Dia. Bearing Piles & 450mm/600mm Dia. Pile Walls
Bearing Pile Capacity in Compression Rev. 02

Bored Pile Design: straight - shafted

Version : BSPile 3.03

Design Ground Level (m.O.D.) = **44.600**
Design Ground Water Level (m.O.D.) = **44.600**

SWL = Lesser of USF / **1.20** and (USF + UEB) / **2.60**

where : SWL = Safe working load
USF = Ultimate shaft fiction
UEB = Ultimate end bearing
SWL Output enclosed in brackets indicates that overall F.O.S. is used

Pile Toe Level (m.O.D)	Founding Strata	Type & Description	Geotechnical Design Parameters γ (kN/m³)	SPT "N"	Ks / (α)	Tan(δ)/ (Cu (kPa))	Nq / (Nc)	Qus (kPa)	Qub (kPa)	Pile Dia(mm): 300 Qub (kPa)	USF (kN)	UEB (kN)	SWL (kN)	Pile Dia(mm): 450 Qub (kPa)	USF (kN)	UEB (kN)	SWL (kN)	Pile Dia(mm): 600 Qub (kPa)	USF (kN)	UEB (kN)	SWL (kN)
44.100	0	Dug-out Basement	18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
43.600	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
43.100	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
42.600	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
42.100	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
41.600	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
41.100	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
40.600	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
40.100	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
39.600	0		18.00							0	0	0	(0)	0	0	0	(0)	0	0	0	(0)
39.100	2	London Clay	19.00		(0.50)	(65)	(9.00)	32	583	583	12	41	10	540	18	86	15	486	24	137	20
38.600	2		19.00		(0.50)	(71)	(9.00)	35	637	637	28	45	23	637	42	101	35	637	56	180	46
38.100	2		19.00		(0.50)	(77)	(9.00)	38	691	691	45	49	(36)	691	68	110	57	691	90	195	75
37.600	2		19.00		(0.50)	(83)	(9.00)	41	745	745	64	53	(45)	745	96	119	80	745	128	211	107
37.100	2		19.00		(0.50)	(89)	(9.00)	44	799	799	84	56	(54)	799	126	127	(98)	799	169	226	141
36.600	2		19.00		(0.50)	(95)	(9.00)	47	853	853	106	60	(64)	853	159	136	(113)	853	212	241	(174)
36.100	2		19.00		(0.50)	(101)	(9.00)	50	907	907	129	64	(74)	907	194	144	(130)	907	258	257	(198)
35.600	2		19.00		(0.50)	(107)	(9.00)	53	961	961	154	68	(85)	961	230	153	(147)	961	307	272	(223)
35.100	2		19.00		(0.50)	(113)	(9.00)	56	1015	1015	179	72	(97)	1015	269	161	(166)	1015	359	287	(248)
34.600	2		19.00		(0.50)	(119)	(9.00)	59	1069	1069	207	76	(109)	1069	310	170	(185)	1069	414	302	(275)
34.100	2		19.00		(0.50)	(125)	(9.00)	62	1123	1123	236	79	(121)	1123	353	179	(205)	1123	471	318	(303)
33.600	2		19.00		(0.50)	(131)	(9.00)	65	1177	1177	266	83	(134)	1177	398	187	(225)	1177	531	333	(332)
33.100	2		19.00		(0.50)	(137)	(9.00)	68	1231	1231	297	87	(148)	1231	446	196	(247)	1231	594	348	(363)
32.600	2		19.00		(0.50)	(143)	(9.00)	71	1285	1285	330	91	(162)	1285	495	204	(269)	1285	660	363	(394)
32.100	2		19.00		(0.50)	(149)	(9.00)	74	1339	1339	365	95	(177)	1339	547	213	(292)	1339	729	379	(426)
31.600	2		19.00		(0.50)	(155)	(9.00)	77	1393	1393	400	98	(192)	1393	601	222	(316)	1393	801	394	(459)
31.100	2		19.00		(0.50)	(161)	(9.00)	80	1447	1447	438	102	(208)	1447	656	230	(341)	1447	875	409	(494)
30.600	2		19.00		(0.50)	(167)	(9.00)	83	1501	1501	476	106	(224)	1501	714	239	(367)	1501	952	424	(530)
30.100	2		19.00		(0.50)	(173)	(9.00)	86	1555	1555	516	110	(241)	1555	774	247	(393)	1555	1033	440	(566)
29.600	2		19.00		(0.50)	(179)	(9.00)	89	1609	1609	558	114	(258)	1609	837	256	(420)	1609	1115	455	(604)
29.100	2		19.00		(0.50)	(185)	(9.00)	92	1663	1663	601	118	(276)	1663	901	265	(448)	1663	1201	470	(643)
28.600	2		19.00		(0.50)	(191)	(9.00)	95	1717	1717	645	121	(295)	1717	967	273	(477)	1717	1290	486	(683)
28.100	2		19.00		(0.50)	(197)	(9.00)	98	1771	1771	691	125	(314)	1771	1036	282	(507)	1771	1381	501	(724)
27.600	2		19.00		(0.50)	(203)	(9.00)	101	1825	1825	738	129	(333)	1825	1107	290	(537)	1825	1475	516	(766)
27.100	2		19.00		(0.50)	(209)	(9.00)	104	1879	1879	786	133	(353)	1879	1179	299	(569)	1879	1572	531	(809)
26.600	2		19.00		(0.50)	(215)	(9.00)	107	1933	1933	836	137	(374)	1933	1254	307	(601)	1933	1672	547	(853)
26.100	2		19.00		(0.50)	(221)	(9.00)	110	1987	1987	888	140	(395)	1987	1331	316	(634)	1987	1775	562	(899)
25.600	2		19.00		(0.50)	(227)	(9.00)	113	2041	2041	940	144	(417)	2041	1410	325	(667)	2041	1881	577	(945)
25.100	2		19.00		(0.50)	(233)	(9.00)	116	2095	2095	994	148	(439)	2095	1492	333	(702)	2095	1989	592	(993)
24.600	2		19.00		(0.50)	(239)	(9.00)	119	2149	2149	1050	152	(462)	2149	1575	342	(737)	2149	2100	608	(1041)
24.100	2		19.00		(0.50)	(245)	(9.00)	122	2203	2203	1107	156	(486)	2203	1661	350	(773)	2203	2214	623	(1091)
23.600	2		19.00		(0.50)	(251)	(9.00)	125	2257	2257	1165	160	(510)	2257	1748	359	(810)	2257	2331	638	(1142)
23.100	2		19.00		(0.50)	(257)	(9.00)	128	2311	2311	1225	163	(534)	2311	1838	368	(848)	2311	2451	653	(1194)
22.600	2		19.00		(0.50)	(263)	(9.00)	131	2365	2365	1287	167	(559)	2365	1930	376	(887)	2365	2573	669	(1247)
22.100	2		19.00		(0.50)	(269)	(9.00)	134	2419	2419	1349	171	(585)	2419	2024	385	(926)	2419	2698	684	(1301)
21.600	2		19.00		(0.50)	(275)	(9.00)	137	2473	2473	1413	175	(611)	2473	2120	393	(967)	2473	2827	699	(1356)
21.100	2		19.00		(0.50)	(281)	(9.00)	140	2527	2527	1479	179	(637)	2527	2218	402	(1008)	2372	2958	671	(1396)
20.600	2		19.00		(0.50)	(287)	(9.00)	140	2581	2581	1545	182	(664)	1743	2317	277	(998)	1307	3090	370	(1330)
20.100	2		19.00		(0.50)	(293)	(9.00)	140	2635	440	1611	31	(631)	294	2416	47	(947)	220	3221	62	(1263)

MS Excel Spreadsheet – Pile Vertical Capacities in Tension

CALCULATION SHEET

Deep Foundations Specialists Tel: 01628 670982
21 Brambling Way
Maidenhead
Berkshire www.deep-foundations.co.uk
SL6 8PQ

Sheet No. of
Enq. No. Con. No.
Calculated by : AR Date : 30/11/2022
Checked by : AA Date : 30/11/2022

BROXWOOD VIEW, 29 ST. EDMUND'S TERRACE LONDON NW8 7QH
300mm Dia. Bearing Piles & 450mm/600mm Dia. Pile Walls
Bearing Pile Capacity in Tension Rev. 02

Bored Pile Design: straight - shafted

Version : BSPile 3.03

Design Ground Level (m.O.D.) = **44.600**
Design Ground Water Level (m.O.D.) = **44.600**

SWL = USF / **3.00**

where : SWL = Safe working load
USF = Ultimate shaft fiction
UEB = Ultimate end bearing
SWL Output enclosed in brackets indicates that overall F.O.S. is used

Pile Toe Level (m.O.D)	Founding Strata Type & Description		Geotechnical Design Parameters γ (kN/m³)	SPT "N"	Ks / (α)	Tan(δ)/ (Cu (kPa))	Nq / (Nc)	Qus (kPa)	Qub (kPa)	Pile Dia(mm): 300 Qub (kPa)	USF (kN)	UEB (kN)	SWL (kN)	Pile Dia(mm): 450 Qub (kPa)	USF (kN)	UEB (kN)	SWL (kN)	Pile Dia(mm): 600 Qub (kPa)	USF (kN)	UEB (kN)	SWL (kN)
44.100	0	Dug-out Basement	18.00							0	0	0	0	0	0	0	0	0	0	0	0
43.600	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
43.100	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
42.600	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
42.100	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
41.600	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
41.100	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
40.600	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
40.100	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
39.600	0		18.00							0	0	0	0	0	0	0	0	0	0	0	0
39.100	2	London Clay	19.00		(0.50)	(65)	(9.00)	32	583	583	12	41	4	540	18	86	6	486	24	137	8
38.600	2		19.00		(0.50)	(71)	(9.00)	35	637	637	28	45	9	637	42	101	14	637	56	180	19
38.100	2		19.00		(0.50)	(77)	(9.00)	38	691	691	45	49	15	691	68	110	23	691	90	195	30
37.600	2		19.00		(0.50)	(83)	(9.00)	41	745	745	64	53	21	745	96	119	32	745	128	211	43
37.100	2		19.00		(0.50)	(89)	(9.00)	44	799	799	84	56	28	799	126	127	42	799	169	226	56
36.600	2		19.00		(0.50)	(95)	(9.00)	47	853	853	106	60	35	853	159	136	53	853	212	241	71
36.100	2		19.00		(0.50)	(101)	(9.00)	50	907	907	129	64	43	907	194	144	65	907	258	257	86
35.600	2		19.00		(0.50)	(107)	(9.00)	53	961	961	154	68	51	961	230	153	77	961	307	272	102
35.100	2		19.00		(0.50)	(113)	(9.00)	56	1015	1015	179	72	60	1015	269	161	90	1015	359	287	120
34.600	2		19.00		(0.50)	(119)	(9.00)	59	1069	1069	207	76	69	1069	310	170	103	1069	414	302	138
34.100	2		19.00		(0.50)	(125)	(9.00)	62	1123	1123	236	79	79	1123	353	179	118	1123	471	318	157
33.600	2		19.00		(0.50)	(131)	(9.00)	65	1177	1177	266	83	89	1177	398	187	133	1177	531	333	177
33.100	2		19.00		(0.50)	(137)	(9.00)	68	1231	1231	297	87	99	1231	446	196	149	1231	594	348	198
32.600	2		19.00		(0.50)	(143)	(9.00)	71	1285	1285	330	91	110	1285	495	204	165	1285	660	363	220
32.100	2		19.00		(0.50)	(149)	(9.00)	74	1339	1339	365	95	122	1339	547	213	182	1339	729	379	243
31.600	2		19.00		(0.50)	(155)	(9.00)	77	1393	1393	400	98	133	1393	601	222	200	1393	801	394	267
31.100	2		19.00		(0.50)	(161)	(9.00)	80	1447	1447	438	102	146	1447	656	230	219	1447	875	409	292
30.600	2		19.00		(0.50)	(167)	(9.00)	83	1501	1501	476	106	159	1501	714	239	238	1501	952	424	317
30.100	2		19.00		(0.50)	(173)	(9.00)	86	1555	1555	516	110	172	1555	774	247	258	1555	1033	440	344
29.600	2		19.00		(0.50)	(179)	(9.00)	89	1609	1609	558	114	186	1609	837	256	279	1609	1115	455	372
29.100	2		19.00		(0.50)	(185)	(9.00)	92	1663	1663	601	118	200	1663	901	265	300	1663	1201	470	400
28.600	2		19.00		(0.50)	(191)	(9.00)	95	1717	1717	645	121	215	1717	967	273	322	1717	1290	486	430
28.100	2		19.00		(0.50)	(197)	(9.00)	98	1771	1771	691	125	230	1771	1036	282	345	1771	1381	501	460
27.600	2		19.00		(0.50)	(203)	(9.00)	101	1825	1825	738	129	246	1825	1107	290	369	1825	1475	516	492
27.100	2		19.00		(0.50)	(209)	(9.00)	104	1879	1879	786	133	262	1879	1179	299	393	1879	1572	531	524
26.600	2		19.00		(0.50)	(215)	(9.00)	107	1933	1933	836	137	279	1933	1254	307	418	1933	1672	547	557
26.100	2		19.00		(0.50)	(221)	(9.00)	110	1987	1987	888	140	296	1987	1331	316	444	1987	1775	562	592
25.600	2		19.00		(0.50)	(227)	(9.00)	113	2041	2041	940	144	313	2041	1410	325	470	2041	1881	577	627
25.100	2		19.00		(0.50)	(233)	(9.00)	116	2095	2095	994	148	331	2095	1492	333	497	2095	1989	592	663
24.600	2		19.00		(0.50)	(239)	(9.00)	119	2149	2149	1050	152	350	2149	1575	342	525	2149	2100	608	700
24.100	2		19.00		(0.50)	(245)	(9.00)	122	2203	2203	1107	156	369	2203	1661	350	554	2203	2214	623	738
23.600	2		19.00		(0.50)	(251)	(9.00)	125	2257	2257	1165	160	388	2257	1748	359	583	2257	2331	638	777
23.100	2		19.00		(0.50)	(257)	(9.00)	128	2311	2311	1225	163	408	2311	1838	368	613	2311	2451	653	817
22.600	2		19.00		(0.50)	(263)	(9.00)	131	2365	2365	1287	167	429	2365	1930	376	643	2365	2573	669	858
22.100	2		19.00		(0.50)	(269)	(9.00)	134	2419	2419	1349	171	450	2419	2024	385	675	2419	2698	684	899
21.600	2		19.00		(0.50)	(275)	(9.00)	137	2473	2473	1413	175	471	2473	2120	393	707	2473	2827	699	942
21.100	2		19.00		(0.50)	(281)	(9.00)	140	2527	2527	1479	179	493	2527	2218	402	739	2372	2958	671	986
20.600	2		19.00		(0.50)	(287)	(9.00)	140	2581	2581	1545	182	515	1743	2317	277	772	1307	3090	370	1030
20.100	2		19.00		(0.50)	(293)	(9.00)	140	2635	440	1611	31	537	294	2416	47	805	220	3221	62	1074

MS Excel Spreadsheet – Bearing Pile Lateral Analysis

CALCULATION SHEET

2nd Floor
The Porter Building
1 Brunel Way
Slough
SL1 1FQ
Web: www.deep-foundations.co.uk

Sheet No. 1 of 1
Enq.No. Con. No.
Calculated by : AR Date : 30/11/2022
Checked by : **AA** Date : 30/11/2022

Broxwood View, 29 Edmund's Terrace London NW8 7QH
300mm Dia. Bearing Piles
Pile Behaviour Under Combined Lateral Loading, Overturning Moments & Tension

Laterally loaded single pile analysis - Bengt.B.Broms (1964) Method as CIRIA Report 103 (1984)

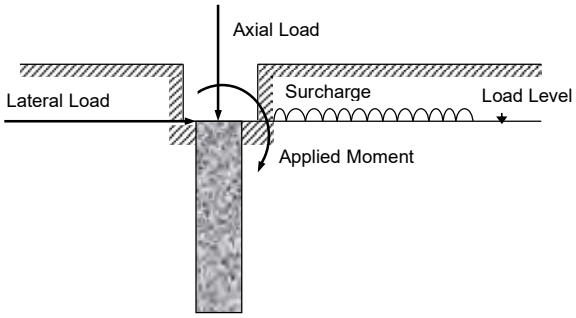
Version : V3.07

General Data

Sucharge at load level (kPa) = 0.0
Ground Water Level (mOD) = 0.000
Concrete : f_{cu} (N/mm^2) = 35 (γ_m = 1.50)
Steel : f_y (N/mm^2) = 500 (γ_m = 1.15)
Global Load Factor = 1.50 Comp. Bars (Y/N) Y

Soil Strata Data

	Strata Description	Top Level of Strata (mOD)	Bulk Density (kN/m^3)	ϕ ' (Degs)	Undr'd Cohesion Cu $_{top}$ (kPa)	Undr'd Cohesion Cu $_{gradient}$ (kPa/m)
1)	Made Ground	0.000	18.0	28.0		
2)	London Clay	-2.500	19.0		30	12.00
3)						
4)						
5)						
6)						
7)						
8)						



Pile Load & Geometry Data and Results

	Lateral Load (kN)	Axial Loads * Max. (kN)	Axial Loads * Min. (kN)	Applied Moment (kNm)	Pile Dia. (mm)	Cover to links (mm)	Pile Head Restraint (Y/N)	Maximum Moment Level (mOD)	Maximum Moment Value (kNm)	Cage Toe Level (mOD)	Moment Capacity (kNm)	Longitudinal Steel	Max / Min *	Helical Shear Steel f_{yv} = 250
1)	10.0	0.0	-25.0	19.0	300	50	N	-1.730	30.6	-3.990	37.5	4 B 25	Min	R 6 @ 120
2)														
3)														
4)														
5)														
6)														
7)														
8)														
9)														
10)														
11)														
12)														
13)														
14)														
15)														
16)														
17)														
18)														
19)														
20)														

Notes :-

1.) The lateral analysis using the Broms method is described on the explanation sheet.
2.) The structural analysis is valid for any number of main steel bars as the most critical cage orientation / rotation is considered.
3.) The steel requirement is calculated for each axial load condition and the most critical adopted.
4.) The axial loads are factored by the "Global Load Factor" . Where Applied Moments are not directly a function of the applied Axial Load, the axial loads may be considered as beneficial and therefore should be factored down.
5.) The main bar size is increased to provide a minimum steel area of 0.4% of the cross-sectional area of the concrete section.
6.) The shear steel design is in accordance with Clarke & Birjandi (1993); nominal links may be adopted from 5 x pile dia. below the load level.
7.) Nominal link spacing to ensure cage integrity is specified where v < vc' and axial stress < 2.5% of f_{cu} i.e. nominal compression.

CALCULATION SHEET

2nd Floor
The Porter Building
1 Brunel Way
Slough
SL1 1FQ

Web: www.deep-foundations.co.uk

Sheet No.	of
Enq.	Con. No. 0
Calculated by : AR	Date : 30/11/2022
Checked by :	Date :

Broxwood View, 29 Edmund's Terrace London NW8 7QH
300mm Dia. Bearing Piles
Pile Behaviour Under Combined Lateral Loading, Overturning Moments & Tension

Laterally loaded single pile analysis - Bengt.B.Broms (1964) Method as CIRIA Report 103 (1984)

1) Method of Calculation

The calculation is based upon the Bengt.B.Broms (1964) method modified to take advantage of computing techniques. Calculations are carried out at 0.01m intervals from the top of the pile and incorporates a factor of safety = 3.0.

The effective overburden pressure is calculated for each increment

$\sigma_{vi}' = \gamma'.z + \sigma_{vi-1}' + s$ where σ_{vi}' = Overburden pressure at increment
γ' = Density (Buoyant if below water level)
z = Thickness of increment layer
s = Surcharge at top of pile level

2) Lateral Soil Pressures

The lateral soil pressure of a stratum is calculated according to the soil type.

In granular strata the ultimate lateral pressure, $\sigma_{hi}' = 3 \cdot Kp \cdot \sigma_{vi}'$ $Kp = \frac{1 + \sin \phi'}{1 - \sin \phi'}$

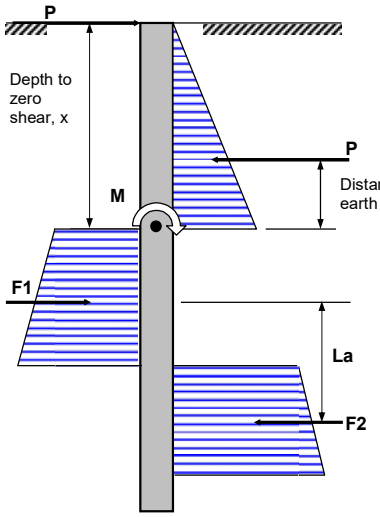
In cohesive strata there are two citerion for the ultimate lateral pressure,

at top of pile to 3 x Pile diameter depth, $\sigma_{hi}' = 2 \cdot C_u$ increasing to $9 \cdot C_u$
below 3 x Pile Diameter, D $\sigma_{hi}' = 9 \cdot C_u$

In changing strata where a granular strata is underlain by a clay, the following are adopted to calculate the ultimate lateral pressure,

where σ_{vi}' is greater than 3 x Pile Diameter x $\gamma = 9 \cdot C_u$
where σ_{vi}' is less than 3 x Pile Diameter x $\gamma_c = 2 \cdot C_u + \frac{\sigma_v'}{3 \cdot D \cdot \gamma_c} \cdot 7 \cdot Cu$

3) Maximum Bending Moment & Cage Toe Level



Maximum / Peak induced Bending Moment, M

M = P . x - P . y

Cage depth achieved when :

a) **F1 = F2**
b) **F1 . La > M**

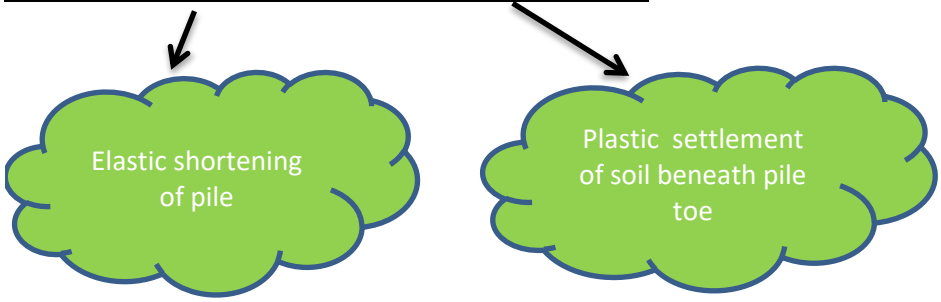
MS Excel Spreadsheet – Bearing Pile Settlement Analysis

Poisson Ratio, ν	
Clay	0.15
Silt	0.3
Sands	0.15
Gravels	0.15
Rocks	0.2

Q_s =	558	kN	Ultimate Shaft capacity of pile
Q_b =	114	kN	Ultimate Base capacity of pile
SWL	250	kN	Safe Working Load
F.O.S.	1.5		Factor of Safety

N_{SPT} =	35	N	SPT at Base
W_s =	250	kN	Load on Pile Shaft
W_b =	0	kN	Total Load on Pile Base
L =	15	m	Shaft Length (Total Pile Length from cutoff)
B =	0.3	m	Pile Diameter
E_p =	15	Gpa	Elastic Modulus of Concrete = 30GPa, use 15GPa
A_s =	14.14	m^2	Shaft Area
A_b =	0.07	m^2	Pile Base Area
ν =	0.15		Poisson Ratio of soil beneath Base
I_p =	0.5		Influence Factor
E_b =	70000	Kpa	Deformation Modulus of Soil Beneath the pile

ε =	8.84E-03	mm	+	0.0 mm



ε =	8.84E-06	m
ε =	0.01	mm

Pile settlement is less than 10mm

CADS PWS 6.09 Computer Output Files for Pile Retaining Wall – ULS Analysis

Pile geometry

Pile top Level	0	m
Pile Length	16	m
Pile toe level	-16	m

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level -5.35

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
.00	Made Ground	18.00	18.00	15000	0	1		28	.67	.30	1.43
						1		28	.50	4.15	4.99
-2.50	S to F to Stiff	19.00	19.00	24000	9600	30	12.0		.67	1.00	2.58
						30	12.0		.50	1.00	2.45
	Granular Fill	19.00	20.00	70000	0			37	.67	.20	
								37	.50	7.92	

Construction sequence

Stage Ref		Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	A	Active surcharge	-0.90	270.0	.3		
2	A	Active surcharge	0.00	10.0	.3		
3		Insert prop	-0.50				
4	A	Passive side excavation	-3.00				
5		Insert prop	-2.50				
6	A	Passive side excavation	-5.35				
7	A	Passive side fill	-4.85				
8	A	Active water level	-4.85				
9	A	Passive water level	-4.85				
10		Insert prop	-3.83				
11	A	Remove prop	-2.50				
12		Insert prop	-0.30				
13	A	Remove prop	-0.50				
14	A	Active water level	0.00				

Code of practice

Code of practice or reference document	
Application of pressures for stability	Not applicable for FOS=1 on moments
FOS on moments (stability check)	1.00
ULS factor on Tan(Phi) values	1.20
ULS fFactor on drained cohesion values	1.20
ULS factor on undrained cohesion values	1.50
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.00

Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	9.8	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	.0	m
Continuity model for wall analysis	Pins at second and lower props	

Deflection parameters

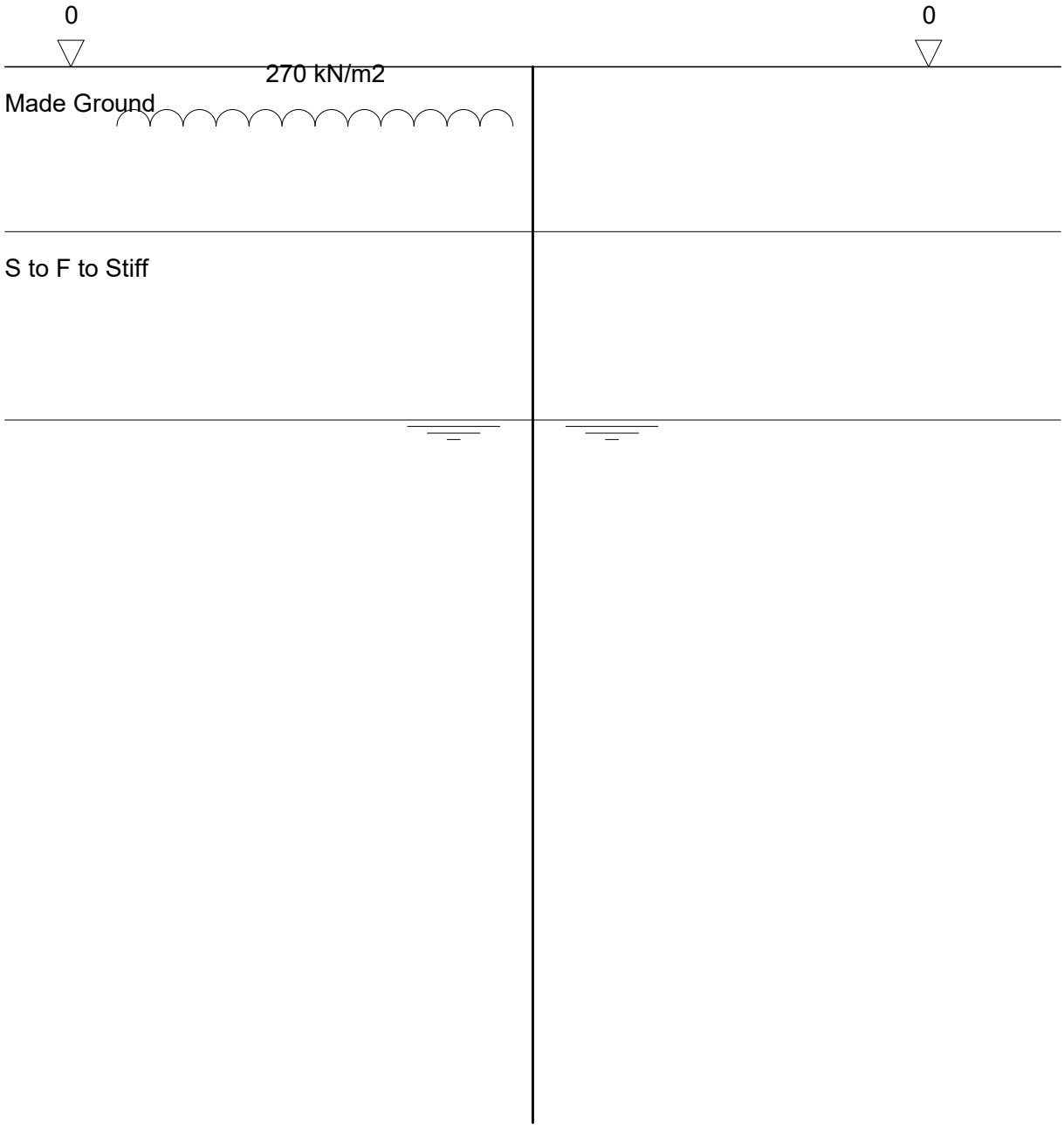
Wall moment of inertia	908818	cm4/m
Wall Youngs modulus	27000000	kN/m2
Properties for prop at -0.5		
Prop/Tie cross sectional area	3	cm2 each
Prop/Tie Youngs modulus	200000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm
Properties for prop at -2.5		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Deflection parameters - continued

Properties for prop at -3.83		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Properties for prop at -0.3		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Stage ref. **1**
Stage type **Active surcharge**

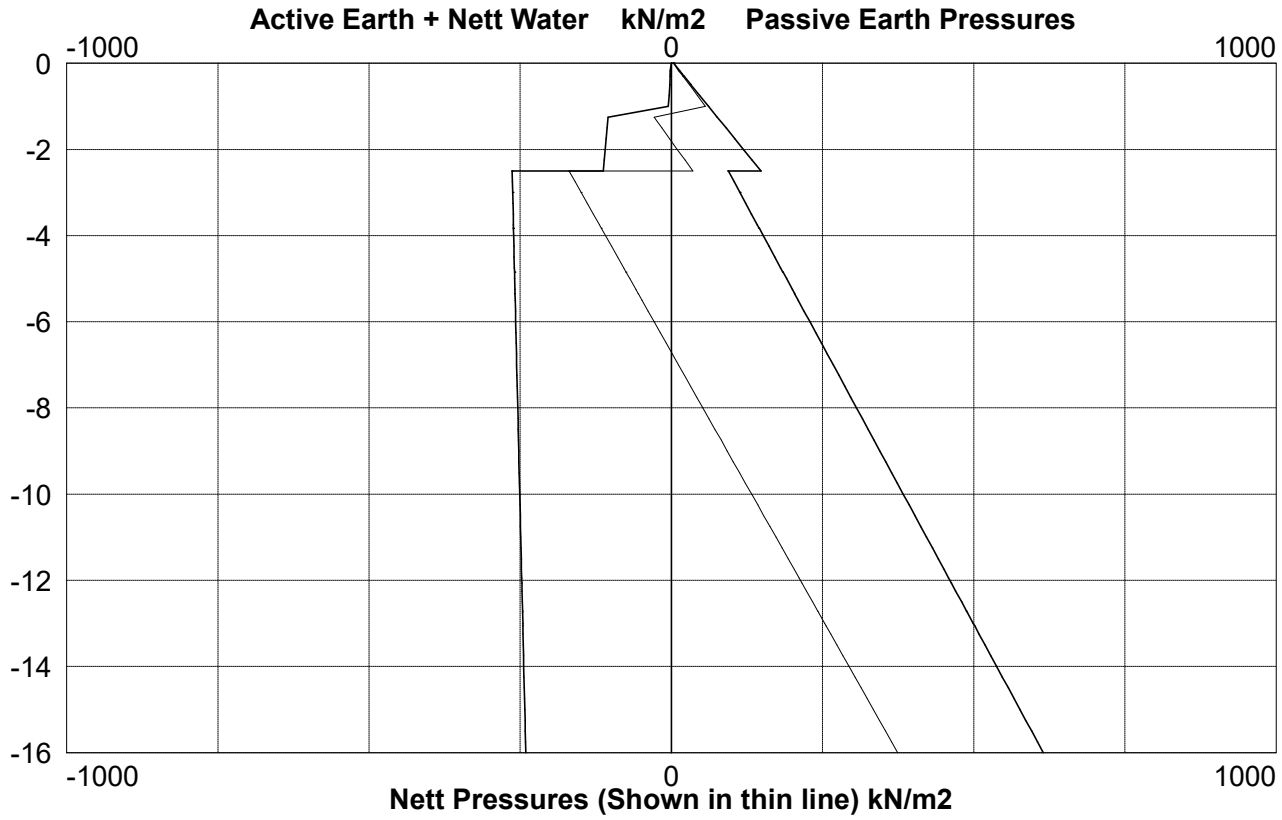


Tabular results from analysis of stage ref 1

strength.
analysis.

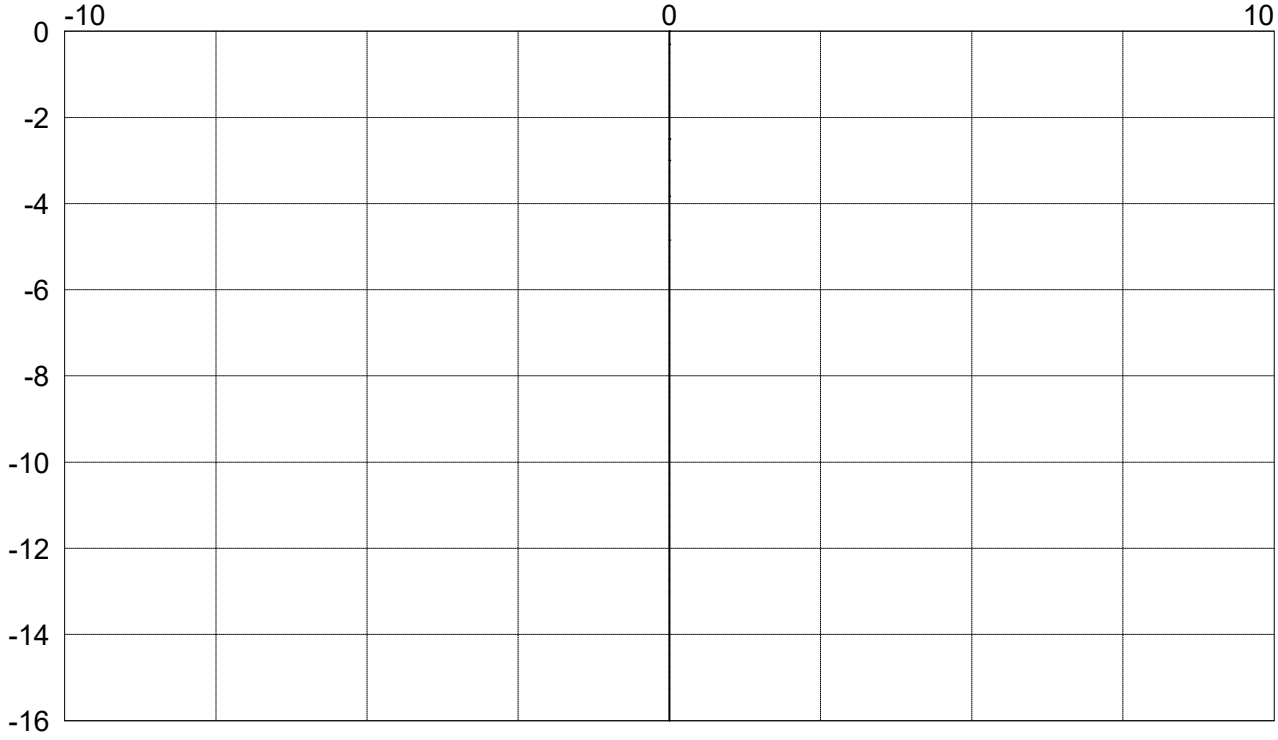
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	3.7	.0	-3.7	0	0			.00
.00	.0	.0	.0	.0	3.8	.0	-3.8	0	0			.14
t -.17	3.1	.0	1.7	3.1	13.7	.0	-12.0	0	0			12.36
t -.30	5.4	.0	1.7	5.4	21.0	.0	-19.3	0	0		.0	10.41
t -.30	5.4	.0	1.7	5.4	21.1	.0	-19.4	0	0			10.41
m -.50	9.0	2.5	.0	9.0	32.5	.0	-30.0	0	0		.0	10.90
m -.50	9.0	2.5	.0	9.0	32.7	.0	-30.1	0	0			10.90
-1.00	18.0	5.2	.0	18.0	61.4	.0	-56.2	0	0			11.91
-2.00	306.0	109.4	.0	36.0	119.2	.0	-9.8	0	0			1.87
-2.50	315.0	112.7	.0	45.0	148.1	.0	-35.4	0	0		.0	1.51
-2.50	315.0	263.3	.0	45.0	94.0	.0	169.3	0	0			1.51
-2.50	315.0	263.3	.0	45.0	94.1	.0	169.2	0	0			1.51
-3.00	324.5	262.5	.0	54.5	113.2	.0	149.3	0	0			1.25
-3.00	324.5	262.5	.0	54.5	113.3	.0	149.2	0	0			1.25
-3.83	340.3	261.1	.0	70.3	145.3	.0	115.8	0	0		.0	.95
-3.83	340.3	261.1	.0	70.3	145.4	.0	115.7	0	0			.95
-4.00	343.5	260.8	.0	73.5	151.9	.0	108.9	0	0			.91
-4.85	359.6	259.4	.0	89.6	184.6	.0	74.8	0	0			.80
-4.85	359.7	259.4	.0	89.6	184.7	.0	74.7	0	0			.80
-5.00	362.5	259.1	.0	92.5	190.5	.0	68.6	0	0			.79
-5.35	369.1	258.5	.0	99.1	203.9	.0	54.6	0	0			.77
-5.35	369.2	258.5	.0	99.1	204.0	.0	54.5	0	0			.77
-6.00	381.5	257.4	.0	111.5	229.1	.0	28.4	0	0			.75
-7.00	400.5	255.8	.0	130.5	267.7	.0	-11.9	0	0			.74
-8.00	419.5	254.1	.0	149.5	306.3	.0	-52.2	0	0			.76
-9.00	438.5	252.4	.0	168.5	344.9	.0	-92.5	0	0			.78
-10.00	457.5	250.7	.0	187.5	383.5	.0	-132.7	0	0			.81
-11.00	476.5	249.1	.0	206.5	422.1	.0	-173.0	0	0			.85
-11.95	494.5	247.5	.0	224.5	458.6	.0	-211.2	0	0			.89
-12.00	495.5	247.4	.0	225.5	460.7	.0	-213.3	0	0			.89
-12.06	496.7	247.3	.0	226.7	463.1	.0	-215.8	0	0			.89
-12.71	509.0	246.2	.0	239.0	488.1	.0	-241.9	0	0			.92
-12.72	509.2	246.2	.0	239.2	488.4	.0	-242.3	0	0			.92
-13.00	514.5	245.7	.0	244.5	499.2	.0	-253.5	0	0			.93
-13.06	515.6	245.6	.0	245.6	501.5	.0	-255.9	0	0			.93
-14.00	533.5	244.0	.0	263.5	537.8	.0	-293.8	0	0			.97
-15.00	552.5	242.4	.0	282.5	576.4	.0	-334.1	0	0			1.02
-16.00	571.5	240.7	.0	301.5	615.0	.0	-374.4	0	0			1.06

Graphical results from analysis of stage ref 1

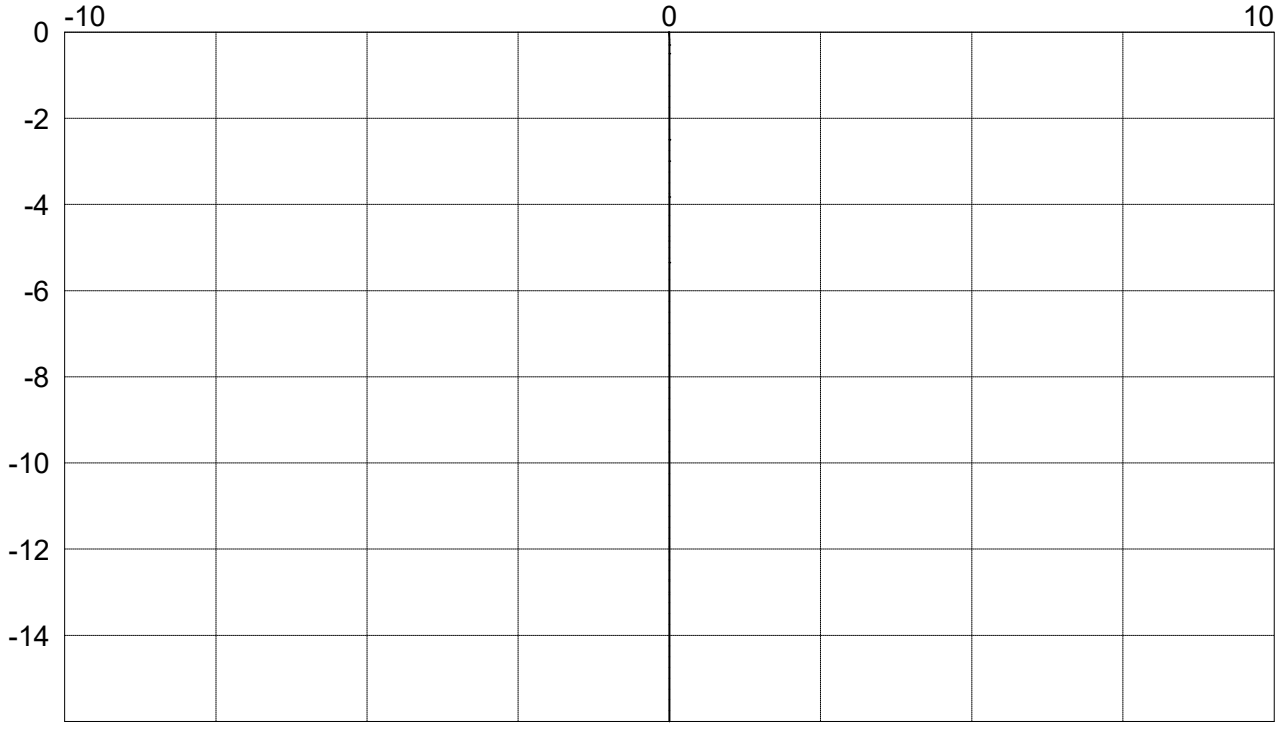


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 1 continued

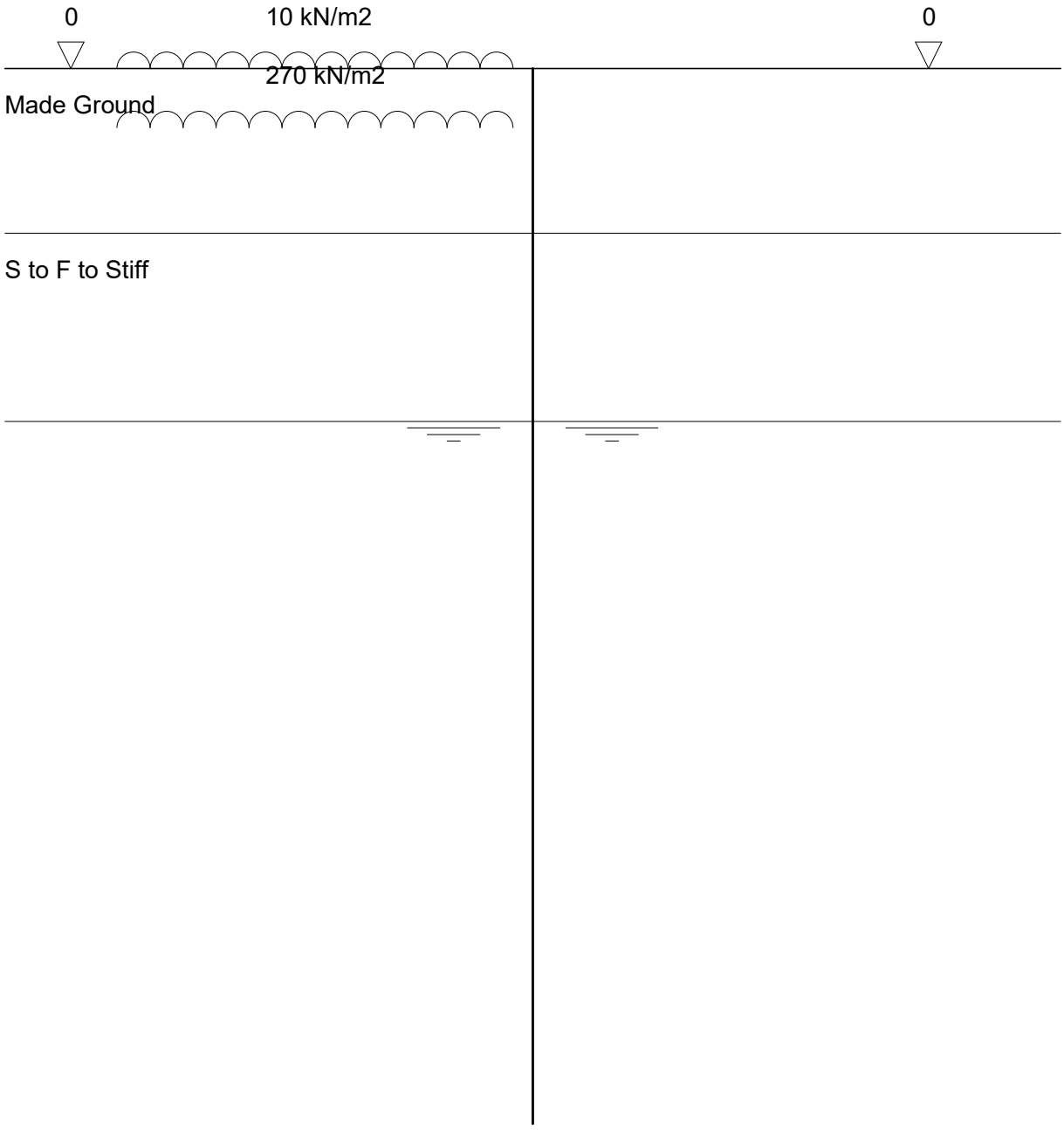


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **2**
Stage type **Active surcharge**

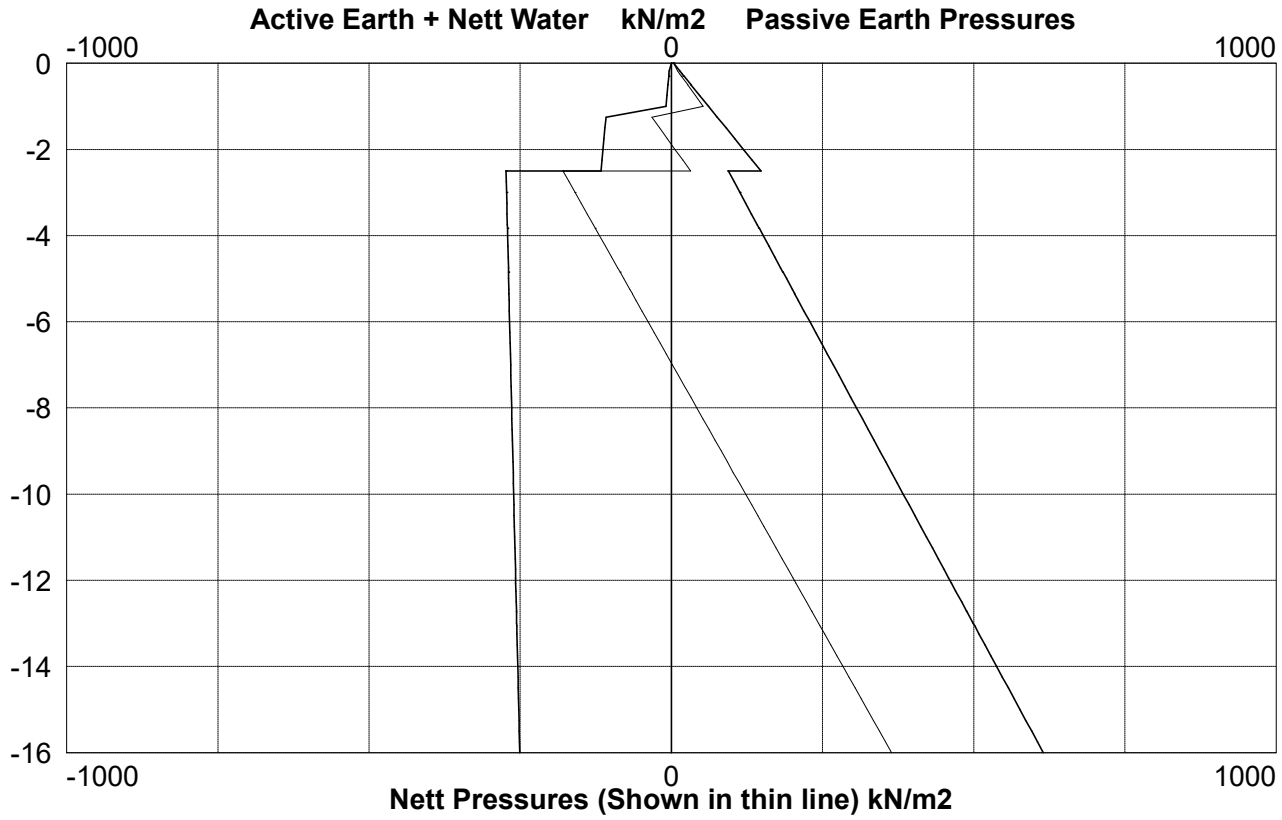


Tabular results from analysis of stage ref 2

strength.
analysis.

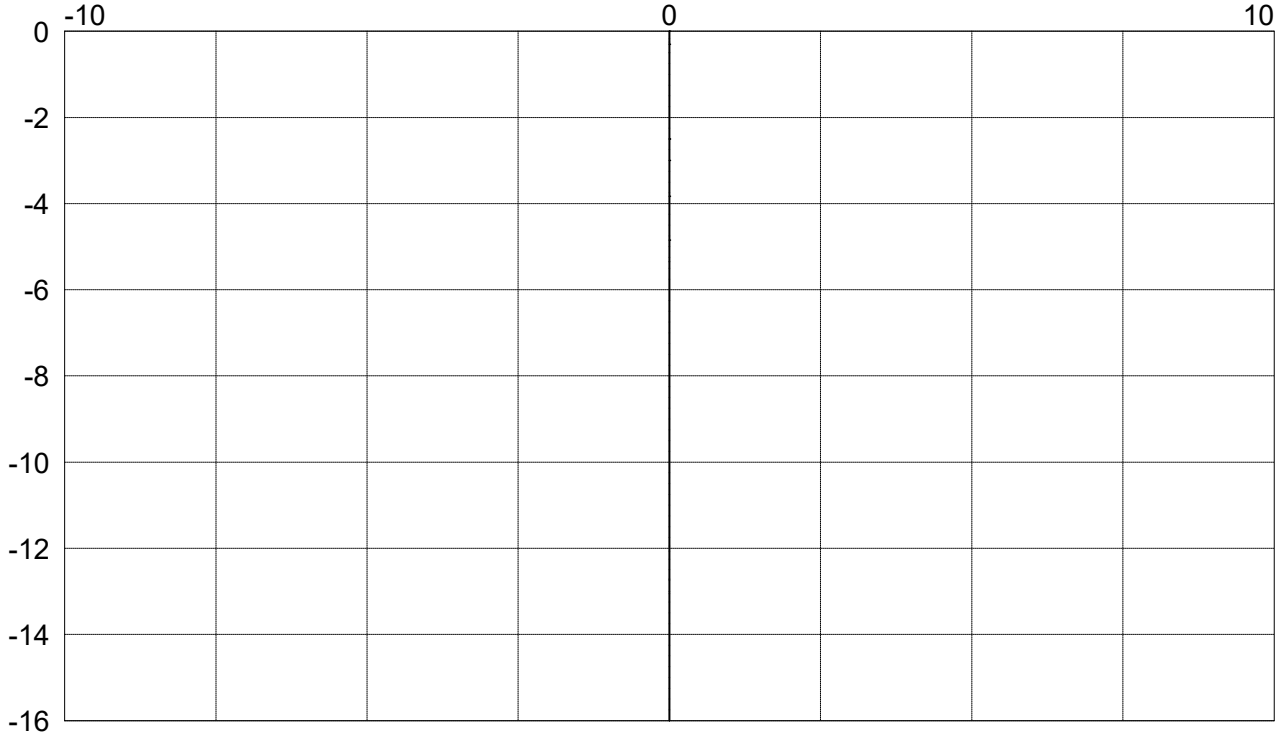
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	3.7	.0	-3.7	0	0			.00
t .00	.0	.0	.0	.0	3.8	.0	-3.8	0	0			>100.00
-.17	13.1	3.5	.0	3.1	13.7	.0	-10.2	0	0			6.15
-.30	15.4	4.3	.0	5.4	21.0	.0	-16.7	0	0		.0	5.01
-.30	15.4	4.3	.0	5.4	21.1	.0	-16.8	0	0			5.01
-.50	19.0	5.6	.0	9.0	32.5	.0	-27.0	0	0		.0	4.94
-.50	19.0	5.6	.0	9.0	32.7	.0	-27.1	0	0			4.94
-1.00	28.0	8.8	.0	18.0	61.4	.0	-52.6	0	0			5.57
-2.00	316.0	113.0	.0	36.0	119.2	.0	-6.2	0	0			1.67
-2.50	325.0	116.3	.0	45.0	148.1	.0	-31.8	0	0		.0	1.39
-2.50	325.0	273.3	.0	45.0	94.0	.0	179.3	0	0			1.39
-2.50	325.0	273.3	.0	45.0	94.1	.0	179.2	0	0			1.39
-3.00	334.5	272.5	.0	54.5	113.2	.0	159.3	0	0			1.17
-3.00	334.5	272.5	.0	54.5	113.3	.0	159.2	0	0			1.17
-3.83	350.3	271.1	.0	70.3	145.3	.0	125.8	0	0		.0	.90
-3.83	350.3	271.1	.0	70.3	145.4	.0	125.7	0	0			.90
-4.00	353.5	270.8	.0	73.5	151.9	.0	118.9	0	0			.87
-4.85	369.6	269.4	.0	89.6	184.6	.0	84.8	0	0			.76
-4.85	369.7	269.4	.0	89.6	184.7	.0	84.7	0	0			.76
-5.00	372.5	269.1	.0	92.5	190.5	.0	78.6	0	0			.75
-5.35	379.1	268.5	.0	99.1	203.9	.0	64.6	0	0			.74
-5.35	379.2	268.5	.0	99.1	204.0	.0	64.5	0	0			.74
-6.00	391.5	267.4	.0	111.5	229.1	.0	38.4	0	0			.72
-7.00	410.5	265.8	.0	130.5	267.7	.0	-1.9	0	0			.71
-8.00	429.5	264.1	.0	149.5	306.3	.0	-42.2	0	0			.73
-9.00	448.5	262.4	.0	168.5	344.9	.0	-82.5	0	0			.75
-10.00	467.5	260.7	.0	187.5	383.5	.0	-122.7	0	0			.78
-11.00	486.5	259.1	.0	206.5	422.1	.0	-163.0	0	0			.82
-11.95	504.5	257.5	.0	224.5	458.6	.0	-201.2	0	0			.85
-12.00	505.5	257.4	.0	225.5	460.7	.0	-203.3	0	0			.85
-12.06	506.7	257.3	.0	226.7	463.1	.0	-205.8	0	0			.86
-12.71	519.0	256.2	.0	239.0	488.1	.0	-231.9	0	0			.88
-12.72	519.2	256.2	.0	239.2	488.4	.0	-232.3	0	0			.88
-13.00	524.5	255.7	.0	244.5	499.2	.0	-243.5	0	0			.89
-13.06	525.6	255.6	.0	245.6	501.5	.0	-245.9	0	0			.90
-14.00	543.5	254.0	.0	263.5	537.8	.0	-283.8	0	0			.94
-15.00	562.5	252.4	.0	282.5	576.4	.0	-324.1	0	0			.98
-16.00	581.5	250.7	.0	301.5	615.0	.0	-364.4	0	0			1.02

Graphical results from analysis of stage ref 2

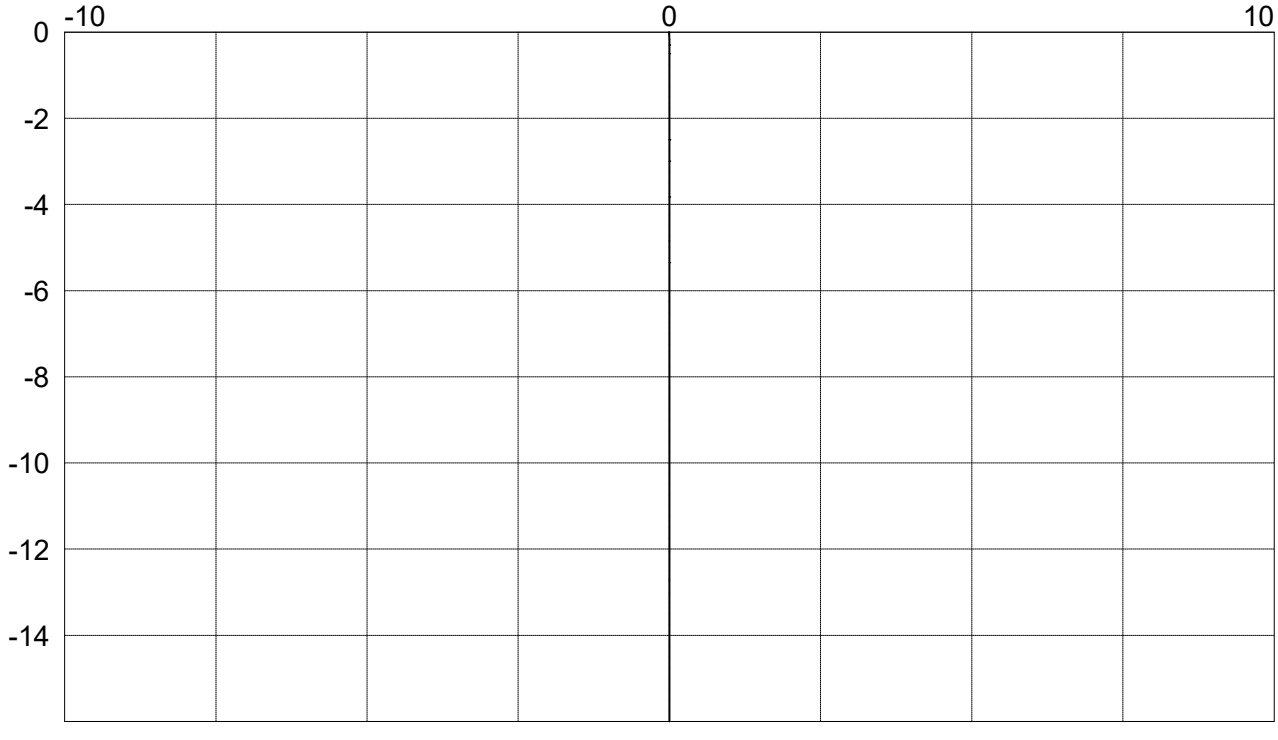


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 2 continued

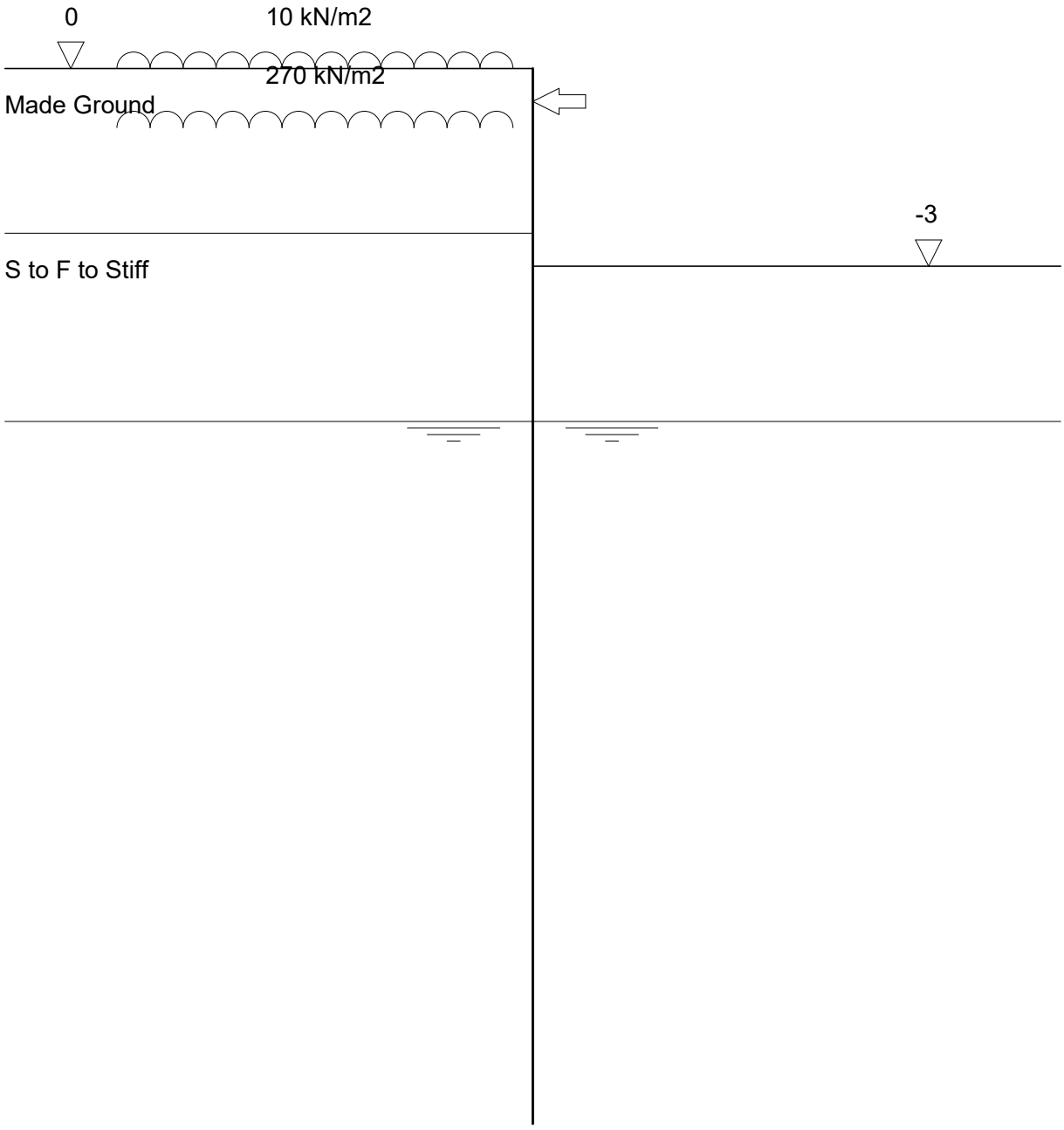


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **4**
Stage type **Passive side excavation**

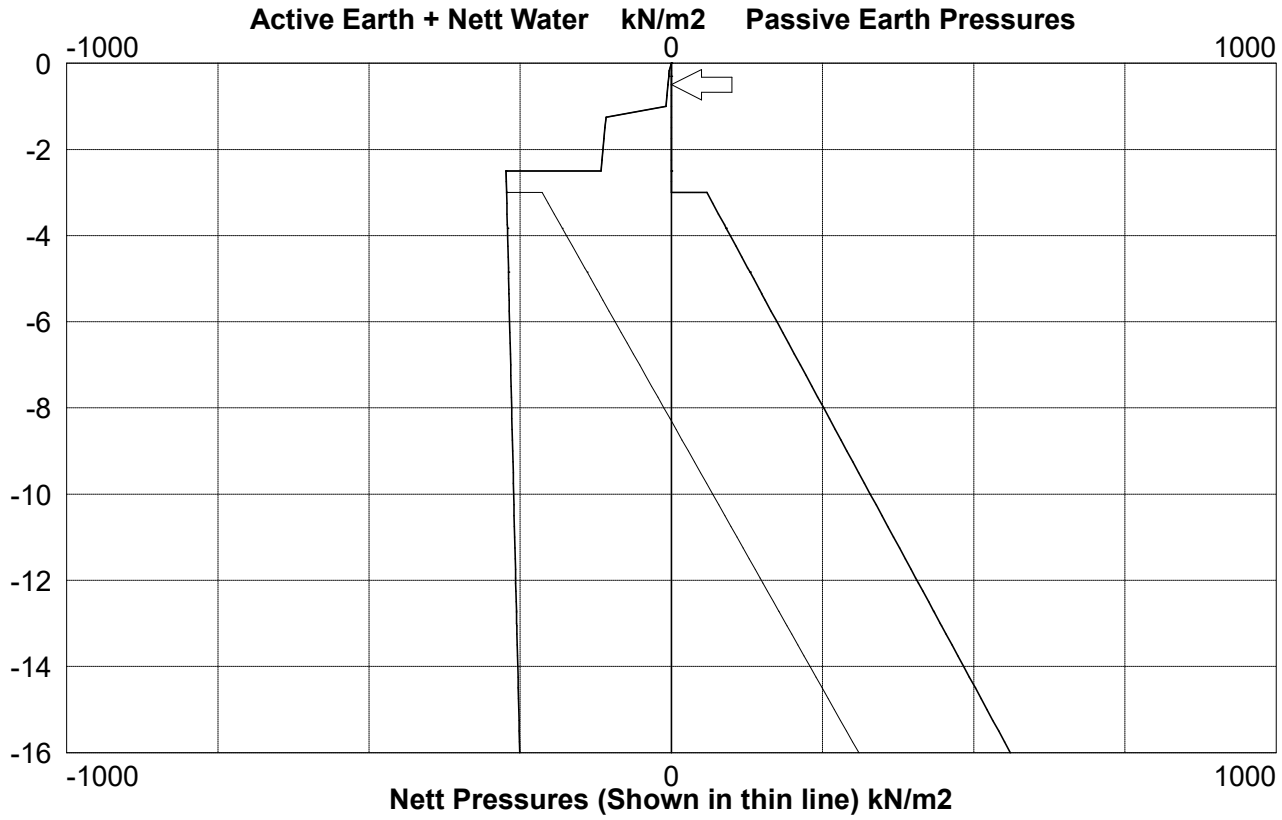


Tabular results from analysis of stage ref 4

strength.
analysis.

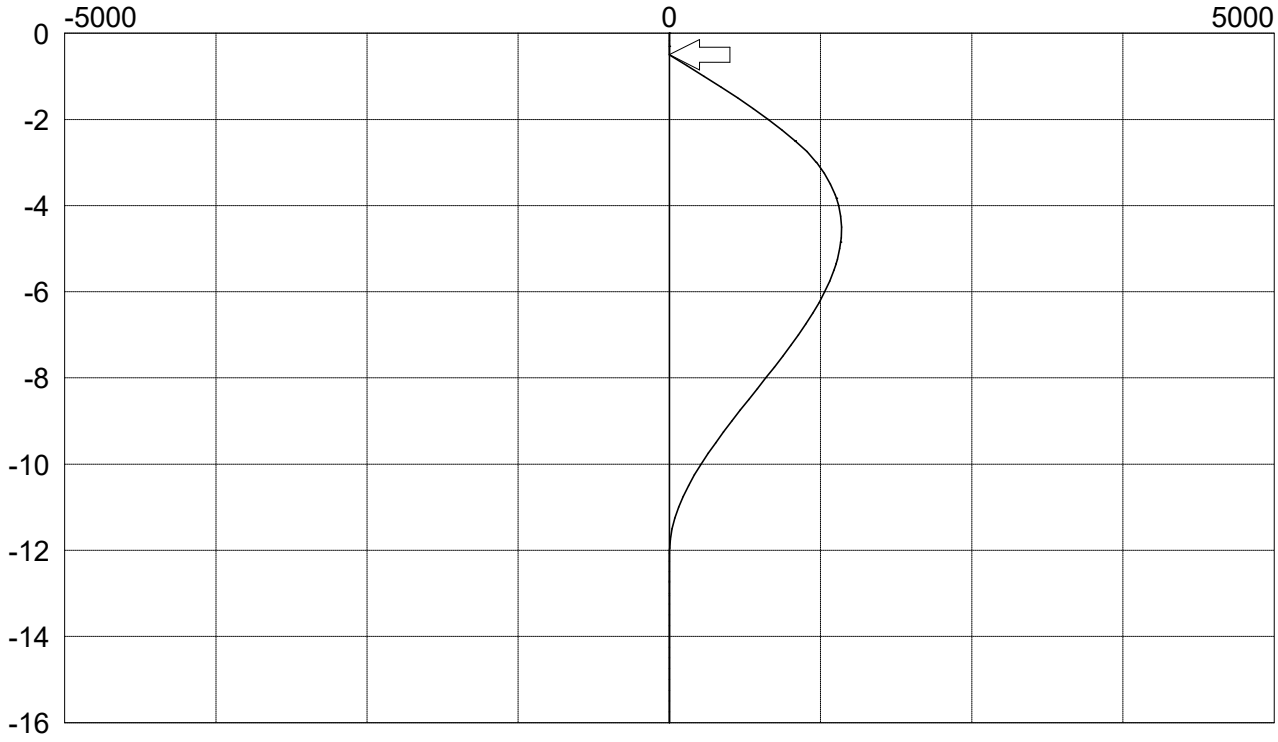
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		.0	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	-1.8		579.4	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	577.6			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-286.5	574.0			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-817.4	476.5			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-1041.3	419.1		.0	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-1041.7	419.1			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-1042.2	418.6			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-1216.2	283.2			.00
-3.00	334.5	272.5	.0	.0	58.8	.0	213.7	-1216.8	282.7			.00
-3.83	350.3	271.1	.0	15.8	90.8	.0	180.3	-1381.7	119.3		.0	.16
-3.83	350.3	271.1	.0	15.8	90.9	.0	180.2	-1381.9	118.9			.16
-4.00	353.5	270.8	.0	19.0	97.4	.0	173.4	-1399.4	89.2			.18
-4.85	369.6	269.4	.0	35.1	130.1	.0	139.3	-1416.7	-43.4			.28
-4.85	369.7	269.4	.0	35.2	130.2	.0	139.2	-1416.7	-43.7			.28
-5.00	372.5	269.1	.0	38.0	136.0	.0	133.1	-1408.6	-64.1			.29
-5.35	379.1	268.5	.0	44.6	149.4	.0	119.1	-1378.5	-108.0			.33
-5.35	379.2	268.5	.0	44.7	149.5	.0	119.0	-1378.3	-108.2			.33
-6.00	391.5	267.4	.0	57.0	174.6	.0	92.9	-1284.6	-177.1			.40
-7.00	410.5	265.8	.0	76.0	213.2	.0	52.6	-1067.8	-249.8			.50
-8.00	429.5	264.1	.0	95.0	251.8	.0	12.3	-798.4	-282.3			.59
-9.00	448.5	262.4	.0	114.0	290.4	.0	-28.0	-516.7	-274.5			.69
-10.00	467.5	260.7	.0	133.0	329.0	.0	-68.2	-262.9	-226.4			.79
-11.00	486.5	259.1	.0	152.0	367.6	.0	-108.5	-77.3	-138.0			.89
-11.95	504.5	257.5	.0	170.0	404.1	.0	-146.7	-1.7	-16.9			.99
-12.00	505.5	257.4	.0	171.0	406.2	.0	-148.8	-.3	-9.4			.99
-12.06	506.7	257.3	.0	172.2	408.6	.0	-151.3	0	0			1.00
-12.71	519.0	256.2	.0	184.5	433.6	.0	-177.4	0	0			1.07
-12.72	519.2	256.2	.0	184.7	433.9	.0	-177.8	0	0			1.07
-13.00	524.5	255.7	.0	190.0	444.7	.0	-189.0	0	0			1.10
-13.06	525.6	255.6	.0	191.1	447.0	.0	-191.4	0	0			1.10
-14.00	543.5	254.0	.0	209.0	483.3	.0	-229.3	0	0			1.20
-15.00	562.5	252.4	.0	228.0	521.9	.0	-269.6	0	0			1.30
-16.00	581.5	250.7	.0	247.0	560.5	.0	-309.9	0	0			1.41

Graphical results from analysis of stage ref 4

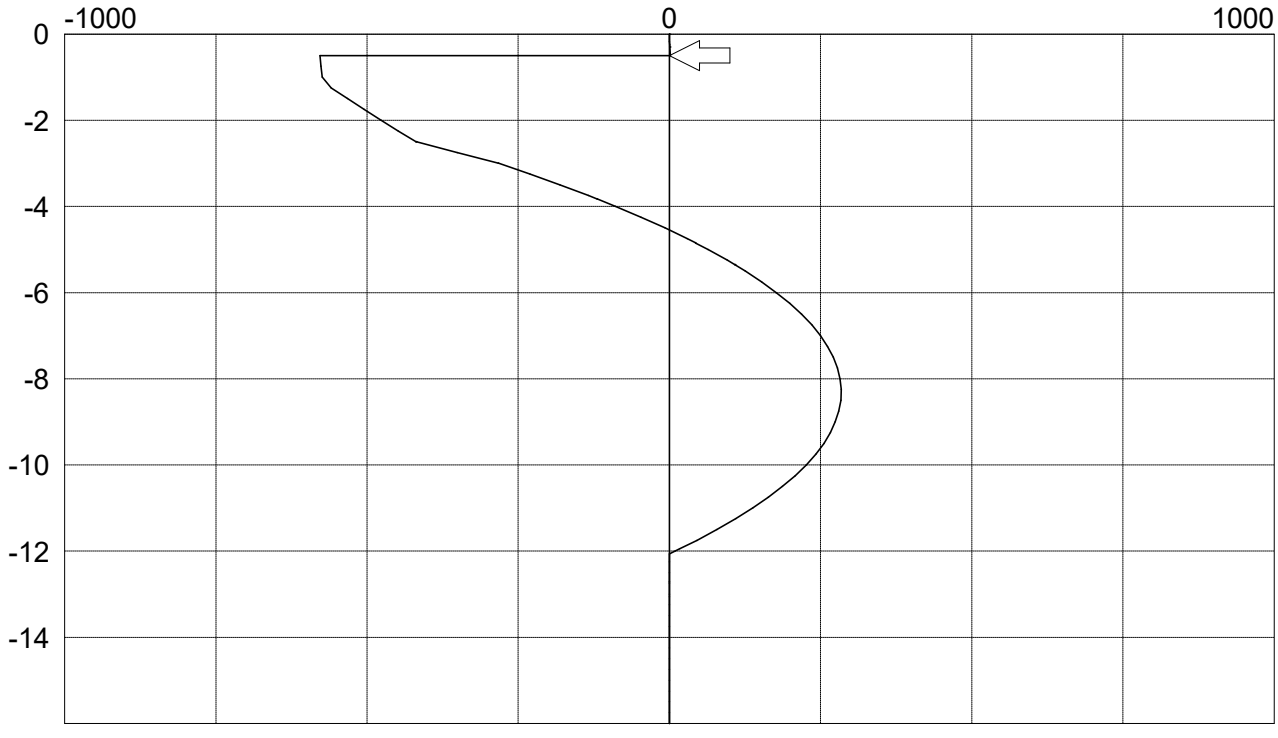


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 4 continued

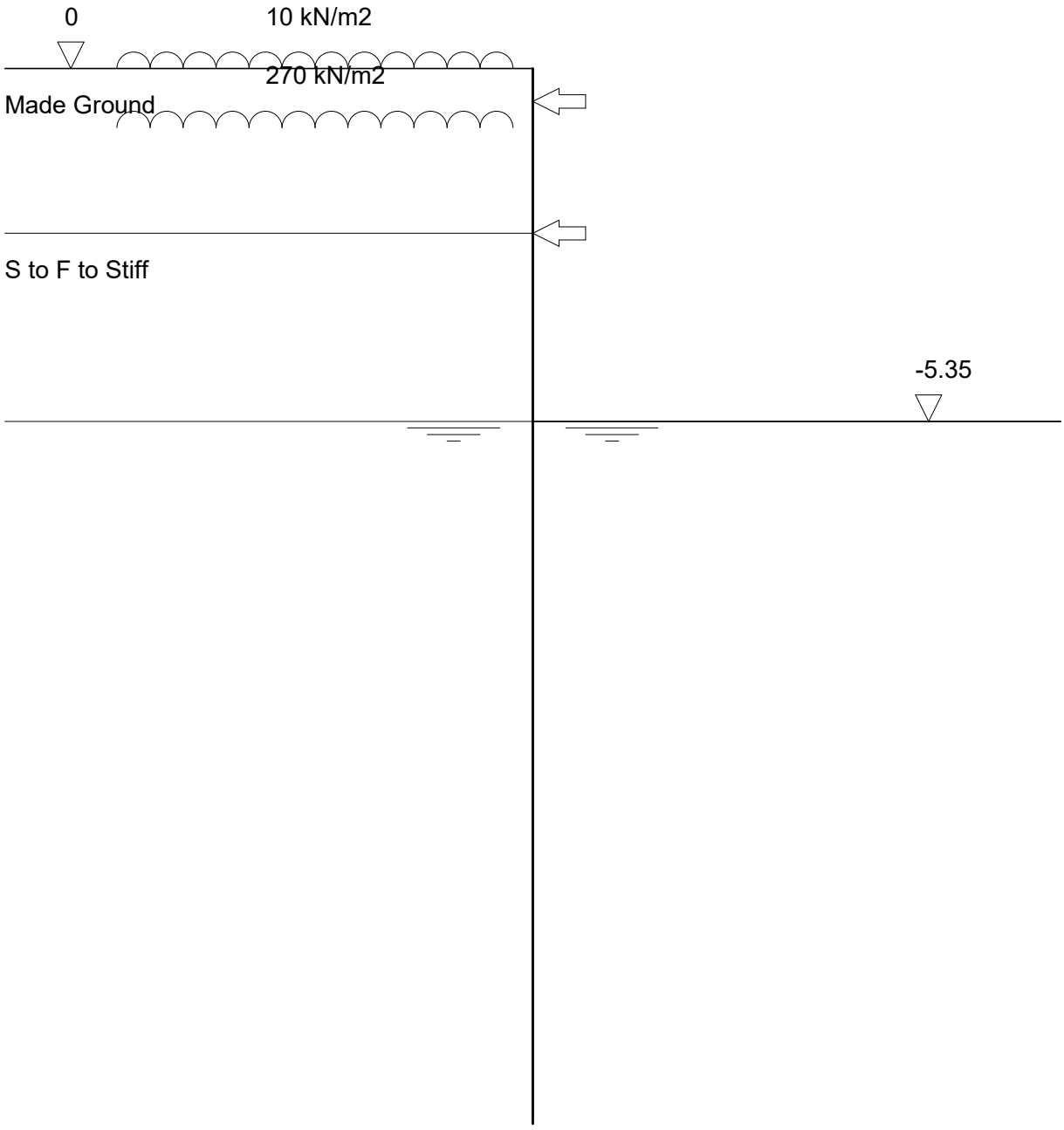


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **6**
Stage type **Passive side excavation**

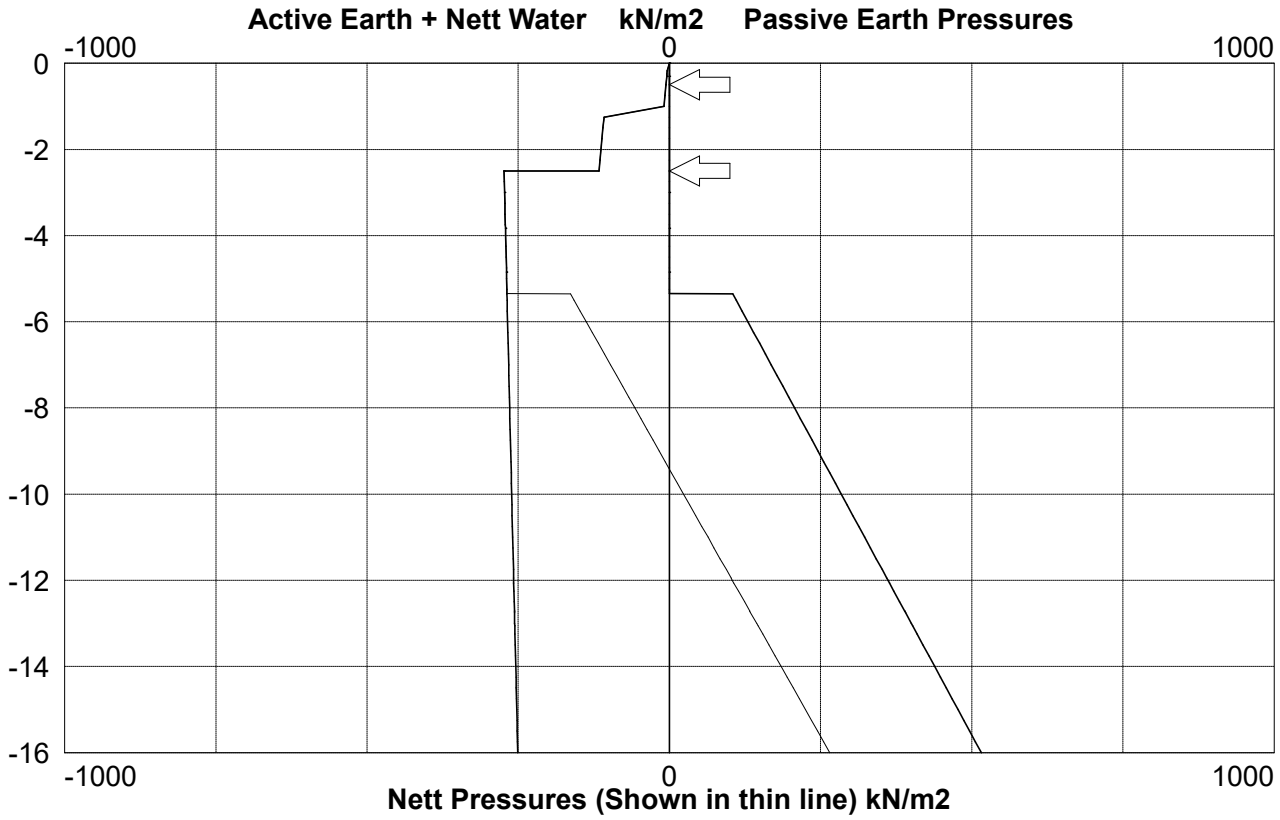


Tabular results from analysis of stage ref 6

strength.
analysis.

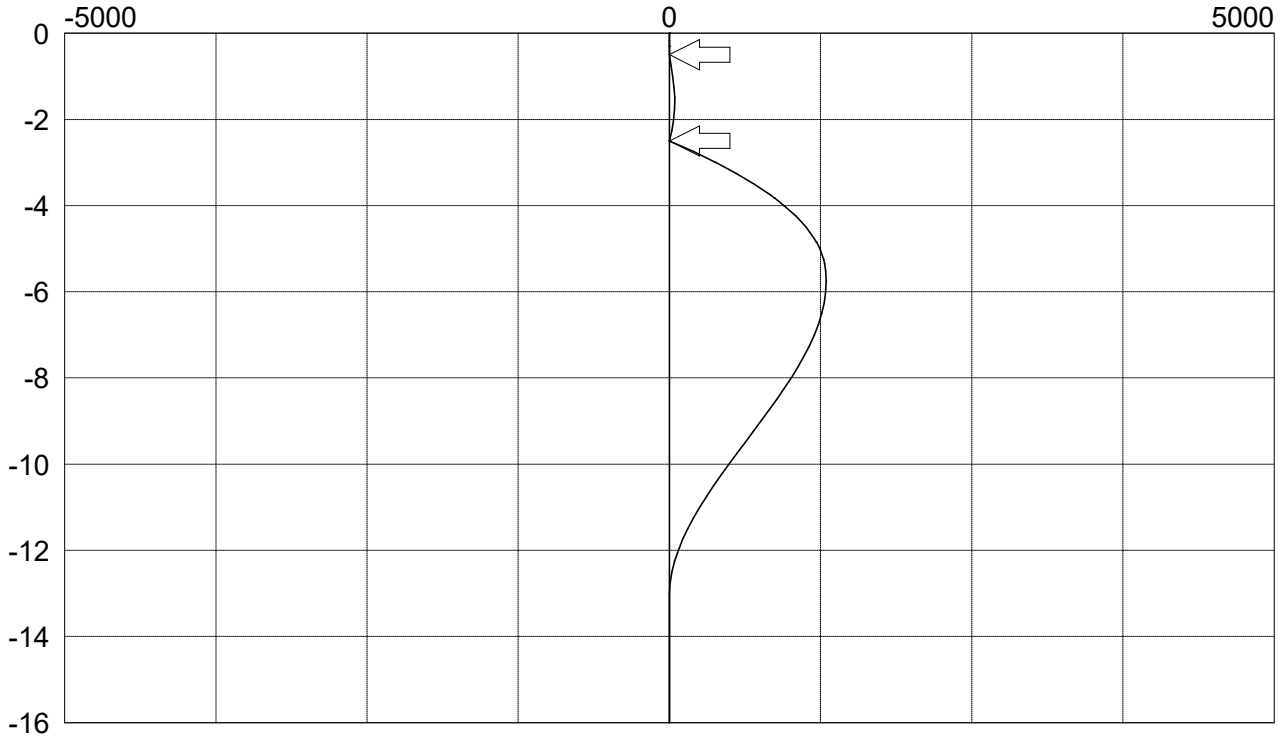
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		.0	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	-1.8		58.3	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	56.5			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-27.0	52.9			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-36.7	-44.7			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-.1	-102.0		939.7	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	0	837.7			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-.8	837.1			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-382.5	701.8			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-383.9	701.2			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-872.2	475.6		.0	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-873.1	475.1			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-949.1	429.6			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-1216.2	200.5			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-1216.6	200.0			.00
-5.00	372.5	269.1	.0	.0	.0	.0	269.1	-1243.6	159.6			.00
-5.35	379.1	268.5	.0	.0	.0	.0	268.5	-1282.8	66.1			.00
-5.35	379.2	268.5	.0	.0	104.8	.0	163.7	-1283.0	65.6			.00
-6.00	391.5	267.4	.0	12.4	129.9	.0	137.5	-1292.9	-32.3			.15
-7.00	410.5	265.8	.0	31.4	168.5	.0	97.2	-1198.6	-149.6			.31
-8.00	429.5	264.1	.0	50.4	207.1	.0	57.0	-1007.1	-226.7			.44
-9.00	448.5	262.4	.0	69.4	245.7	.0	16.7	-758.5	-263.6			.56
-10.00	467.5	260.7	.0	88.4	284.3	.0	-23.6	-493.3	-260.1			.67
-11.00	486.5	259.1	.0	107.4	322.9	.0	-63.8	-251.7	-216.4			.78
-11.95	504.5	257.5	.0	125.4	359.5	.0	-102.0	-81.4	-137.6			.88
-12.00	505.5	257.4	.0	126.4	361.5	.0	-104.1	-73.9	-132.4			.89
-12.06	506.7	257.3	.0	127.6	364.0	.0	-106.7	-65.6	-125.7			.89
-12.71	519.0	256.2	.0	139.9	389.0	.0	-132.8	-8.9	-47.9			.96
-12.72	519.2	256.2	.0	140.0	389.3	.0	-133.1	-8.5	-46.9			.96
-13.00	524.5	255.7	.0	145.4	400.1	.0	-144.4	-.2	-8.2			.99
-13.06	525.6	255.6	.0	146.5	402.3	.0	-146.7	0	0			1.00
-14.00	543.5	254.0	.0	164.4	438.7	.0	-184.7	0	0			1.10
-15.00	562.5	252.4	.0	183.4	477.3	.0	-224.9	0	0			1.21
-16.00	581.5	250.7	.0	202.4	515.9	.0	-265.2	0	0			1.31

Graphical results from analysis of stage ref 6

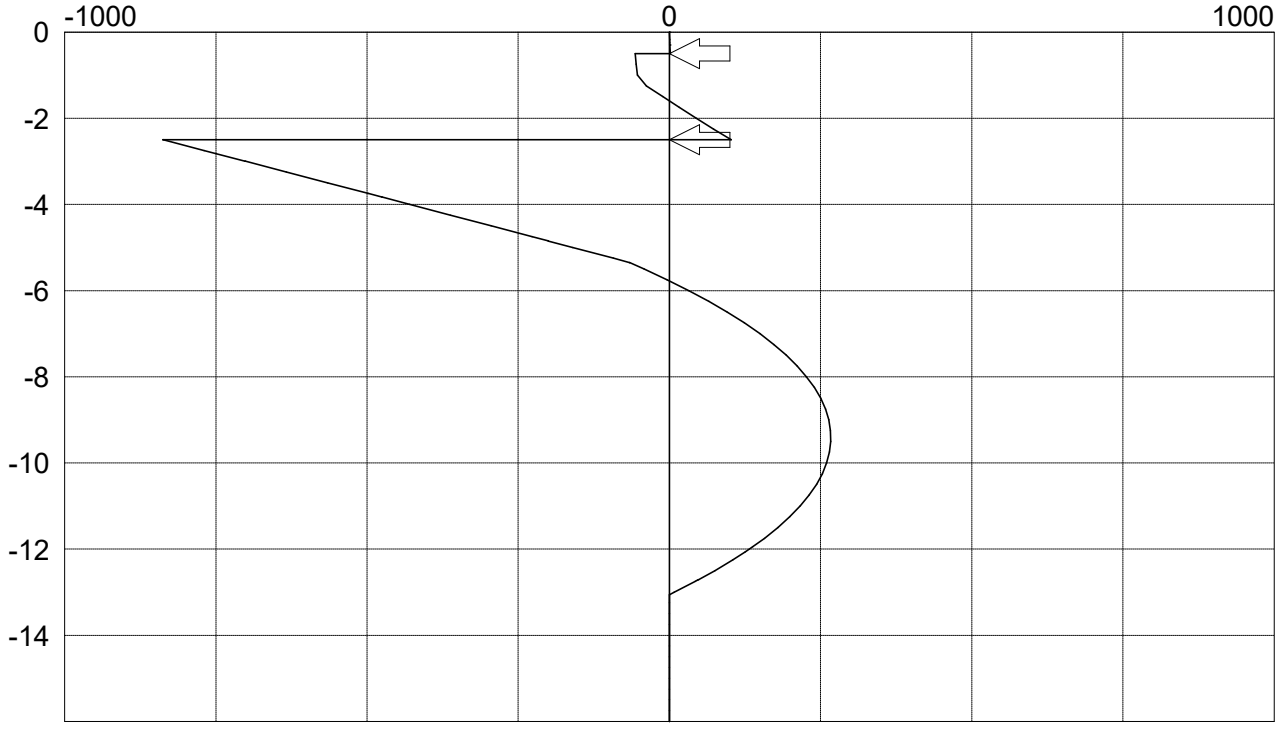


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 6 continued

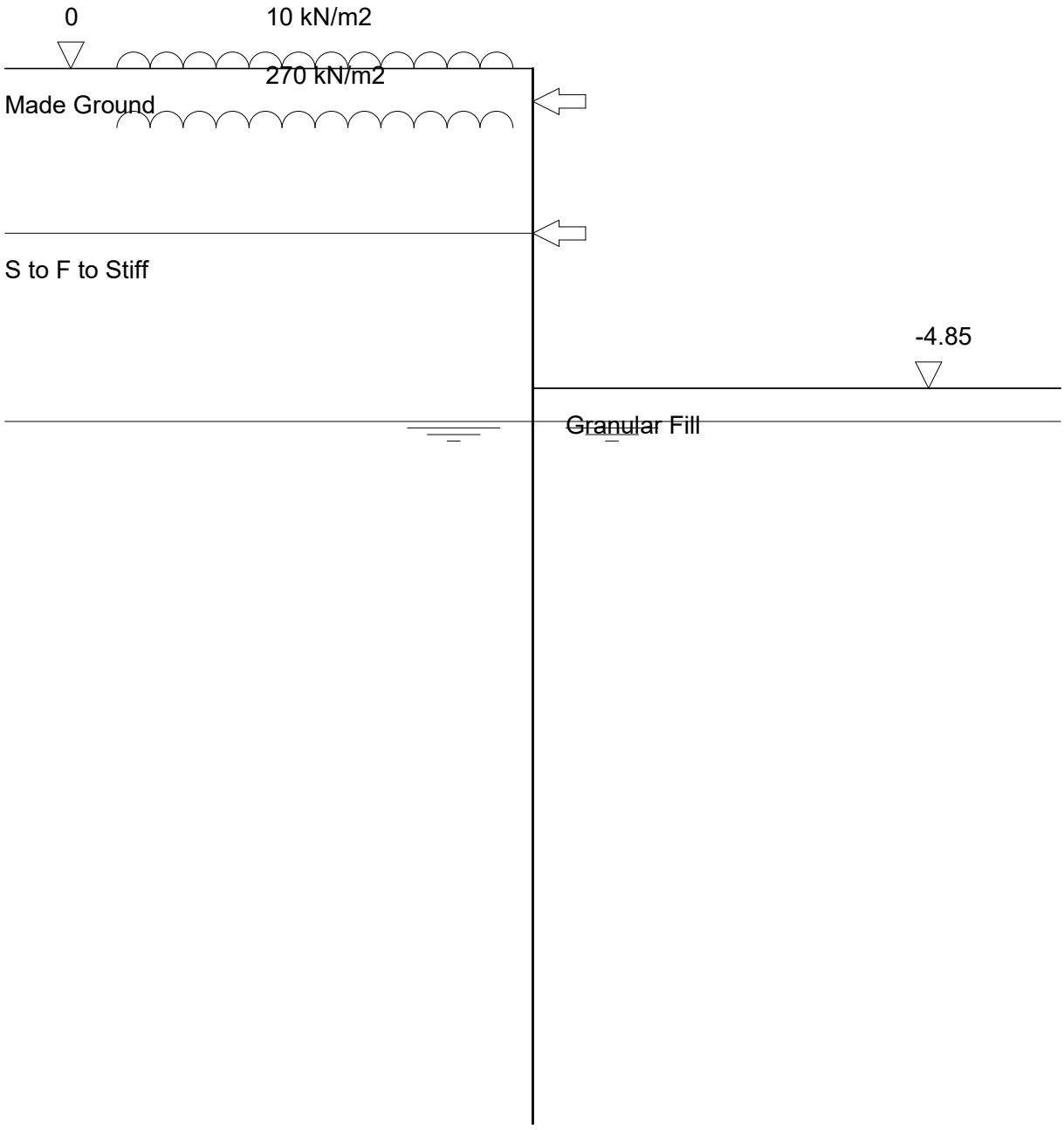


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **7**
Stage type **Passive side fill**

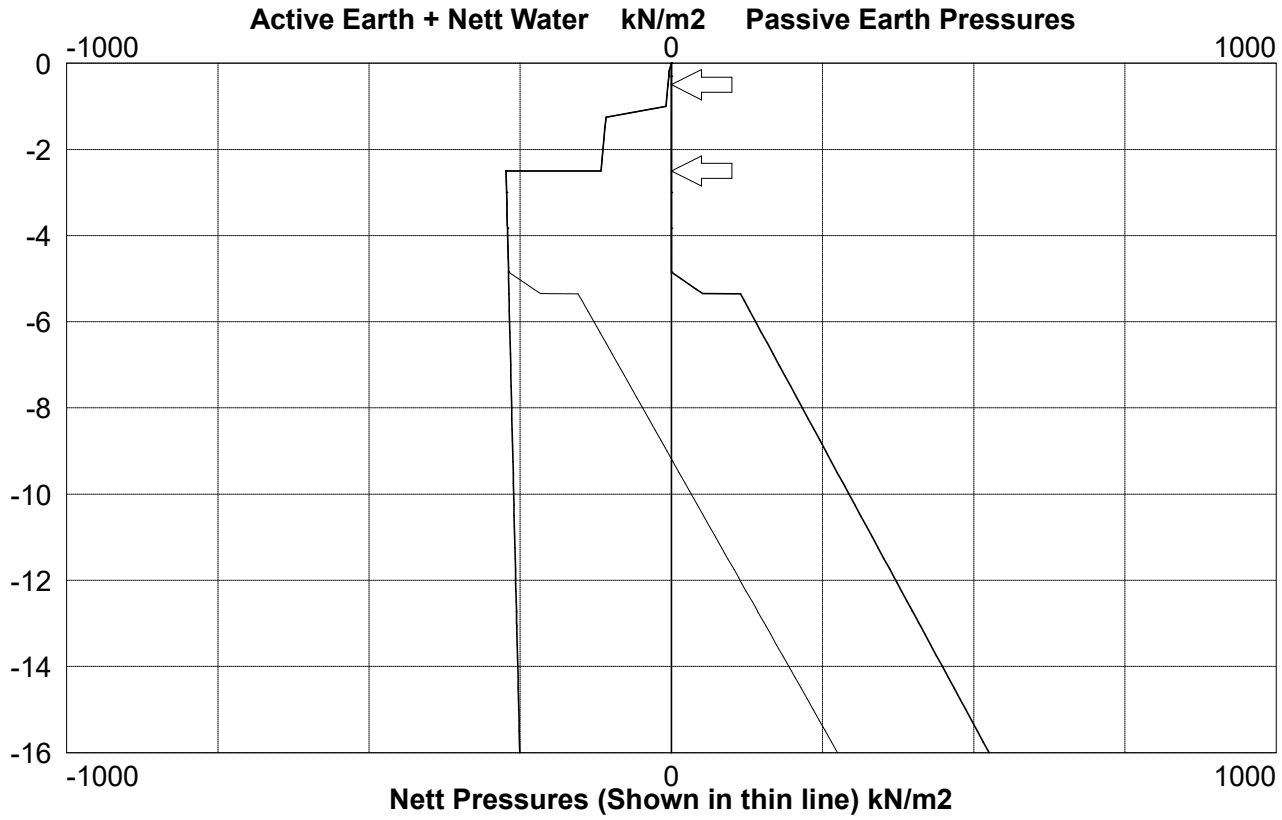


Tabular results from analysis of stage ref 7

strength.
analysis.

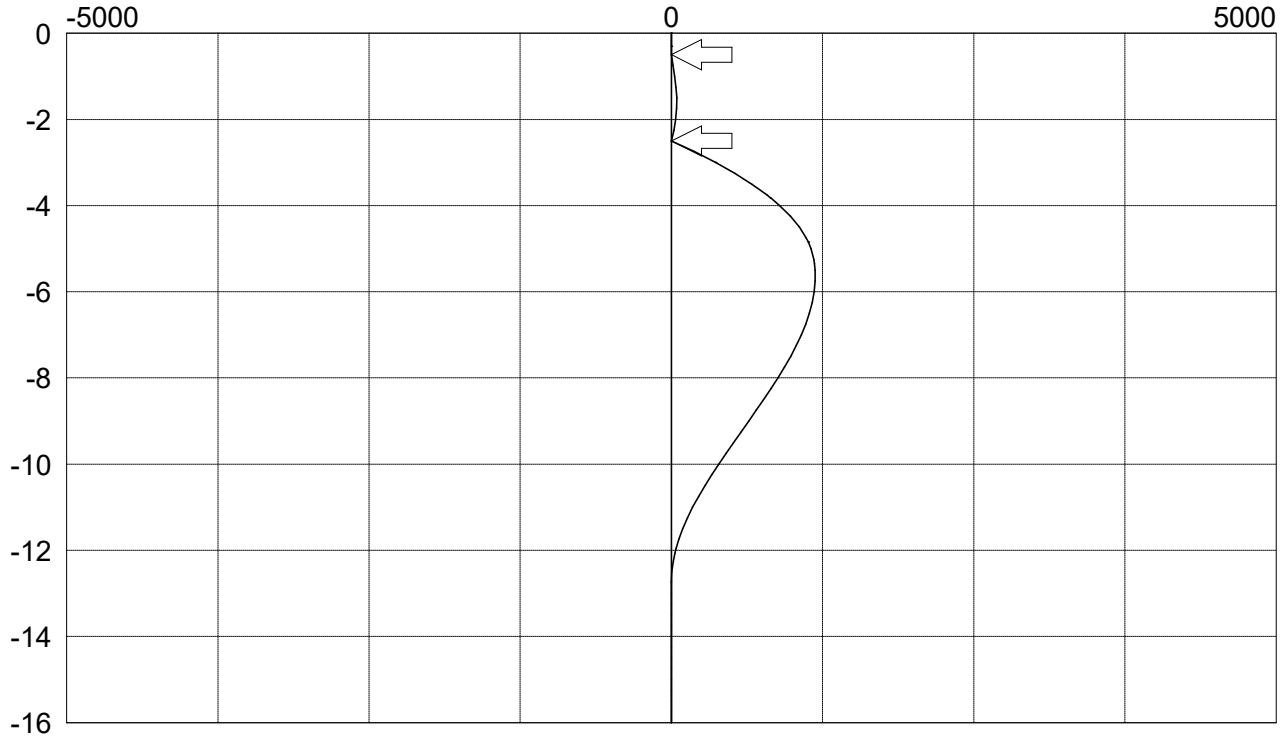
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		.0	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	-1.8		58.3	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	56.5			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-27.0	52.9			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-36.7	-44.7			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-.1	-102.0		904.0	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	0	802.0			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-.8	801.5			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-364.8	666.1			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-366.1	665.6			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-824.8	440.0		.0	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-825.7	439.5			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-895.7	394.0			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-1132.6	164.9			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-1132.9	164.4			.00
-5.00	372.5	269.1	.0	2.9	15.7	.0	253.5	-1154.6	125.2			.00
-5.35	379.1	268.5	.0	9.5	52.0	.0	216.6	-1183.6	43.4			.03
-5.35	379.2	268.5	.0	9.5	114.3	.0	154.2	-1183.7	43.0			.03
-6.00	391.5	267.4	.0	21.9	139.4	.0	128.0	-1180.9	-48.7			.18
-7.00	410.5	265.8	.0	40.9	178.0	.0	87.7	-1074.9	-156.6			.34
-8.00	429.5	264.1	.0	59.9	216.6	.0	47.5	-881.2	-224.2			.48
-9.00	448.5	262.4	.0	78.9	255.2	.0	7.2	-639.9	-251.5			.60
-10.00	467.5	260.7	.0	97.9	293.8	.0	-33.1	-391.5	-238.6			.71
-11.00	486.5	259.1	.0	116.9	332.4	.0	-73.3	-176.2	-185.4			.82
-11.95	504.5	257.5	.0	134.9	369.0	.0	-111.5	-39.7	-97.5			.92
-12.00	505.5	257.4	.0	135.9	371.0	.0	-113.6	-34.2	-91.9			.92
-12.06	506.7	257.3	.0	137.1	373.5	.0	-116.2	-28.6	-84.5			.93
-12.71	519.0	256.2	.0	149.4	398.5	.0	-142.3	-.1	-1.1			1.00
-12.72	519.2	256.2	.0	149.5	398.8	.0	-142.6	0	0			1.00
-13.00	524.5	255.7	.0	154.9	409.6	.0	-153.9	0	0			1.03
-13.06	525.6	255.6	.0	156.0	411.8	.0	-156.2	0	0			1.04
-14.00	543.5	254.0	.0	173.9	448.2	.0	-194.2	0	0			1.14
-15.00	562.5	252.4	.0	192.9	486.8	.0	-234.4	0	0			1.24
-16.00	581.5	250.7	.0	211.9	525.4	.0	-274.7	0	0			1.35

Graphical results from analysis of stage ref 7

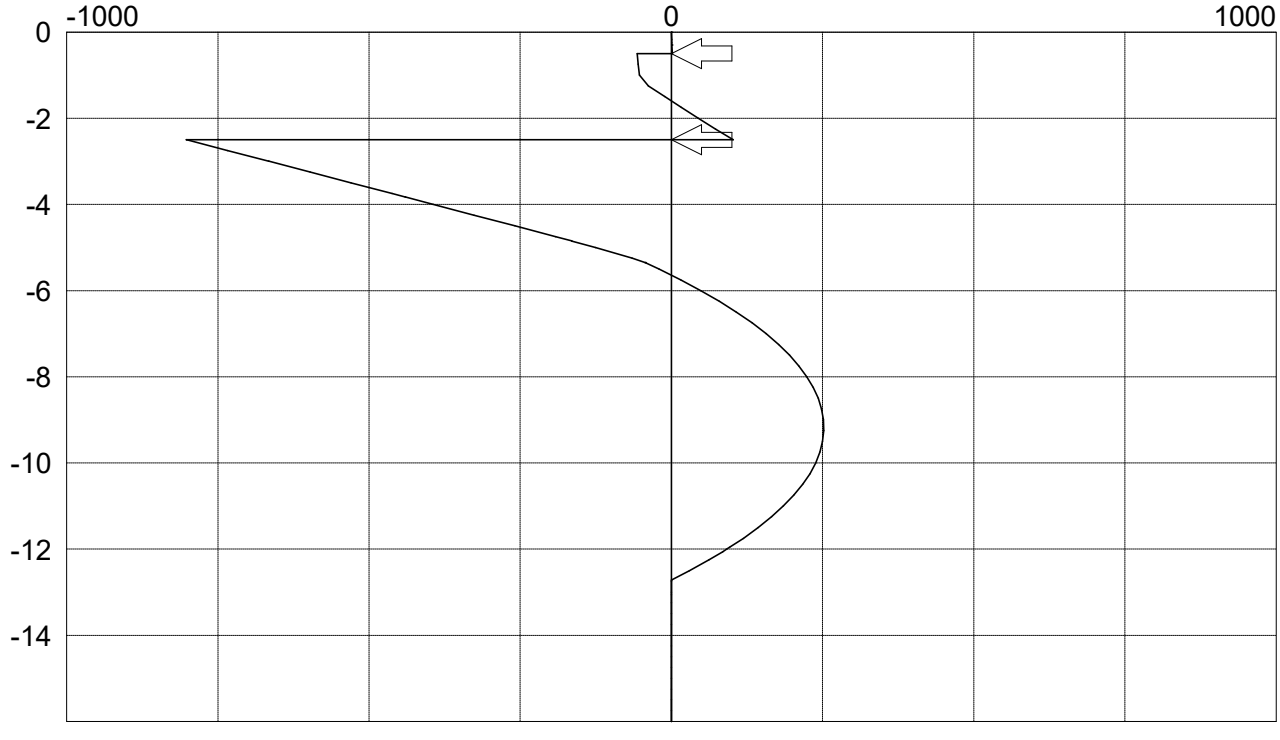


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 7 continued

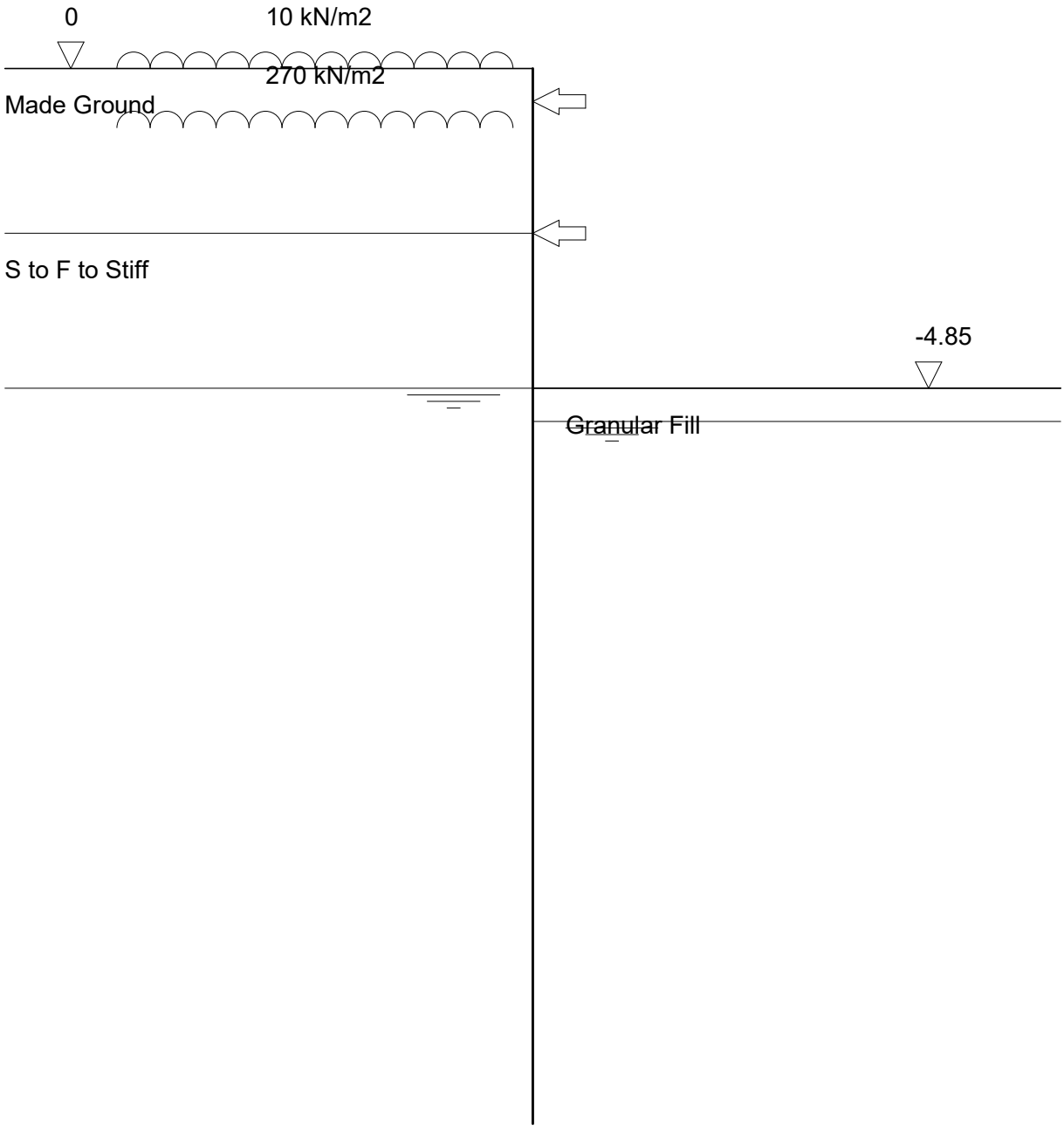


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **8**
Stage type **Active water level**

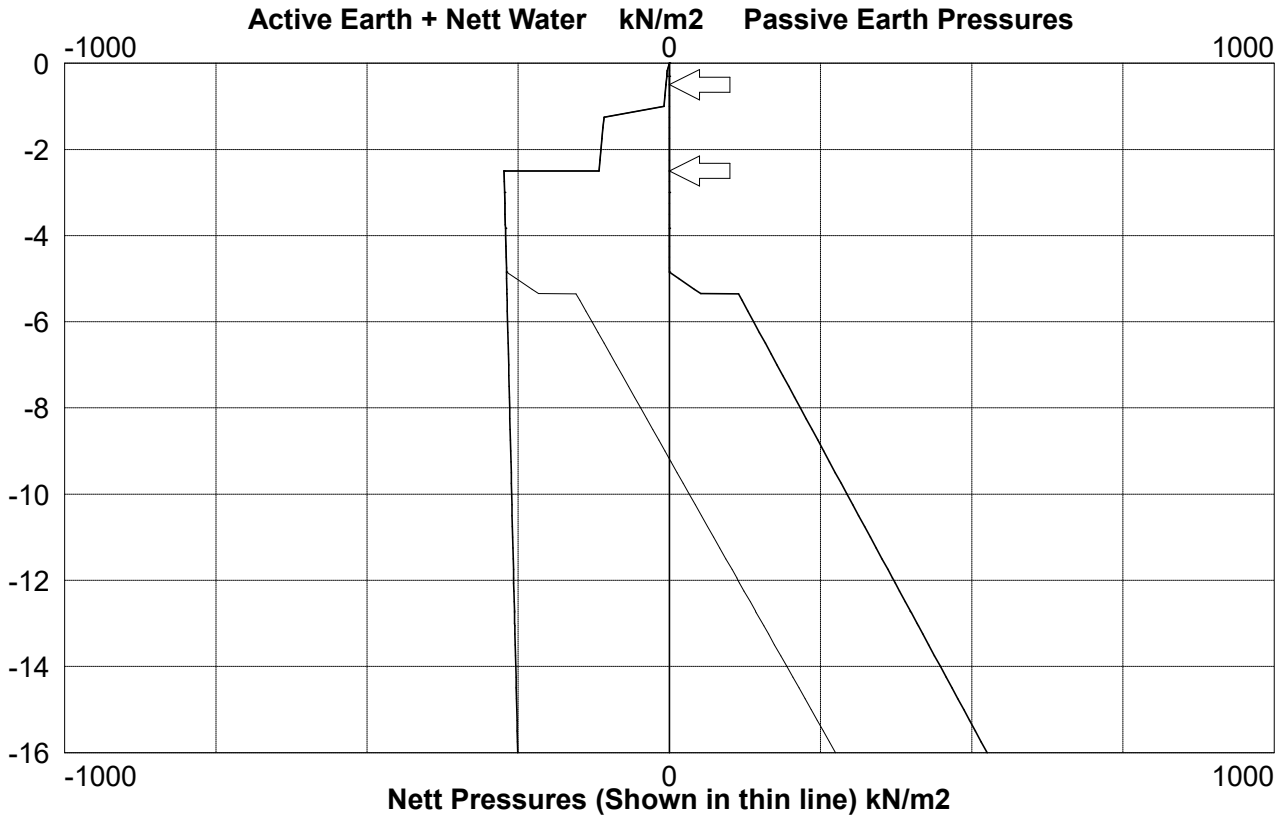


Tabular results from analysis of stage ref 8

strength.
analysis.

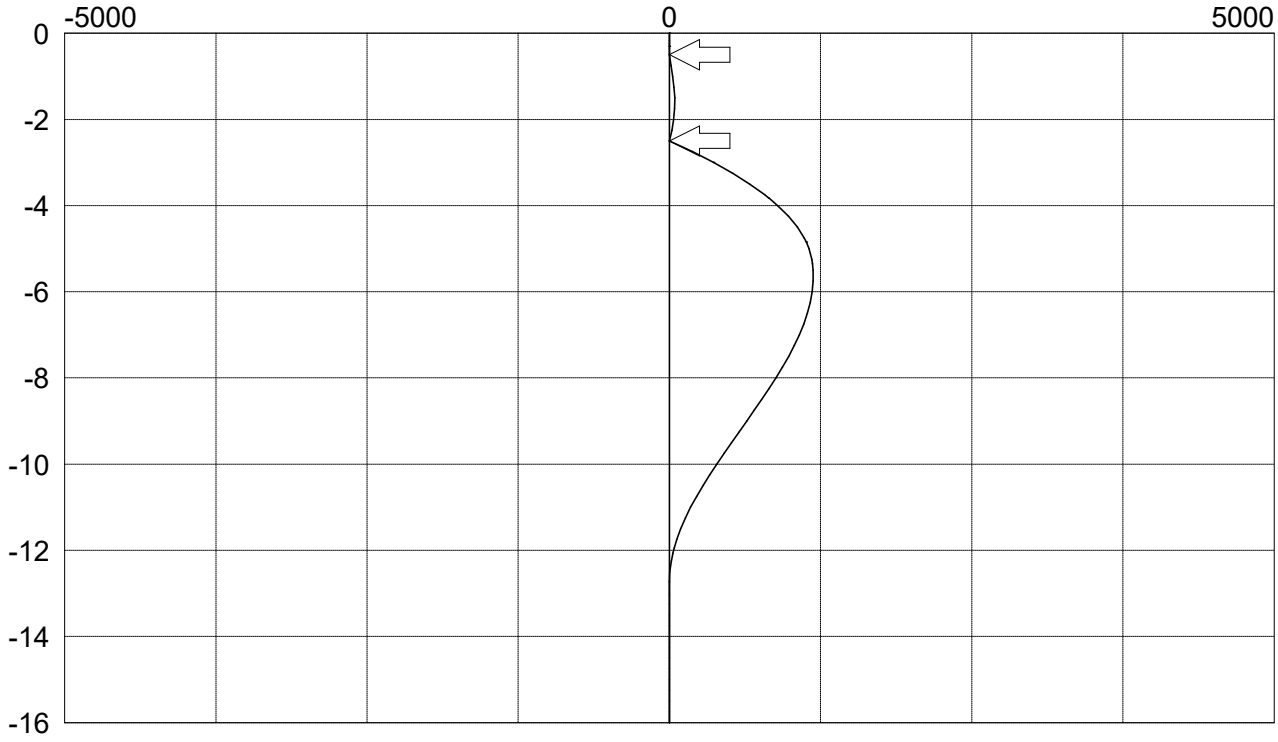
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		.0	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	-1.8		58.3	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	56.5			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-27.0	52.9			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-36.7	-44.7			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-.1	-102.0		904.0	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	0	802.0			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-.8	801.5			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-364.8	666.1			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-366.1	665.6			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-824.8	440.0		.0	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-825.7	439.5			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-895.7	394.0			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-1132.6	164.9			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-1132.9	164.4			.00
-5.00	372.5	269.1	.0	2.9	15.7	.0	253.5	-1154.6	125.2			.00
-5.35	379.1	268.5	.0	9.5	52.0	.0	216.6	-1183.6	43.4			.03
-5.35	379.2	268.5	.0	9.5	114.3	.0	154.2	-1183.7	43.0			.03
-6.00	391.5	267.4	.0	21.9	139.4	.0	128.0	-1180.9	-48.7			.18
-7.00	410.5	265.8	.0	40.9	178.0	.0	87.7	-1074.9	-156.6			.34
-8.00	429.5	264.1	.0	59.9	216.6	.0	47.5	-881.2	-224.2			.48
-9.00	448.5	262.4	.0	78.9	255.2	.0	7.2	-639.9	-251.5			.60
-10.00	467.5	260.7	.0	97.9	293.8	.0	-33.1	-391.5	-238.6			.71
-11.00	486.5	259.1	.0	116.9	332.4	.0	-73.3	-176.2	-185.4			.82
-11.95	504.5	257.5	.0	134.9	369.0	.0	-111.5	-39.7	-97.5			.92
-12.00	505.5	257.4	.0	135.9	371.0	.0	-113.6	-34.2	-91.9			.92
-12.06	506.7	257.3	.0	137.1	373.5	.0	-116.2	-28.6	-84.5			.93
-12.71	519.0	256.2	.0	149.4	398.5	.0	-142.3	-.1	-1.1			1.00
-12.72	519.2	256.2	.0	149.5	398.8	.0	-142.6	0	0			1.00
-13.00	524.5	255.7	.0	154.9	409.6	.0	-153.9	0	0			1.03
-13.06	525.6	255.6	.0	156.0	411.8	.0	-156.2	0	0			1.04
-14.00	543.5	254.0	.0	173.9	448.2	.0	-194.2	0	0			1.14
-15.00	562.5	252.4	.0	192.9	486.8	.0	-234.4	0	0			1.24
-16.00	581.5	250.7	.0	211.9	525.4	.0	-274.7	0	0			1.35

Graphical results from analysis of stage ref 8

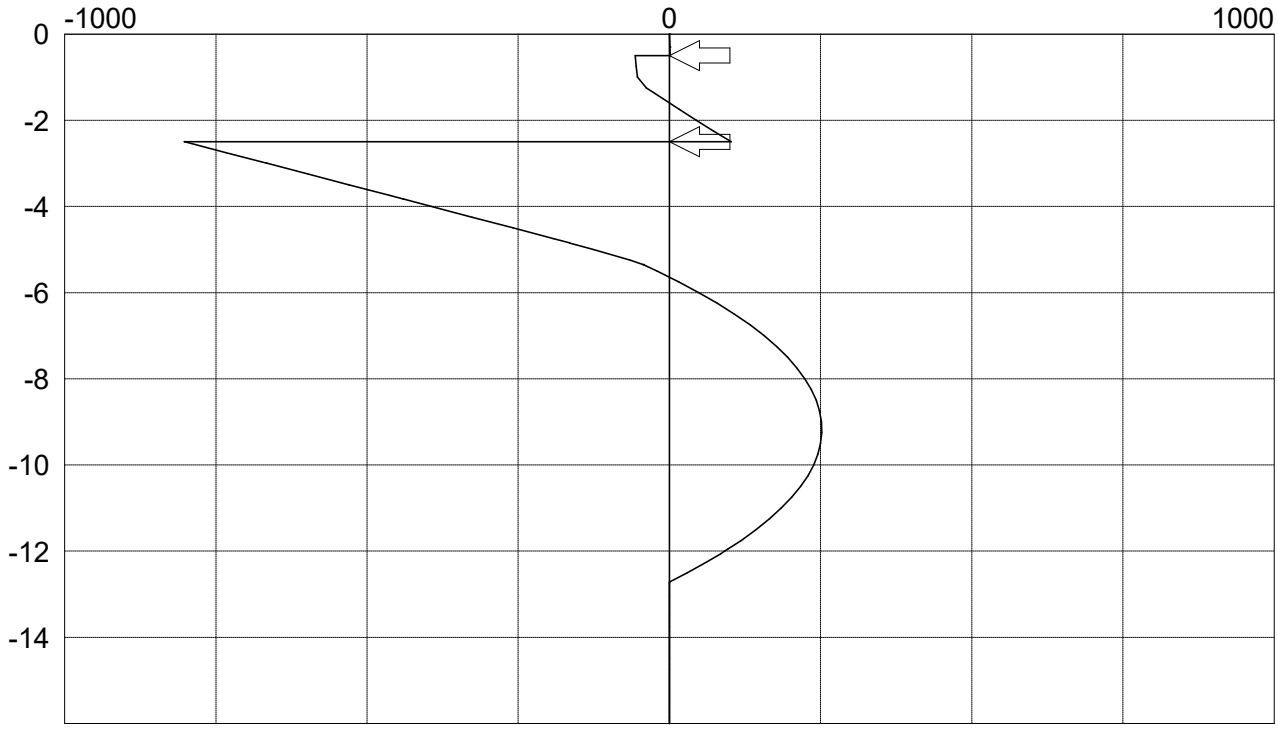


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 8 continued

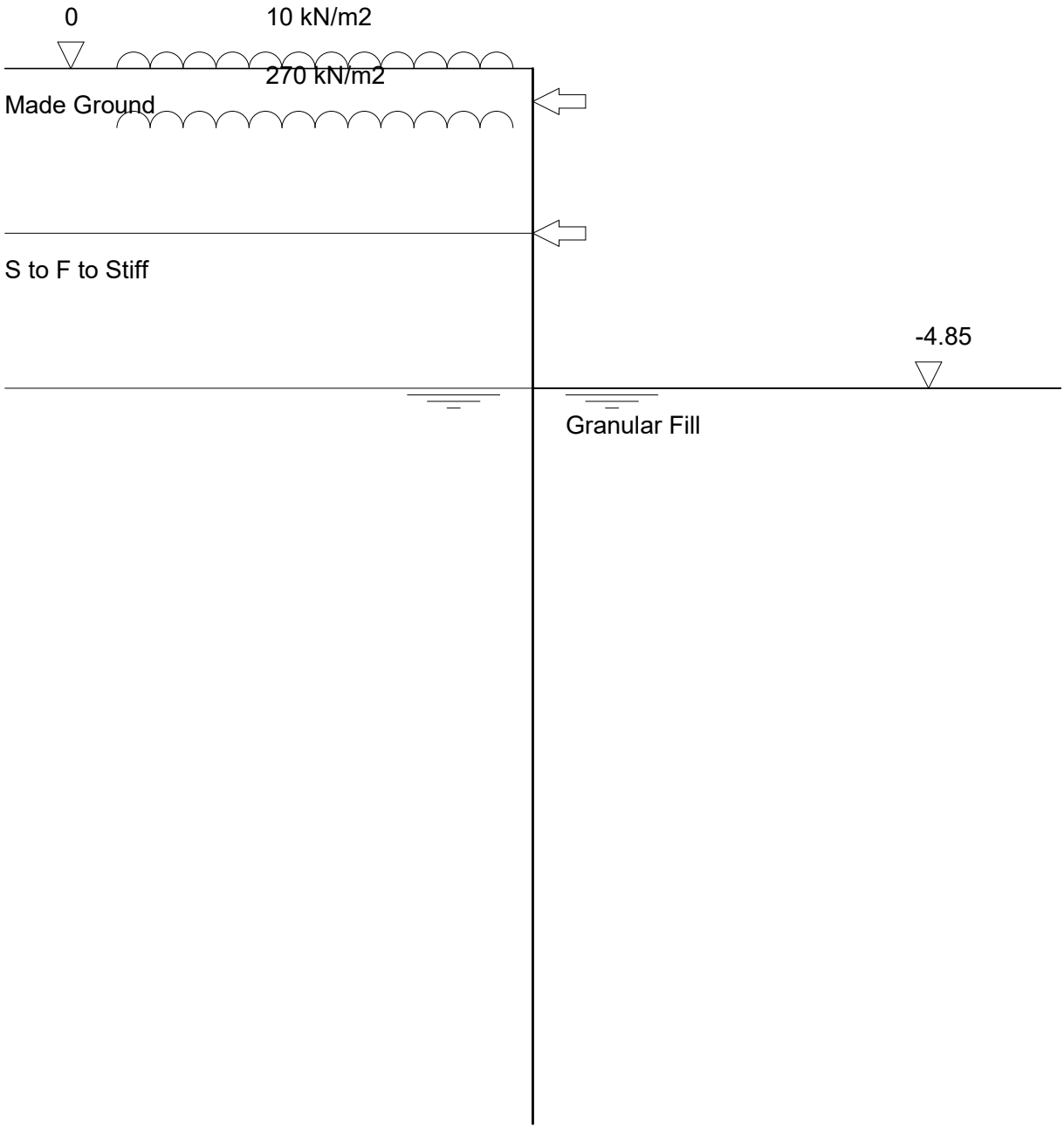


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **9**
Stage type **Passive water level**

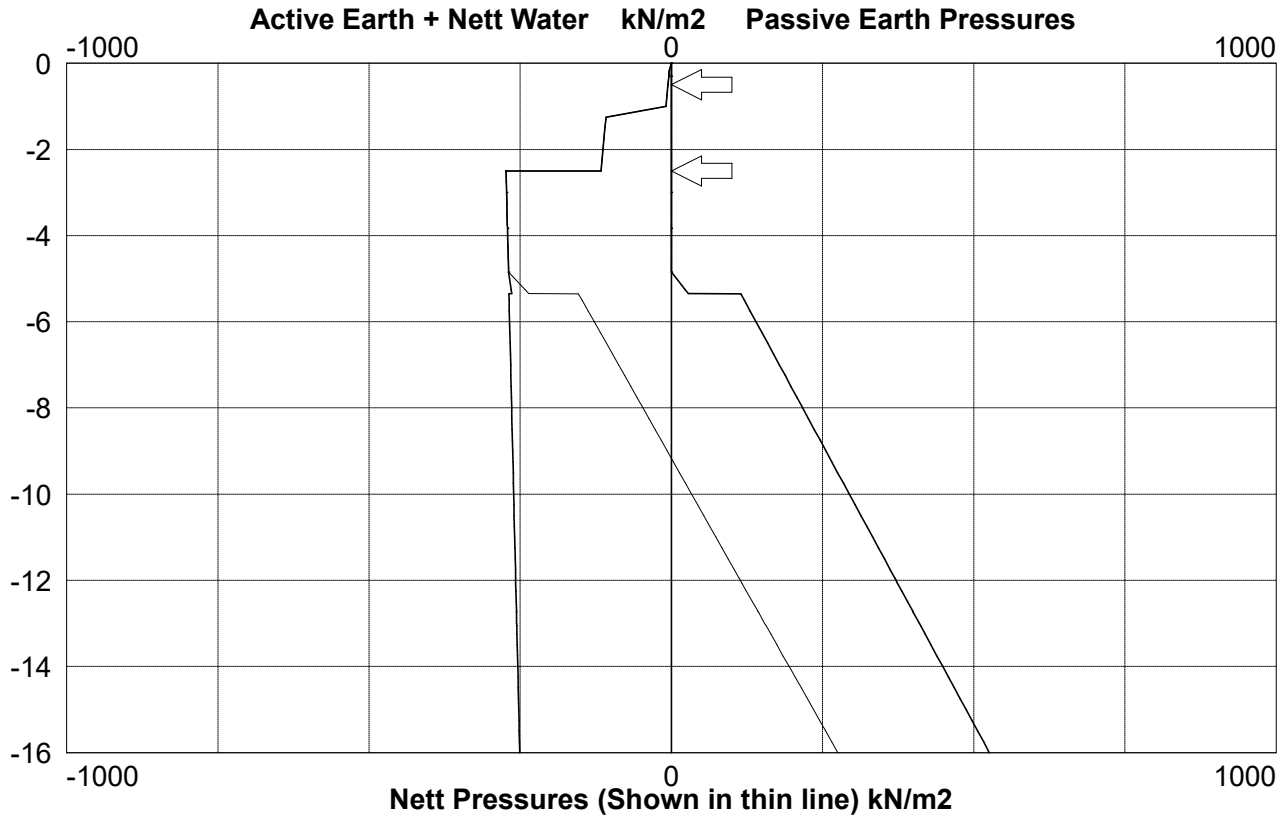


Tabular results from analysis of stage ref 9

strength.
analysis.

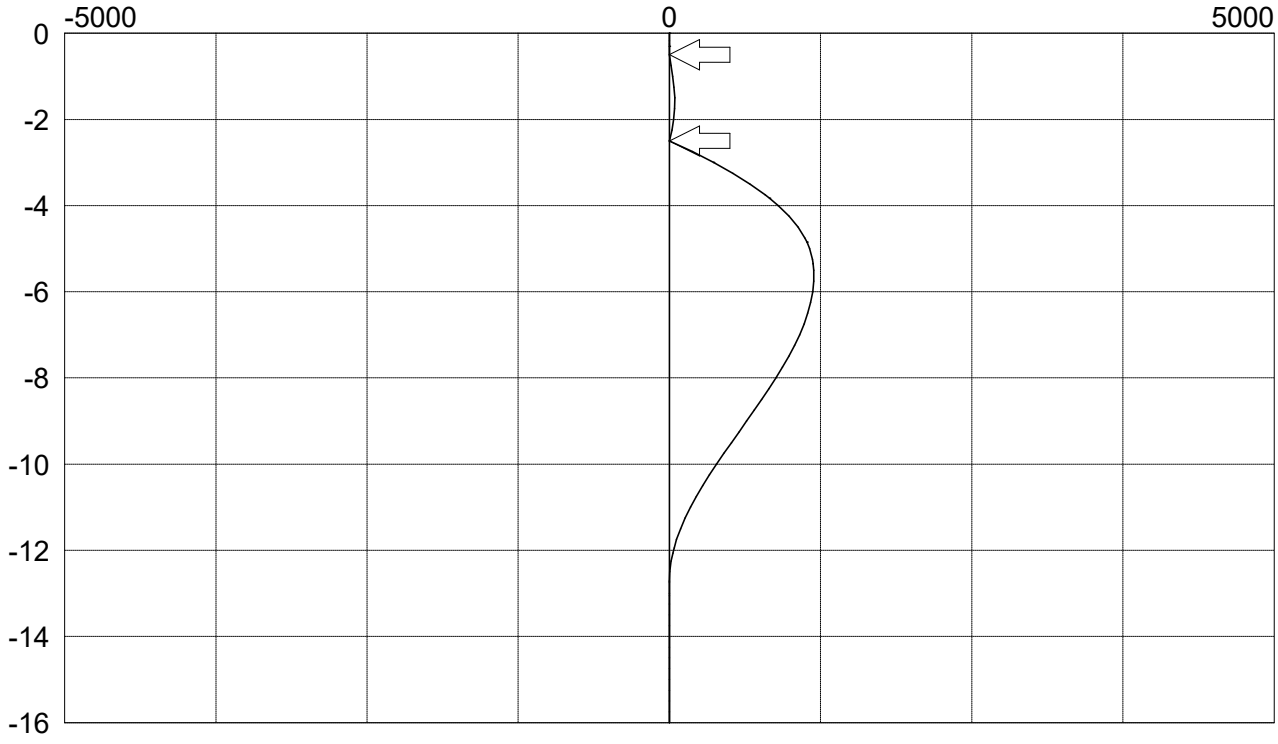
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		.0	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	-1.8		58.3	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	56.5			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-27.0	52.9			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-36.7	-44.7			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-.1	-102.0		906.2	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	0	804.2			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-.8	803.7			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-365.9	668.3			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-367.2	667.8			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-827.8	442.2		.0	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-828.7	441.7			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-899.0	396.2			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-1137.8	167.1			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-1138.1	166.6			.00
-5.00	372.5	269.1	.0	1.5	8.4	1.5	259.2	-1160.1	127.0			.00
-5.35	379.1	268.5	.0	5.1	27.9	4.9	235.8	-1189.1	40.8			.02
-5.35	379.2	268.5	.0	10.0	114.8	.0	153.7	-1189.2	40.4			.02
-6.00	391.5	267.4	.0	22.4	139.9	.0	127.5	-1184.8	-51.0			.17
-7.00	410.5	265.8	.0	41.4	178.5	.0	87.2	-1076.8	-158.3			.34
-8.00	429.5	264.1	.0	60.4	217.1	.0	47.0	-881.5	-225.5			.47
-9.00	448.5	262.4	.0	79.4	255.7	.0	6.7	-639.3	-252.3			.59
-10.00	467.5	260.7	.0	98.4	294.3	.0	-33.6	-390.4	-238.8			.71
-11.00	486.5	259.1	.0	117.4	332.9	.0	-73.8	-175.1	-185.1			.82
-11.95	504.5	257.5	.0	135.4	369.5	.0	-112.0	-39.0	-96.8			.92
-12.00	505.5	257.4	.0	136.4	371.5	.0	-114.1	-33.6	-91.2			.92
-12.06	506.7	257.3	.0	137.6	374.0	.0	-116.7	-28.0	-83.8			.93
-12.71	519.0	256.2	.0	149.9	399.0	.0	-142.8	0	0			1.00
-12.72	519.2	256.2	.0	150.0	399.3	.0	-143.1	0	0			1.00
-13.00	524.5	255.7	.0	155.4	410.1	.0	-154.4	0	0			1.03
-13.06	525.6	255.6	.0	156.5	412.3	.0	-156.7	0	0			1.04
-14.00	543.5	254.0	.0	174.4	448.7	.0	-194.7	0	0			1.14
-15.00	562.5	252.4	.0	193.4	487.3	.0	-234.9	0	0			1.24
-16.00	581.5	250.7	.0	212.4	525.9	.0	-275.2	0	0			1.35

Graphical results from analysis of stage ref 9

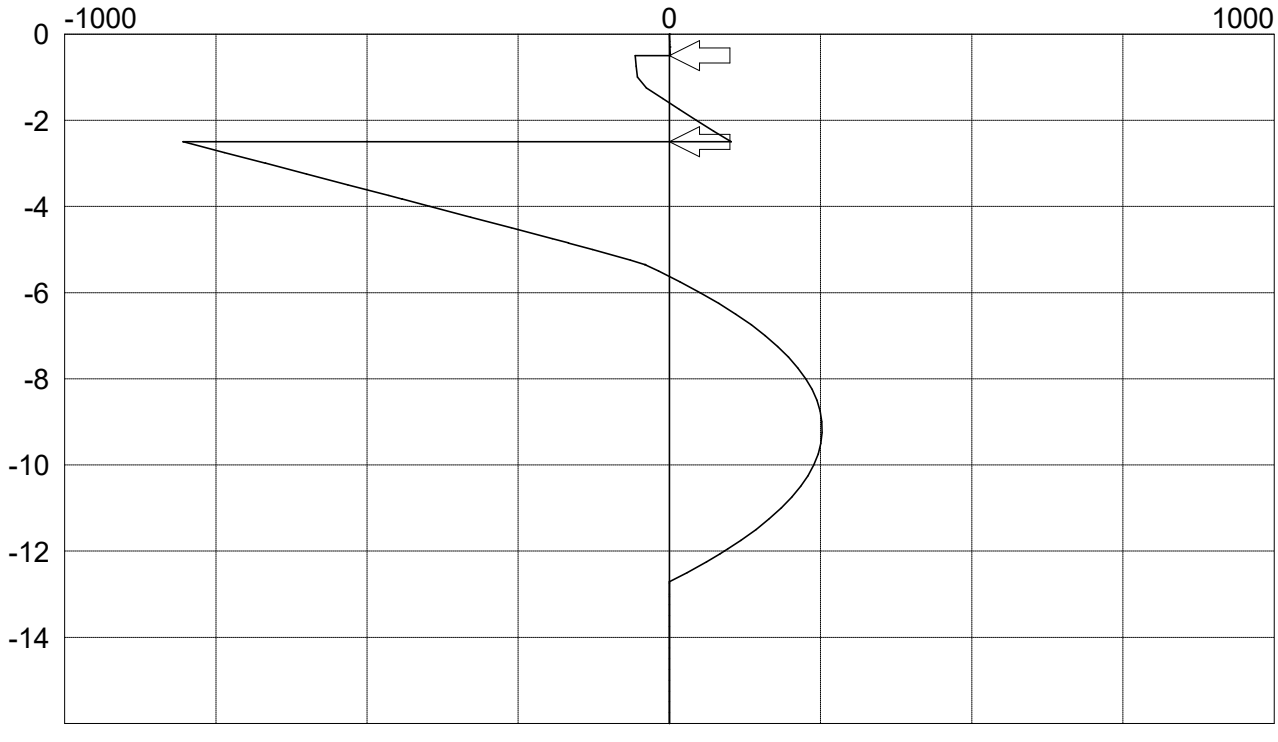


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 9 continued

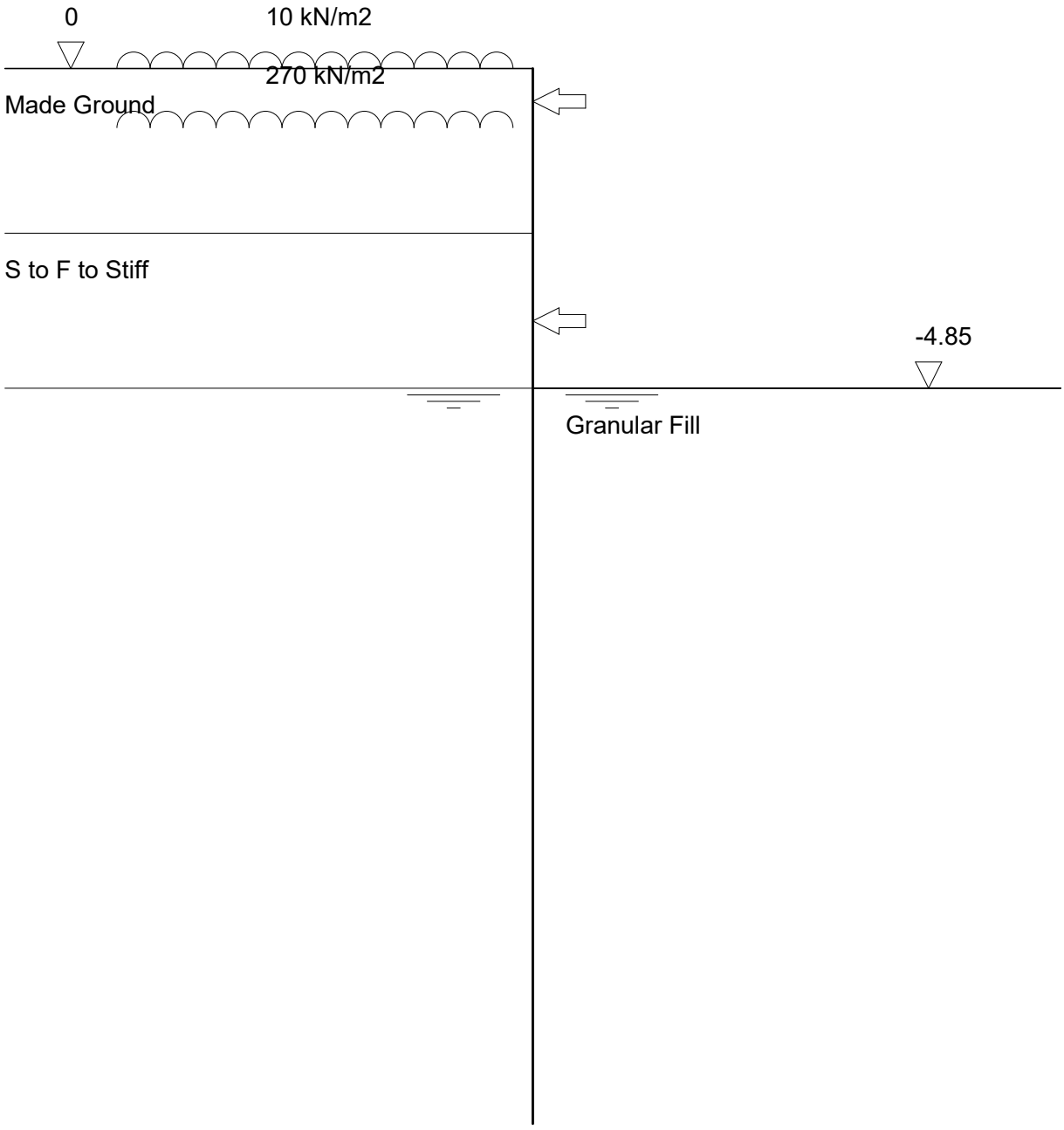


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **11**
Stage type **Remove prop**

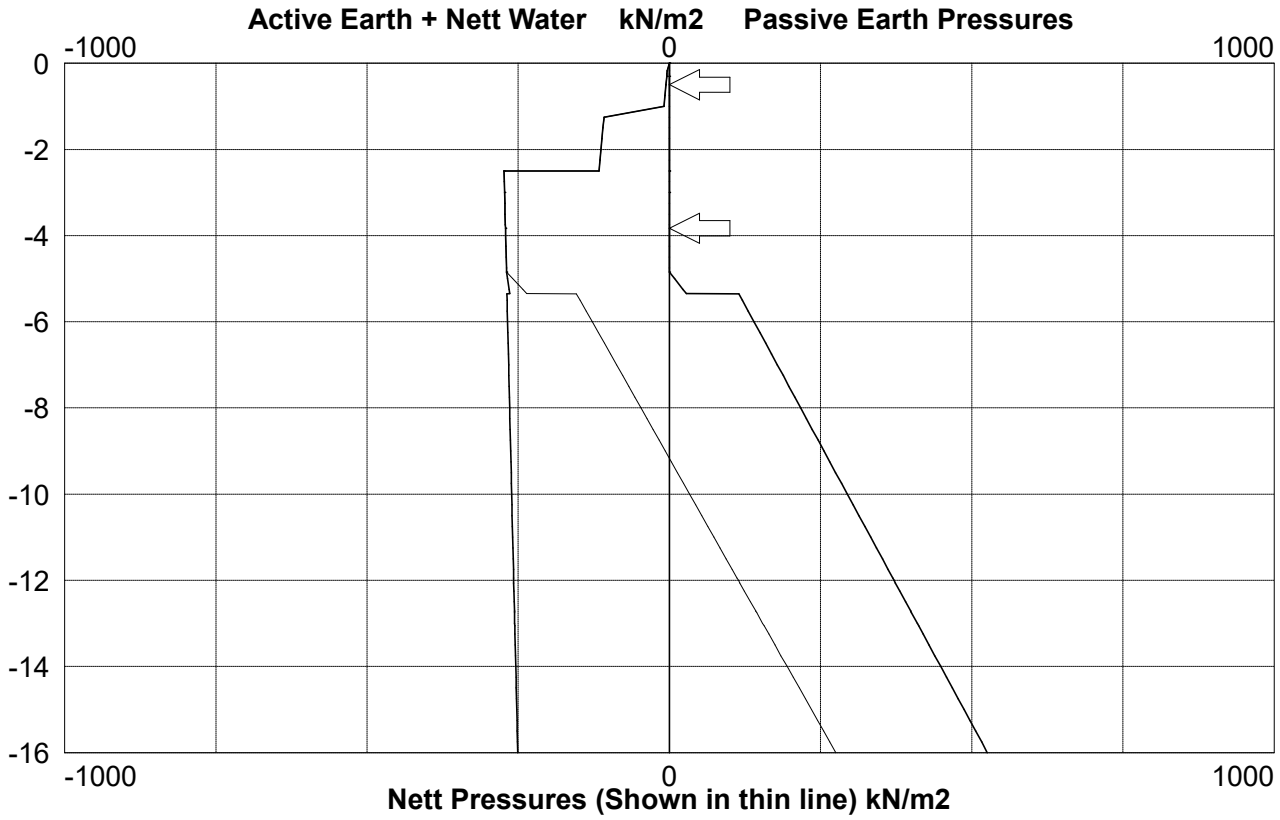


Tabular results from analysis of stage ref 11

strength.
analysis.

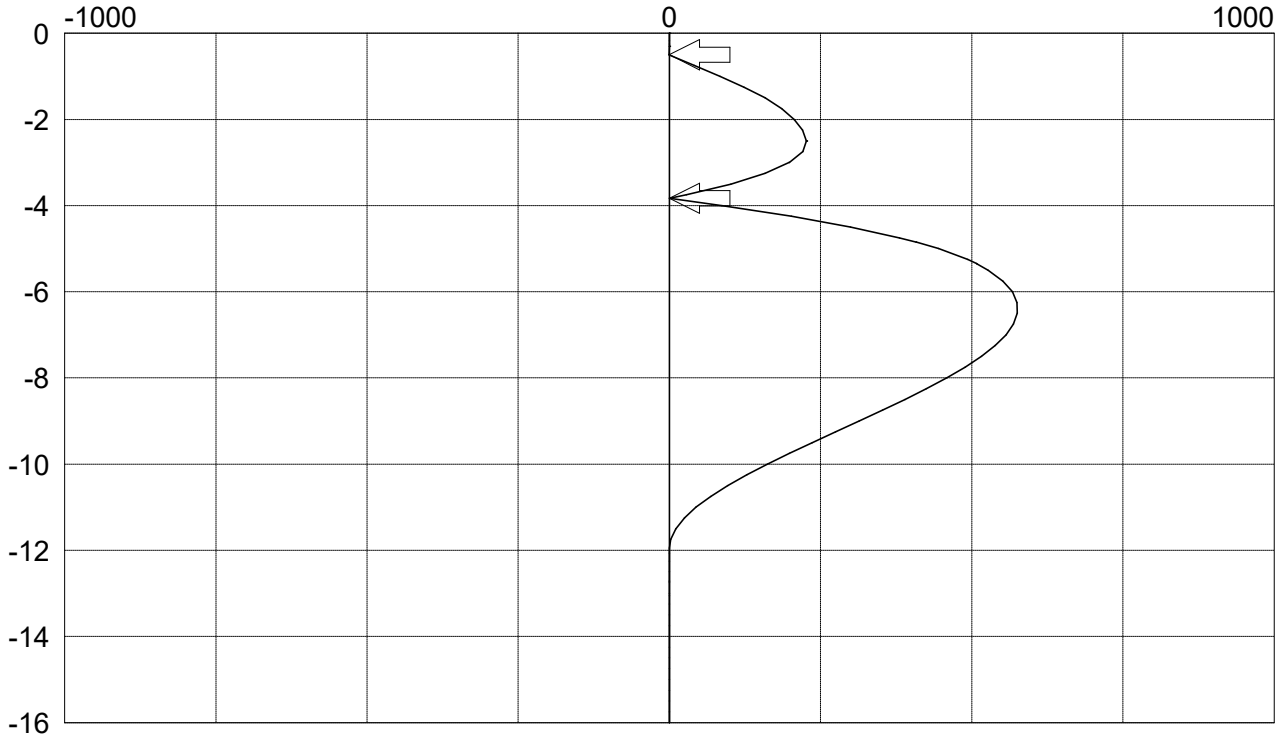
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		.0	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	-1.8		171.7	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	.3	169.9			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-83.4	166.3			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-206.5	68.7			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-226.6	11.4		.0	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-226.6	11.4			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-226.7	10.8			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-198.4	-124.5			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-198.2	-125.1			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-.7	-350.6		890.2	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	0	539.0			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-86.7	493.5			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-408.1	264.5			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-408.6	264.0			.00
-5.00	372.5	269.1	.0	1.5	8.4	1.5	259.2	-445.2	224.3			.00
-5.35	379.1	268.5	.0	5.1	27.9	4.9	235.8	-508.0	138.2			.03
-5.35	379.2	268.5	.0	10.0	114.8	.0	153.7	-508.3	137.8			.03
-6.00	391.5	267.4	.0	22.4	139.9	.0	127.5	-567.2	46.4			.26
-7.00	410.5	265.8	.0	41.4	178.5	.0	87.2	-556.6	-61.0			.44
-8.00	429.5	264.1	.0	60.4	217.1	.0	47.0	-458.7	-128.1			.57
-9.00	448.5	262.4	.0	79.4	255.7	.0	6.7	-313.8	-154.9			.69
-10.00	467.5	260.7	.0	98.4	294.3	.0	-33.6	-162.3	-141.5			.79
-11.00	486.5	259.1	.0	117.4	332.9	.0	-73.8	-44.3	-87.8			.90
-11.95	504.5	257.5	.0	135.4	369.5	.0	-112.0	0	0			1.00
-12.00	505.5	257.4	.0	136.4	371.5	.0	-114.1	0	0			1.01
-12.06	506.7	257.3	.0	137.6	374.0	.0	-116.7	0	0			1.01
-12.71	519.0	256.2	.0	149.9	399.0	.0	-142.8	0	0			1.08
-12.72	519.2	256.2	.0	150.0	399.3	.0	-143.1	0	0			1.08
-13.00	524.5	255.7	.0	155.4	410.1	.0	-154.4	0	0			1.11
-13.06	525.6	255.6	.0	156.5	412.3	.0	-156.7	0	0			1.12
-14.00	543.5	254.0	.0	174.4	448.7	.0	-194.7	0	0			1.22
-15.00	562.5	252.4	.0	193.4	487.3	.0	-234.9	0	0			1.32
-16.00	581.5	250.7	.0	212.4	525.9	.0	-275.2	0	0			1.43

Graphical results from analysis of stage ref 11

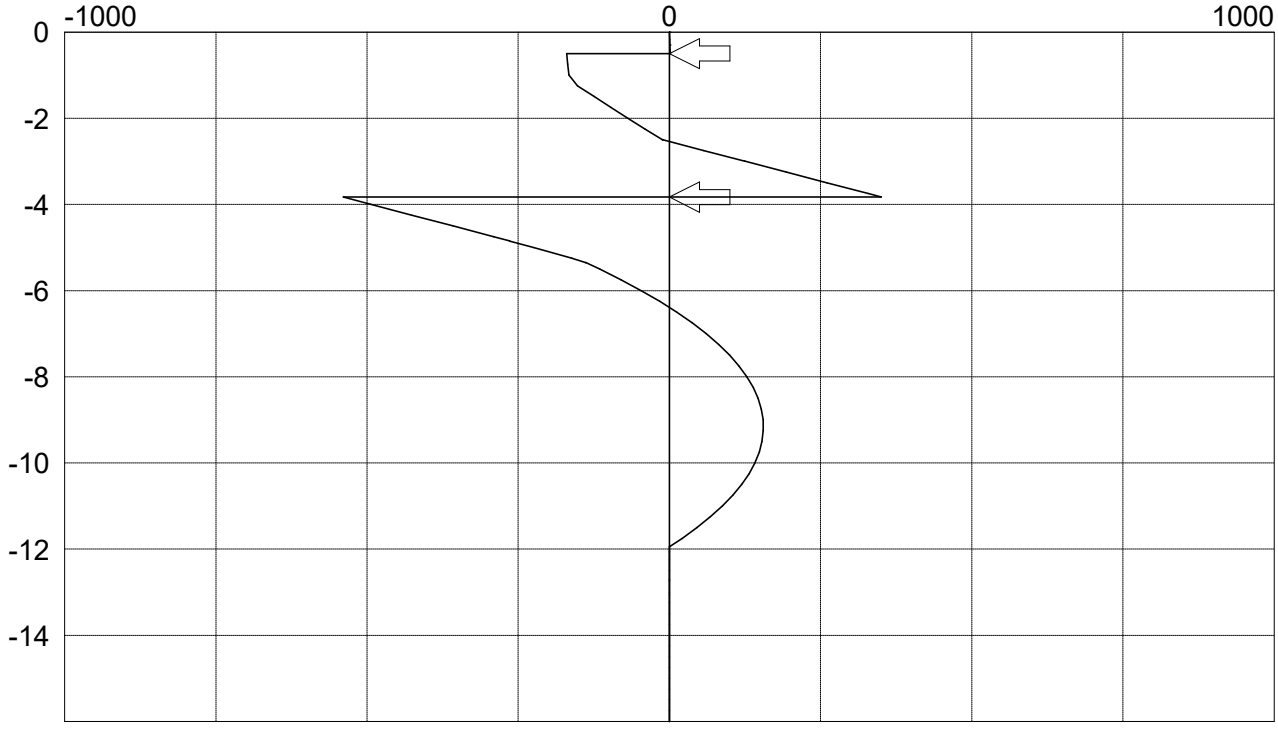


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 11 continued

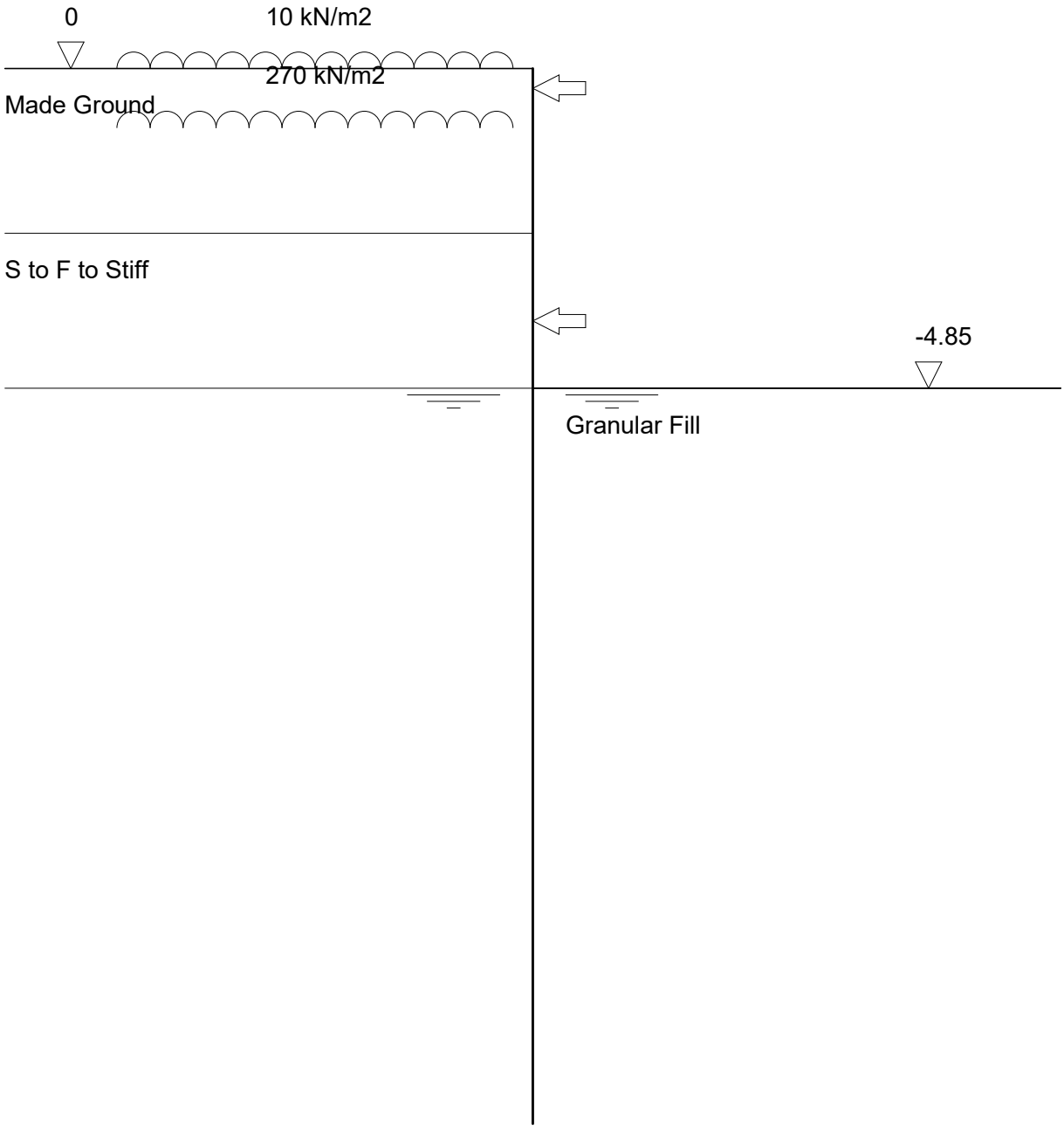


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **13**
Stage type **Remove prop**

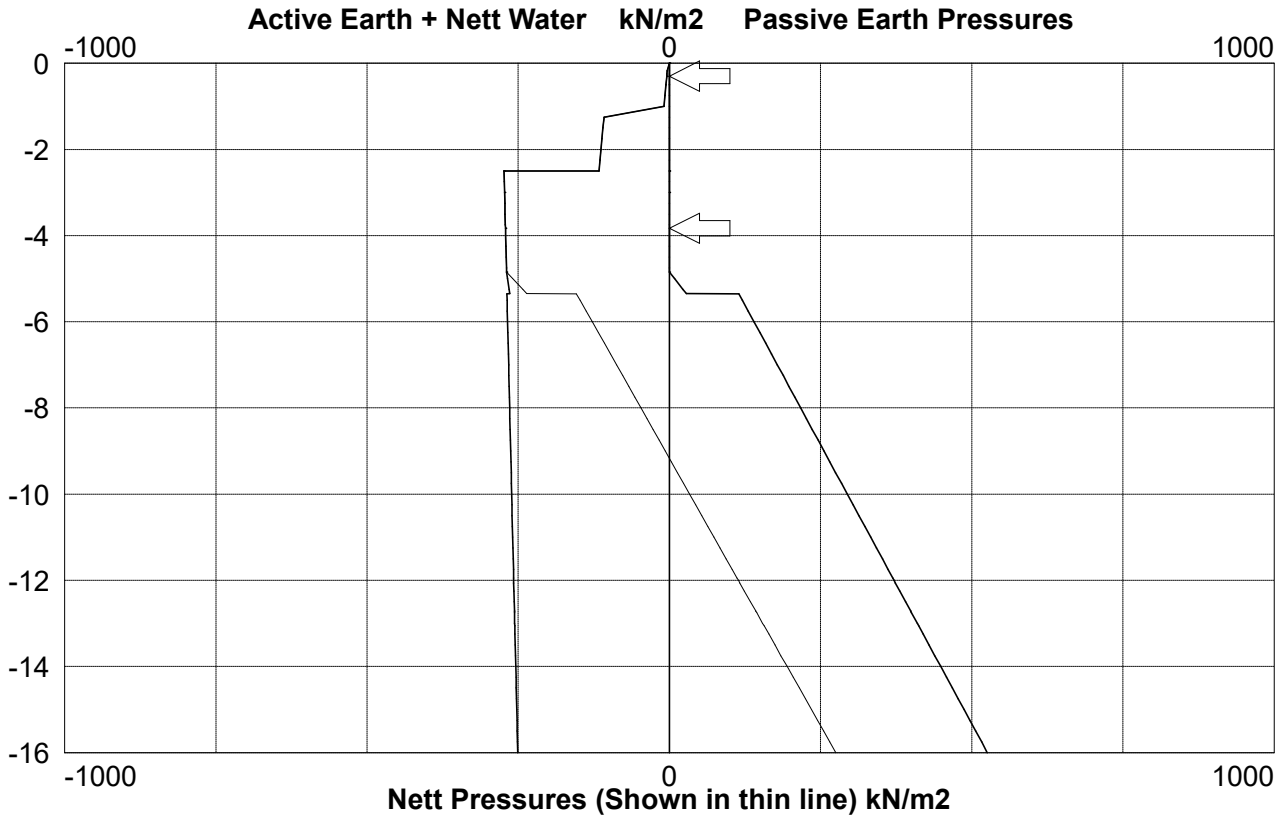


Tabular results from analysis of stage ref 13

strength.
analysis.

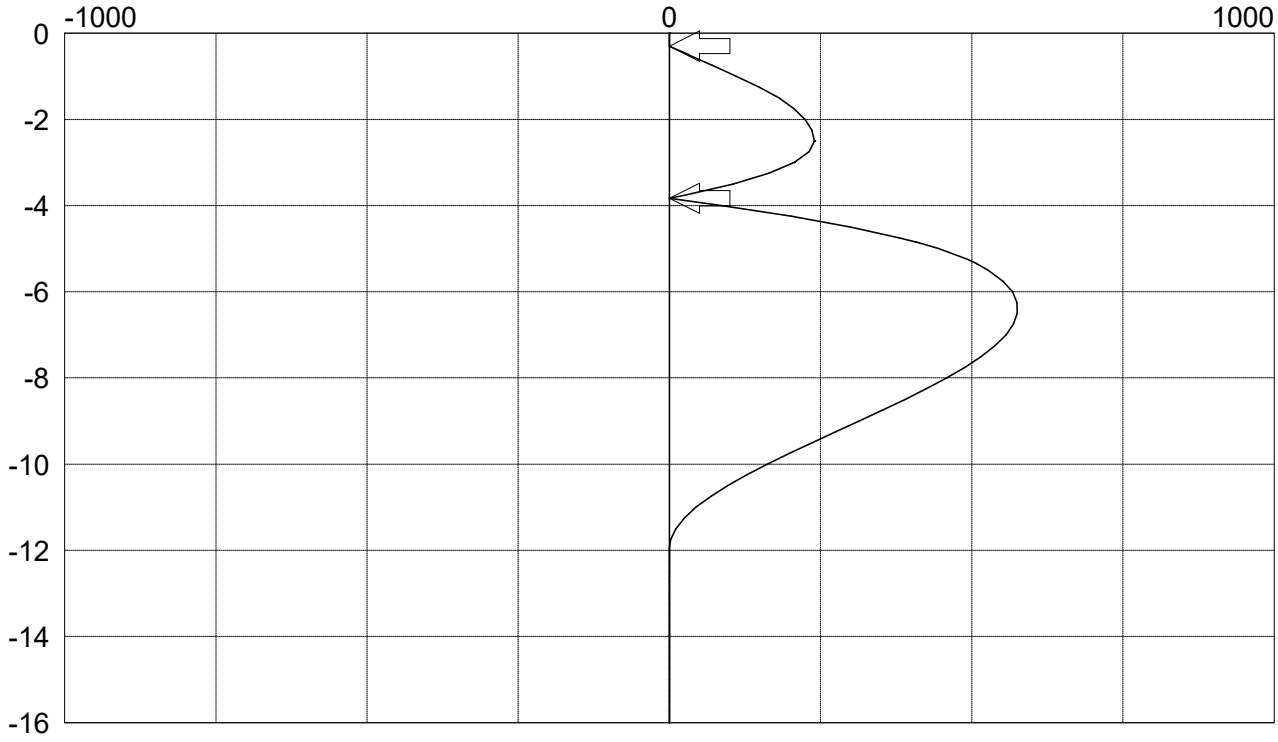
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		161.9	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	161.1			.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	-31.7	160.2		.0	.00
-.50	19.0	5.6	.0	.0	.0	.0	5.6	-32.0	160.1			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-111.0	156.5			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-224.4	59.0			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-239.6	1.7		.0	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-239.6	1.7			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-239.6	1.1			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-206.6	-134.2			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-206.3	-134.8			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-.7	-360.4		900.0	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	0	539.0			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-86.7	493.5			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-408.1	264.5			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-408.6	264.0			.00
-5.00	372.5	269.1	.0	1.5	8.4	1.5	259.2	-445.2	224.3			.00
-5.35	379.1	268.5	.0	5.1	27.9	4.9	235.8	-508.0	138.2			.03
-5.35	379.2	268.5	.0	10.0	114.8	.0	153.7	-508.3	137.8			.03
-6.00	391.5	267.4	.0	22.4	139.9	.0	127.5	-567.2	46.4			.26
-7.00	410.5	265.8	.0	41.4	178.5	.0	87.2	-556.6	-61.0			.44
-8.00	429.5	264.1	.0	60.4	217.1	.0	47.0	-458.7	-128.1			.57
-9.00	448.5	262.4	.0	79.4	255.7	.0	6.7	-313.8	-154.9			.69
-10.00	467.5	260.7	.0	98.4	294.3	.0	-33.6	-162.3	-141.5			.79
-11.00	486.5	259.1	.0	117.4	332.9	.0	-73.8	-44.3	-87.8			.90
-11.95	504.5	257.5	.0	135.4	369.5	.0	-112.0	0	0			1.00
-12.00	505.5	257.4	.0	136.4	371.5	.0	-114.1	0	0			1.01
-12.06	506.7	257.3	.0	137.6	374.0	.0	-116.7	0	0			1.01
-12.71	519.0	256.2	.0	149.9	399.0	.0	-142.8	0	0			1.08
-12.72	519.2	256.2	.0	150.0	399.3	.0	-143.1	0	0			1.08
-13.00	524.5	255.7	.0	155.4	410.1	.0	-154.4	0	0			1.11
-13.06	525.6	255.6	.0	156.5	412.3	.0	-156.7	0	0			1.12
-14.00	543.5	254.0	.0	174.4	448.7	.0	-194.7	0	0			1.22
-15.00	562.5	252.4	.0	193.4	487.3	.0	-234.9	0	0			1.32
-16.00	581.5	250.7	.0	212.4	525.9	.0	-275.2	0	0			1.43

Graphical results from analysis of stage ref 13

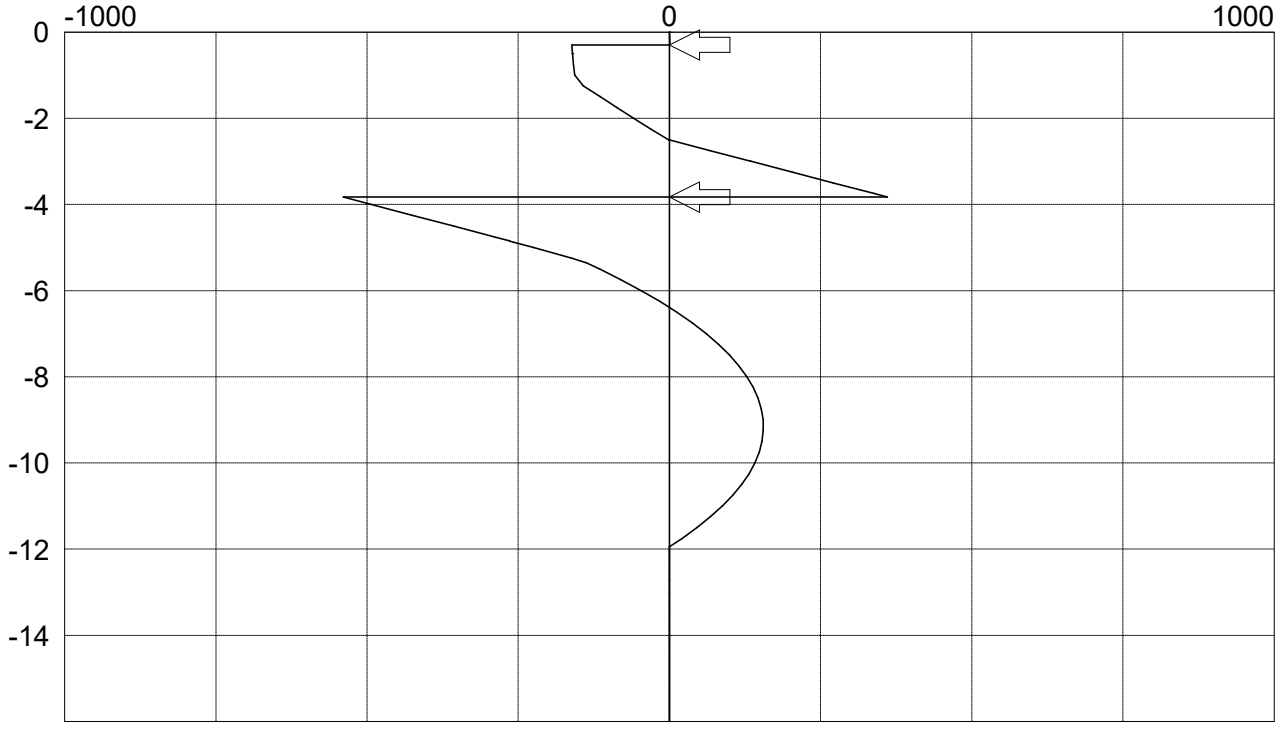


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 13 continued

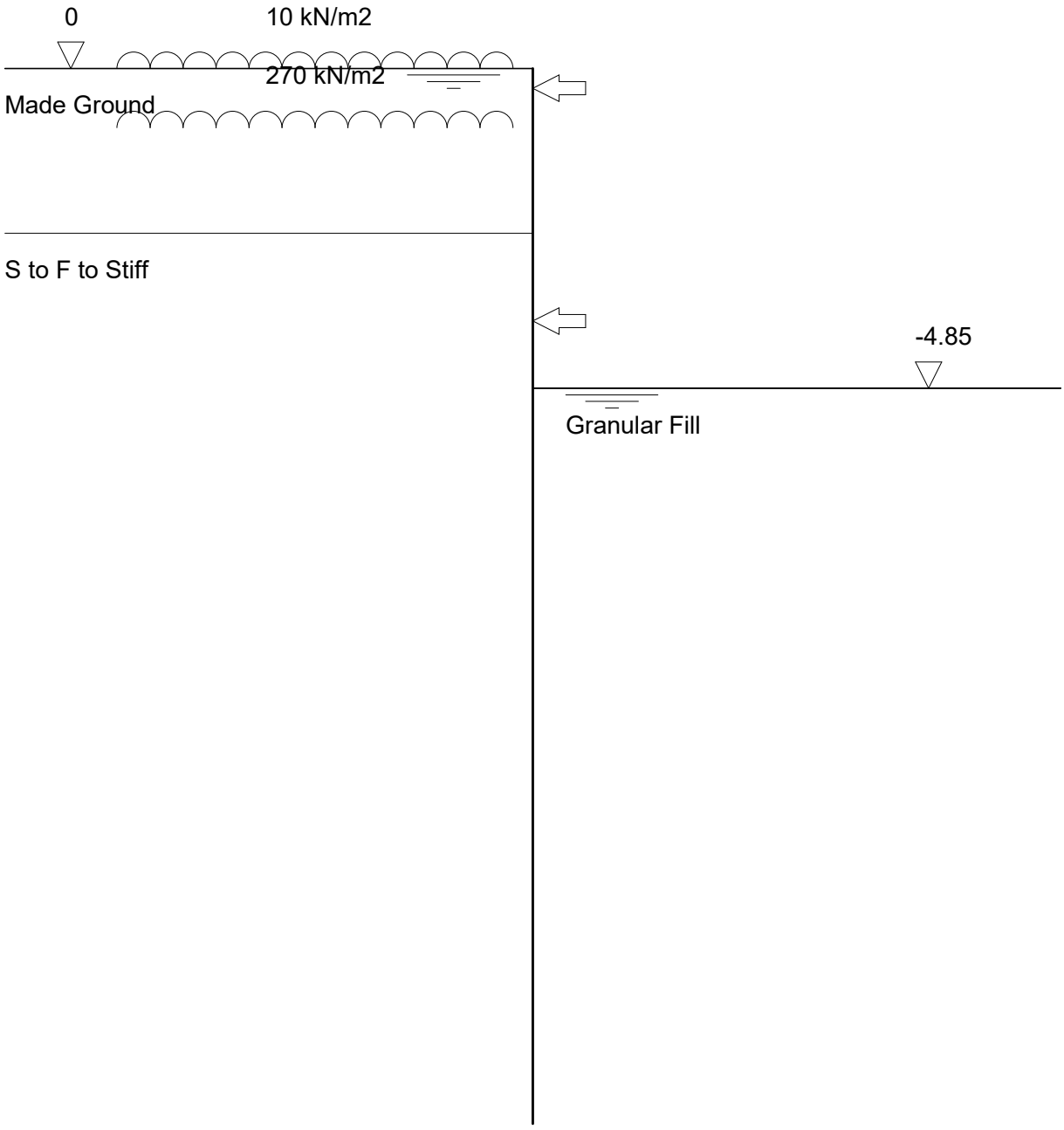


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **14**
Stage type **Active water level**

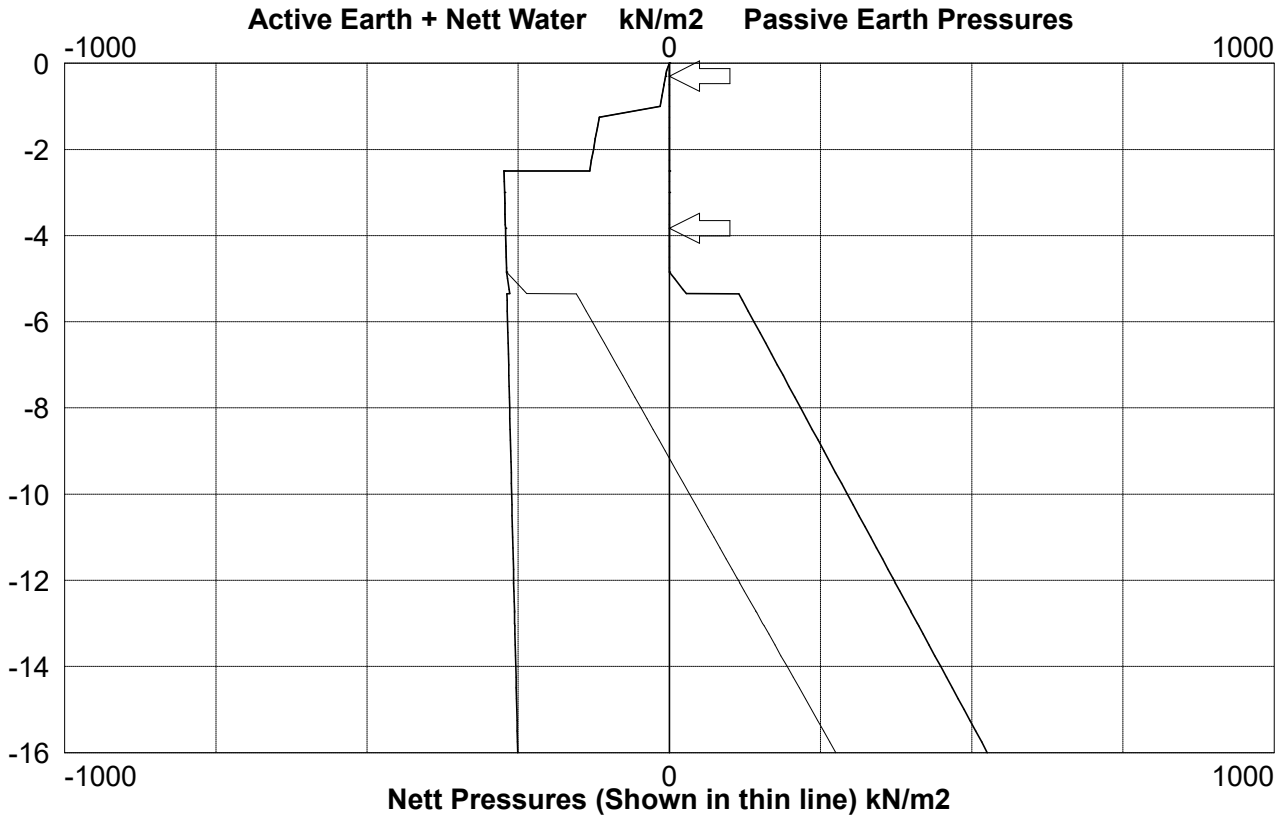


Tabular results from analysis of stage ref 14

strength.
analysis.

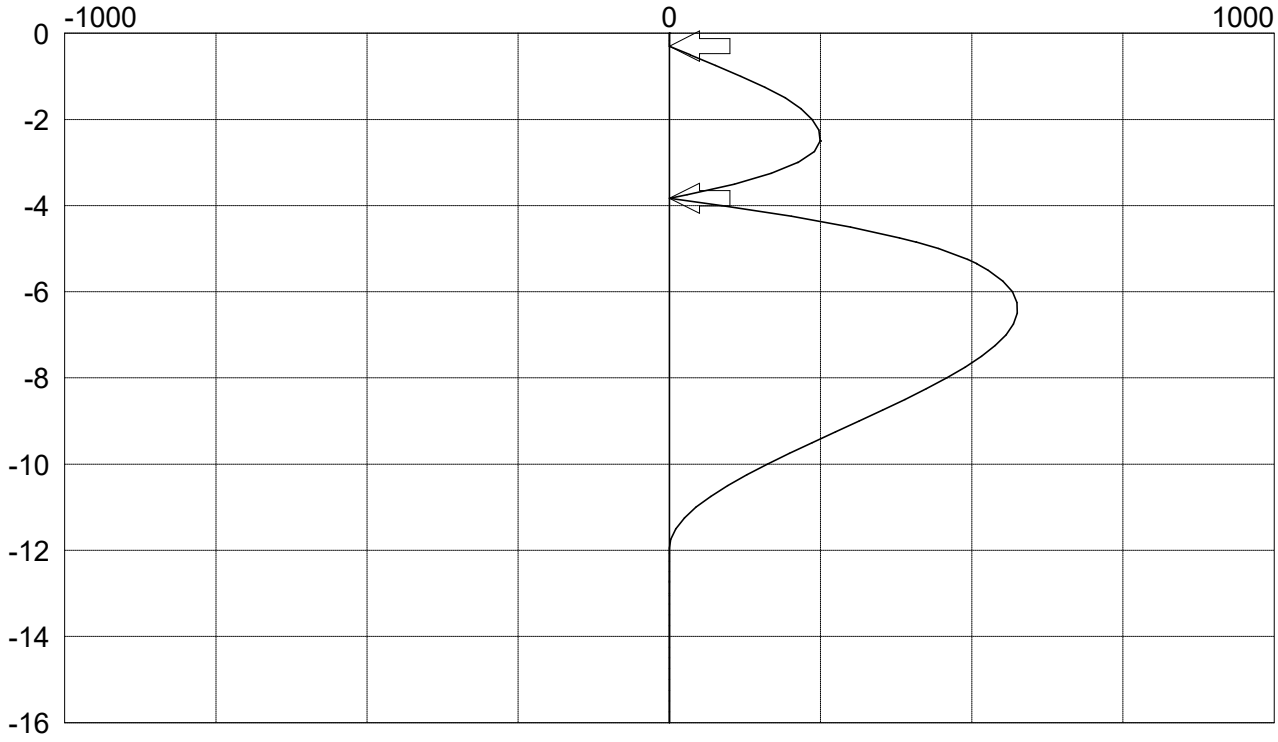
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	11.4	2.8	1.7	.0	.0	.0	4.5	0	-.4			.00
-.30	12.5	3.2	2.9	.0	.0	.0	6.2	.1	-1.1		173.9	.00
-.30	12.5	3.2	3.0	.0	.0	.0	6.2	.1	172.8			.00
-.50	14.1	3.8	4.9	.0	.0	.0	8.7	-34.0	171.4		.0	.00
-.50	14.1	3.8	4.9	.0	.0	.0	8.7	-34.3	171.3			.00
-1.00	18.2	5.3	9.8	.0	.0	.0	15.1	-118.3	165.4			.00
-2.00	296.4	105.9	19.6	.0	.0	.0	125.5	-236.4	58.5			.00
-2.50	300.5	107.4	24.5	.0	.0	.0	131.9	-249.7	-5.9		.0	.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-249.7	-5.9			.00
-2.50	325.0	273.3	.0	.0	.0	.0	273.3	-249.6	-6.4			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-212.9	-141.8			.00
-3.00	334.5	272.5	.0	.0	.0	.0	272.5	-212.6	-142.3			.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	-.7	-367.9		907.5	.00
-3.83	350.3	271.1	.0	.0	.0	.0	271.1	0	539.0			.00
-4.00	353.5	270.8	.0	.0	.0	.0	270.8	-86.7	493.5			.00
-4.85	369.6	269.4	.0	.0	.0	.0	269.4	-408.1	264.5			.00
-4.85	369.7	269.4	.0	.0	.0	.0	269.4	-408.6	264.0			.00
-5.00	372.5	269.1	.0	1.5	8.4	1.5	259.2	-445.2	224.3			.00
-5.35	379.1	268.5	.0	5.1	27.9	4.9	235.8	-508.0	138.2			.03
-5.35	379.2	268.5	.0	10.0	114.8	.0	153.7	-508.3	137.8			.03
-6.00	391.5	267.4	.0	22.4	139.9	.0	127.5	-567.2	46.4			.26
-7.00	410.5	265.8	.0	41.4	178.5	.0	87.2	-556.6	-61.0			.44
-8.00	429.5	264.1	.0	60.4	217.1	.0	47.0	-458.7	-128.1			.57
-9.00	448.5	262.4	.0	79.4	255.7	.0	6.7	-313.8	-154.9			.69
-10.00	467.5	260.7	.0	98.4	294.3	.0	-33.6	-162.3	-141.5			.79
-11.00	486.5	259.1	.0	117.4	332.9	.0	-73.8	-44.3	-87.8			.90
-11.95	504.5	257.5	.0	135.4	369.5	.0	-112.0	0	0			1.00
-12.00	505.5	257.4	.0	136.4	371.5	.0	-114.1	0	0			1.01
-12.06	506.7	257.3	.0	137.6	374.0	.0	-116.7	0	0			1.01
-12.71	519.0	256.2	.0	149.9	399.0	.0	-142.8	0	0			1.08
-12.72	519.2	256.2	.0	150.0	399.3	.0	-143.1	0	0			1.08
-13.00	524.5	255.7	.0	155.4	410.1	.0	-154.4	0	0			1.11
-13.06	525.6	255.6	.0	156.5	412.3	.0	-156.7	0	0			1.12
-14.00	543.5	254.0	.0	174.4	448.7	.0	-194.7	0	0			1.22
-15.00	562.5	252.4	.0	193.4	487.3	.0	-234.9	0	0			1.32
-16.00	581.5	250.7	.0	212.4	525.9	.0	-275.2	0	0			1.43

Graphical results from analysis of stage ref 14

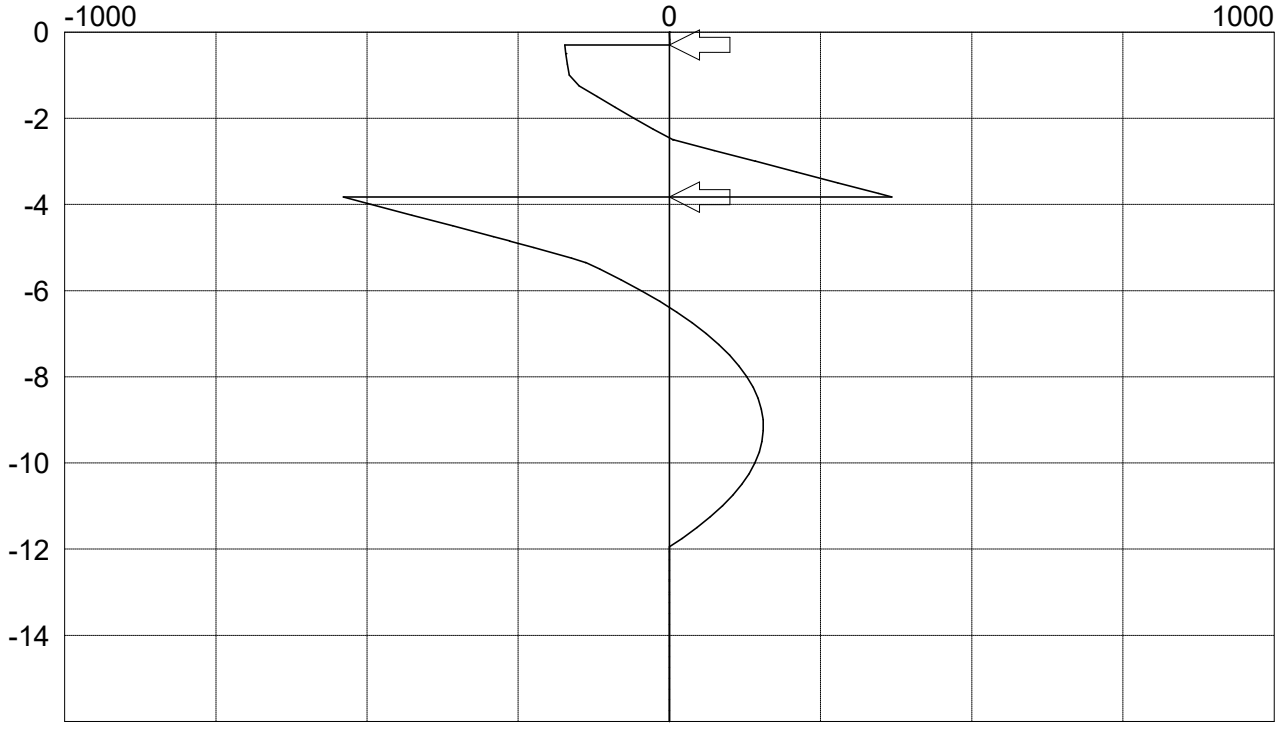


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 14 continued

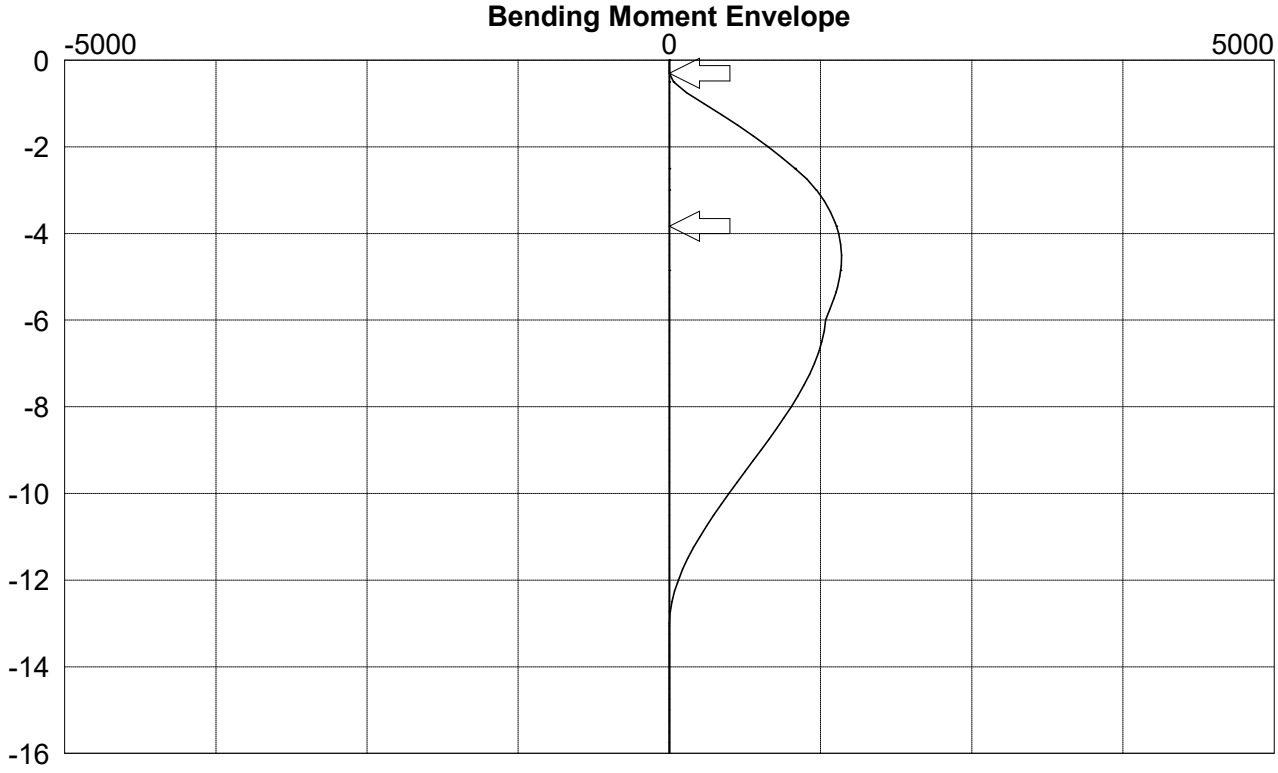


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Graphical plot of envelope from selected construction stages



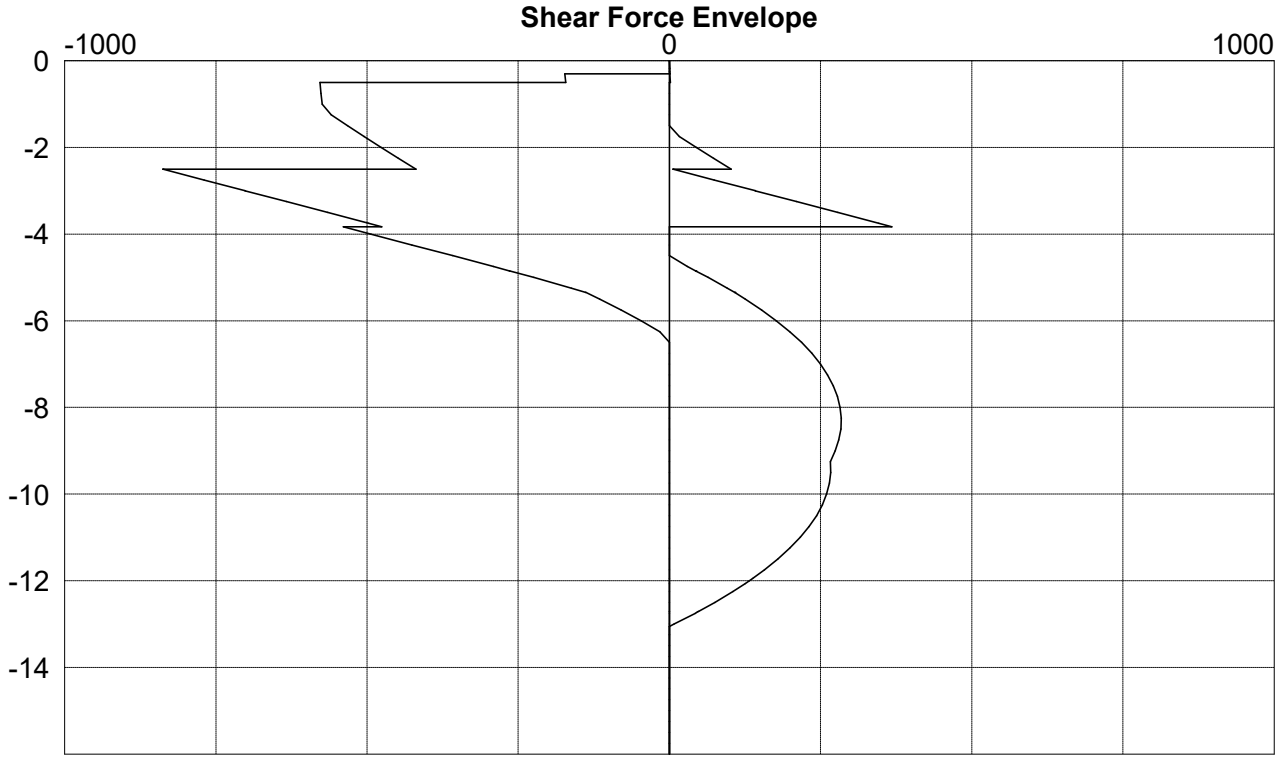


Table of envelope for wall forces

Calc Level m	Bending Minimum kNm/m	Bending Maximum kNm/m	Shear Minimum kN/m	Shear Maximum kN/m	Prop Force kN/m
.00	.0	.0	.0	.0	
.00	.0	.0	.0	.0	
-.17	.0	.0	-.4	.0	
-.30	.0	.1	-1.1	.0	173.9
-.30	.0	.1	-.8	172.8	
-.50	-34.0	.3	-1.8	171.4	579.4
-.50	-34.3	.3	.0	577.6	
-1.00	-286.5	.0	.0	574.0	
-2.00	-817.4	.0	-44.7	476.5	
-2.50	-1041.3	.0	-102.0	419.1	939.7
-2.50	-1041.7	.0	-5.9	837.7	
-2.50	-1042.2	.0	-6.4	837.1	
-3.00	-1216.2	.0	-141.8	701.8	
-3.00	-1216.8	.0	-142.3	701.2	
-3.83	-1381.7	.0	-367.9	475.6	907.5
-3.83	-1381.9	.0	.0	539.0	
-4.00	-1399.4	.0	.0	493.5	
-4.85	-1416.7	.0	-43.4	264.5	
-4.85	-1416.7	.0	-43.7	264.0	
-5.00	-1408.6	.0	-64.1	224.3	
-5.35	-1378.5	.0	-108.0	138.2	
-5.35	-1378.3	.0	-108.2	137.8	
-6.00	-1292.9	.0	-177.1	46.4	
-7.00	-1198.6	.0	-249.8	.0	
-8.00	-1007.1	.0	-282.3	.0	
-9.00	-758.5	.0	-274.5	.0	
-10.00	-493.3	.0	-260.1	.0	
-11.00	-251.7	.0	-216.4	.0	
-11.95	-81.4	.0	-137.6	.0	
-12.00	-73.9	.0	-132.4	.0	
-12.06	-65.6	.0	-125.7	.0	
-12.71	-8.9	.0	-47.9	.0	
-12.72	-8.5	.0	-46.9	.0	
-13.00	-.2	.0	-8.2	.0	
-13.06	.0	.0	.0	.0	
-14.00	.0	.0	.0	.0	
-15.00	.0	.0	.0	.0	
-16.00	.0	.0	.0	.0	

Structural design of wall

Wall section properties

Primary pile diameter	600	mm
Primary pile spacing	700	mm
Infill pile diameter		mm
Main rebar bar diameter	40	mm
Main rebar number of bars	12	
Links/Helix bar diameter	16	mm
Links/Helix spacing/pitch	150	mm

Wall material properties

Concrete cube strength	35	N/mm2
Concrete cover	50	mm
Main rebar steel grade	500	N/mm2
Link rebar steel grade	500	N/mm2
Ultimate load factor	1.00	

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Bending resistance. BS8110 plane strain analysis	996	996	kNm
Max longitudinal steel. BS8110 max 6% by area	16965	15080	mm2
Min longitudinal steel. BS8110 min 0.4% by area	1131	15080	mm2
Shear resistance. BS8110	586	696	kN
Min link dia. BS8110 6mm or 0.25x bar dia	10	16	mm
Max link spacing. BS8110 12x main bar dia or 0.75d	311	150	mm
Min shear link area. BS8110 Clause 3.4.5	2074	2681	mm2/m

Pile geometry

Pile top Level	0	m
Pile Length	16	m
Pile toe level	-16	m

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level -4.85

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
.00	Made Ground	18.00	18.00	15000	0	1		28	.67	.30	1.43
						1		28	.50	4.15	4.99
-2.50	S to F to Stiff	19.00	19.00	19200	7680	10		25	.67	.35	1.52
						10		25	.50	3.38	4.51

Construction sequence

Stage Ref		Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	A	Active surcharge	-0.90	270.0	.3		
2	A	Active surcharge	0.00	10.0	.3		
3	A	Insert prop	-3.83				
4		Insert prop	-0.30				
5	A	Passive side excavation	-4.85				
6	A	Active water level	0.00				

Code of practice

Code of practice or reference document	
Application of pressures for stability	Not applicable for FOS=1 on moments
FOS on moments (stability check)	1.00
ULS factor on Tan(Phi) values	1.20
ULS fFactor on drained cohesion values	1.20
ULS factor on undrained cohesion values	1.50
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.00

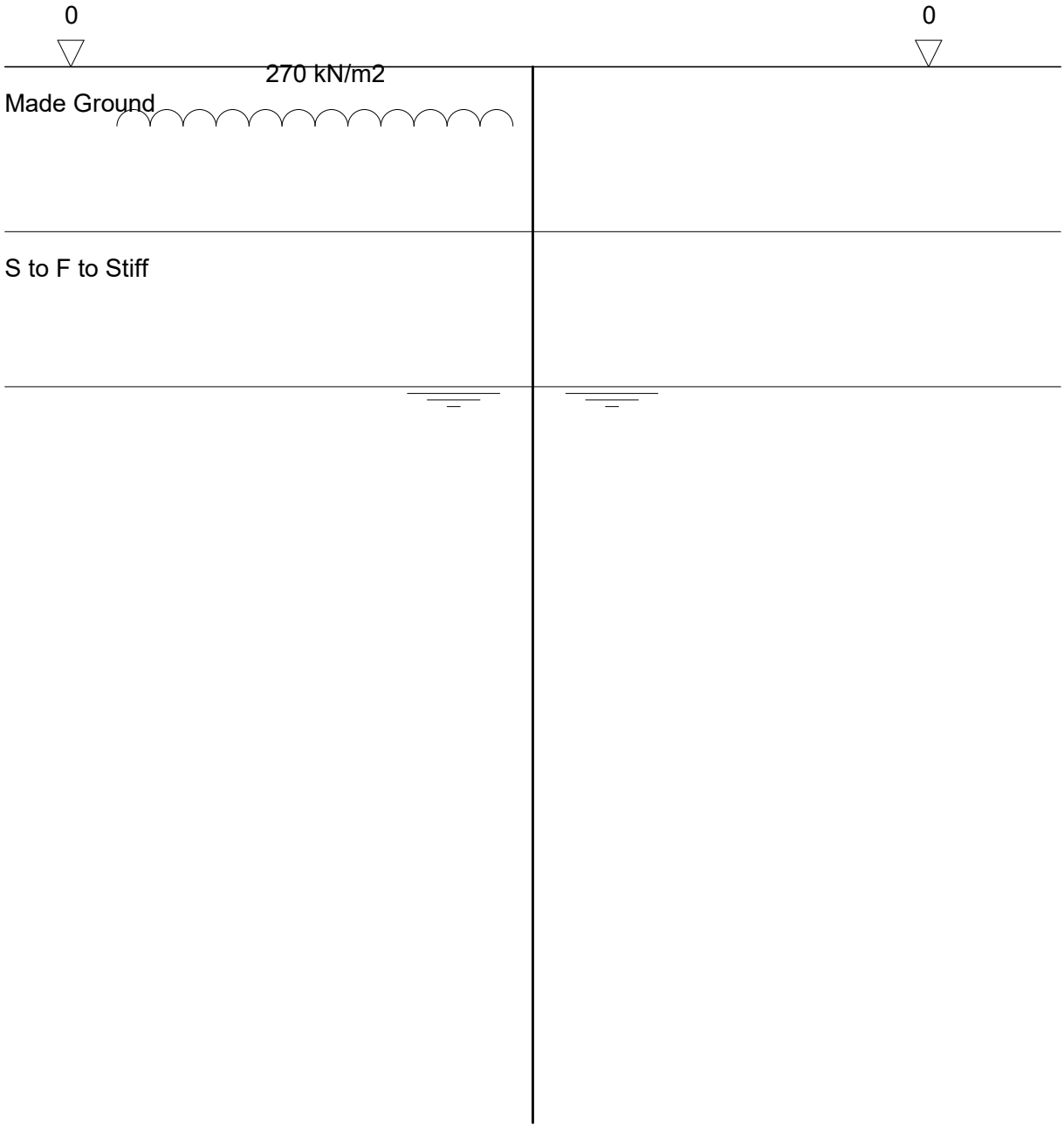
Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	9.8	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	.0	m
Continuity model for wall analysis	Pins at second and lower props	

Deflection parameters

Wall moment of inertia	908818	cm4/m
Wall Youngs modulus	27000000	kN/m2
Properties for prop at -3.83		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm
Properties for prop at -0.3		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Stage ref. **1**
Stage type **Active surcharge**

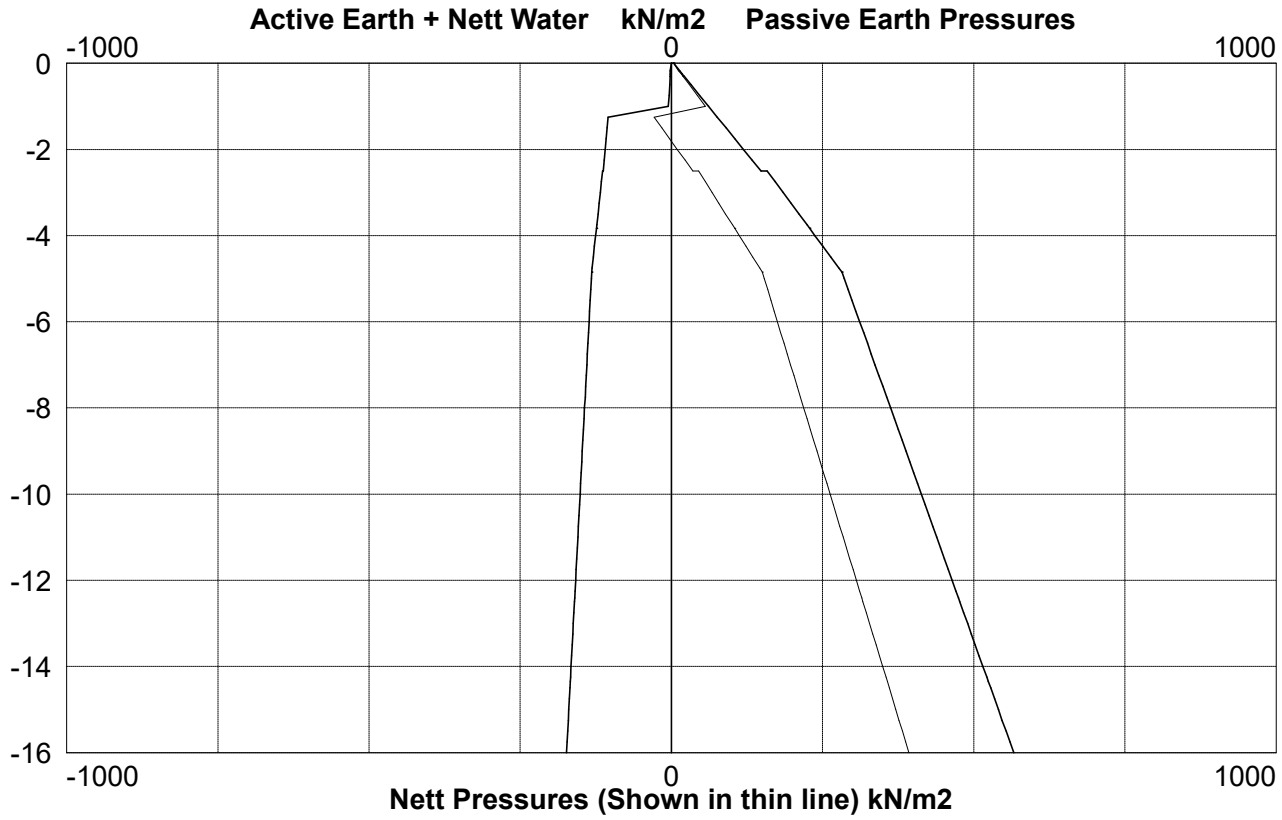


Tabular results from analysis of stage ref 1

strength.
analysis.

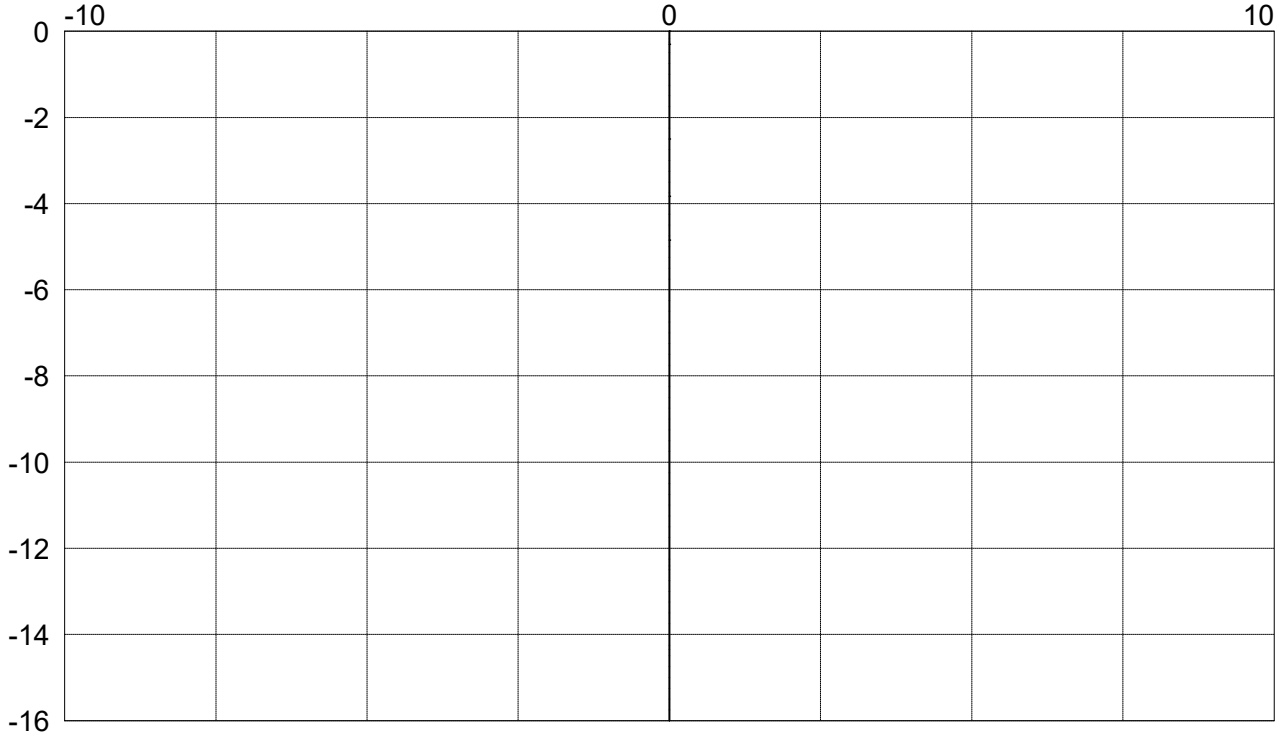
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	3.7	.0	-3.7	0	0			.00
.00	.0	.0	.0	.0	3.8	.0	-3.8	0	0			.14
t -.17	3.1	.0	1.7	3.1	13.7	.0	-12.0	0	0			12.36
t -.30	5.4	.0	1.7	5.4	21.0	.0	-19.3	0	0		.0	10.41
t -.30	5.4	.0	1.7	5.4	21.1	.0	-19.4	0	0			10.41
-1.00	18.0	5.2	.0	18.0	61.4	.0	-56.2	0	0			11.91
-2.00	306.0	109.4	.0	36.0	119.2	.0	-9.8	0	0			1.87
-2.50	315.0	112.7	.0	45.0	148.1	.0	-35.4	0	0			1.51
-2.50	315.0	113.7	.0	45.0	158.6	.0	-44.8	0	0			1.51
-3.00	324.5	117.6	.0	54.5	184.9	.0	-67.3	0	0			1.41
-3.83	340.3	123.9	.0	70.3	228.5	.0	-104.6	0	0		.0	1.39
-3.83	340.3	123.9	.0	70.3	228.6	.0	-104.7	0	0			1.39
-4.00	343.5	125.2	.0	73.5	237.5	.0	-112.2	0	0			1.40
-4.85	359.6	131.8	.0	89.6	282.1	.0	-150.3	0	0			1.46
-4.85	359.7	131.8	.0	89.6	282.2	.0	-150.4	0	0			1.46
-5.00	361.0	132.3	1.5	91.0	286.0	1.5	-153.7	0	0			1.47
-6.00	370.2	136.0	11.3	100.2	311.5	11.3	-175.4	0	0			1.56
-7.00	379.4	139.8	21.1	109.4	336.9	21.1	-197.2	0	0			1.64
-8.00	388.6	143.5	30.9	118.6	362.4	30.9	-218.9	0	0			1.72
-9.00	397.8	147.2	40.7	127.8	387.9	40.7	-240.7	0	0			1.80
-10.00	407.0	150.9	50.5	137.0	413.4	50.5	-262.4	0	0			1.86
-11.00	416.2	154.7	60.3	146.2	438.8	60.3	-284.2	0	0			1.93
-12.00	425.4	158.4	70.1	155.4	464.3	70.1	-305.9	0	0			1.99
-12.41	429.2	159.9	74.1	159.2	474.7	74.1	-314.8	0	0			2.01
-13.00	434.6	162.1	79.9	164.6	489.8	79.9	-327.7	0	0			2.04
-14.00	443.8	165.8	89.7	173.8	515.3	89.7	-349.4	0	0			2.10
-14.35	447.1	167.1	93.1	177.1	524.2	93.1	-357.0	0	0			2.12
-15.00	453.0	169.5	99.5	183.0	540.7	99.5	-371.2	0	0			2.15
-16.00	462.2	173.3	109.3	192.2	566.2	109.3	-392.9	0	0			2.20

Graphical results from analysis of stage ref 1

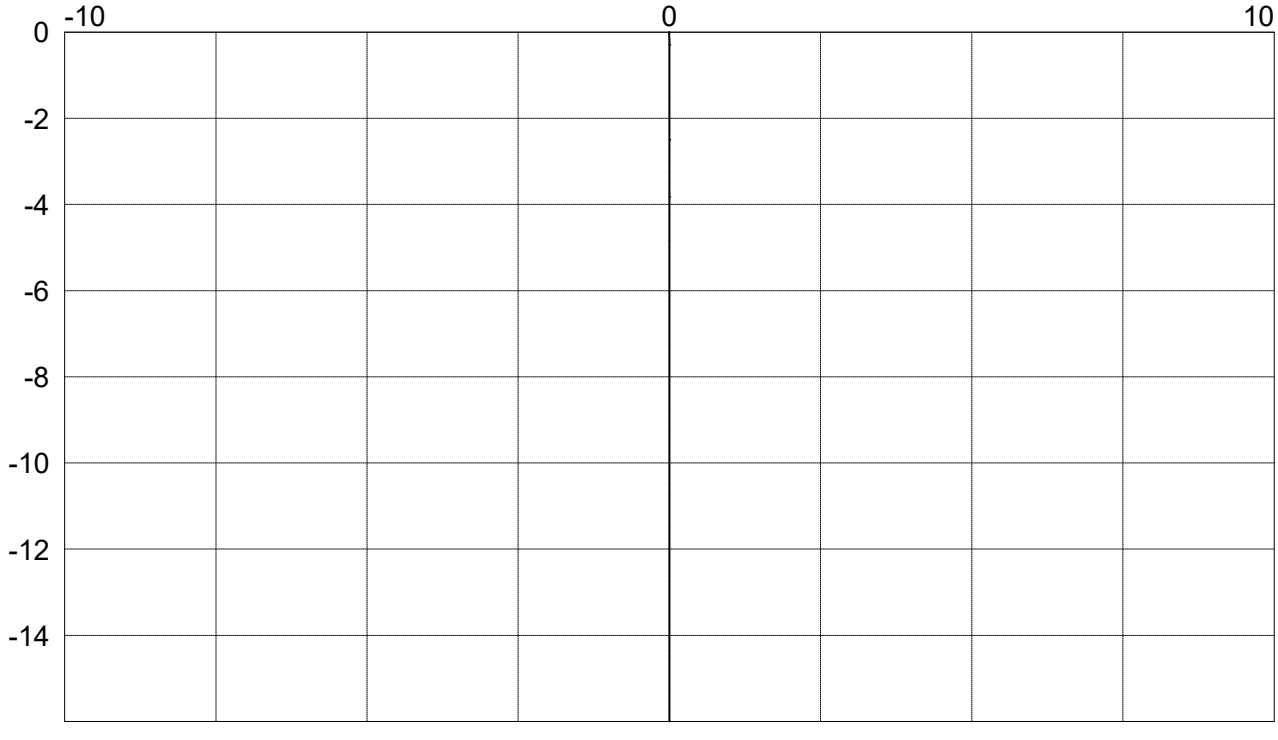


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 1 continued

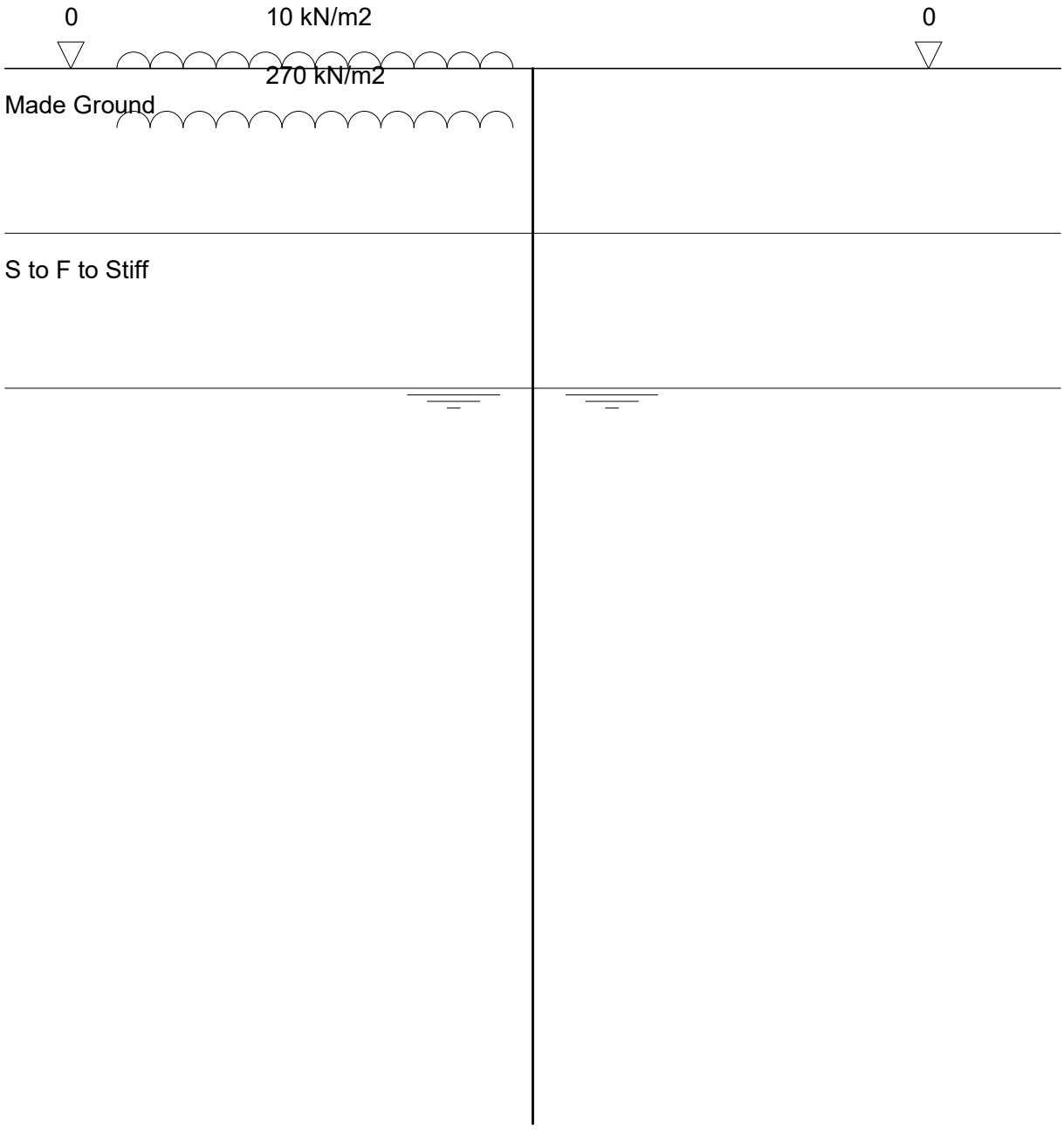


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **2**
Stage type **Active surcharge**

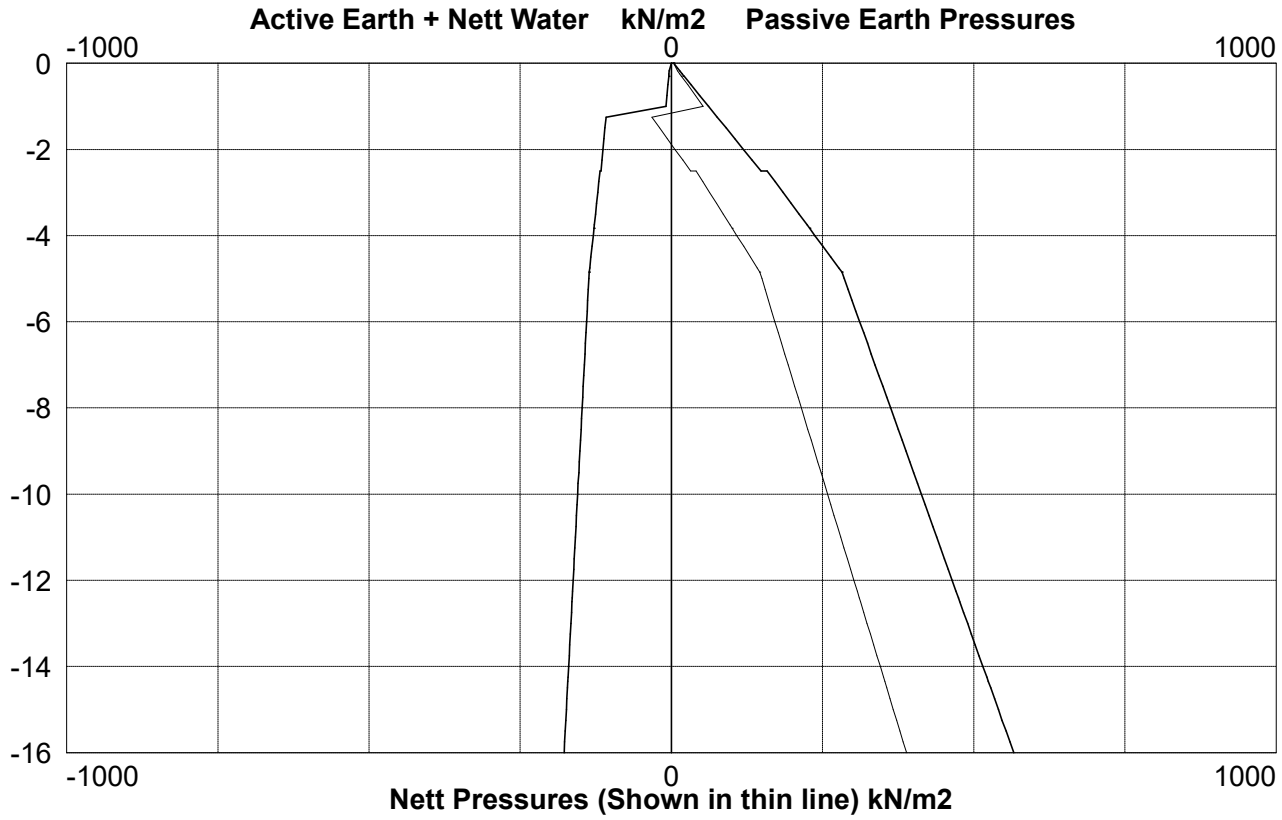


Tabular results from analysis of stage ref 2

strength.
analysis.

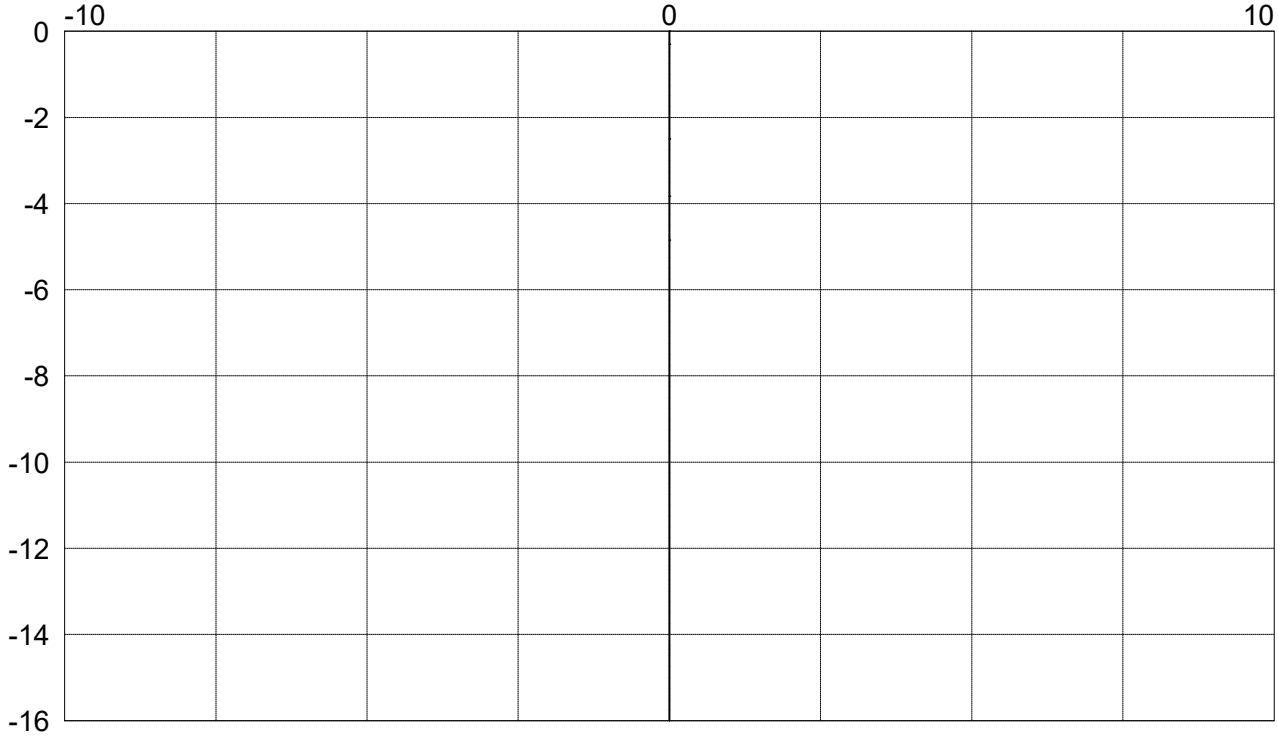
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	3.7	.0	-3.7	0	0			.00
t .00	.0	.0	.0	.0	3.8	.0	-3.8	0	0			>100.00
-.17	13.1	3.5	.0	3.1	13.7	.0	-10.2	0	0			6.15
-.30	15.4	4.3	.0	5.4	21.0	.0	-16.7	0	0		.0	5.01
-.30	15.4	4.3	.0	5.4	21.1	.0	-16.8	0	0			5.01
-1.00	28.0	8.8	.0	18.0	61.4	.0	-52.6	0	0			5.57
-2.00	316.0	113.0	.0	36.0	119.2	.0	-6.2	0	0			1.67
-2.50	325.0	116.3	.0	45.0	148.1	.0	-31.8	0	0			1.39
-2.50	325.0	117.8	.0	45.0	158.6	.0	-40.8	0	0			1.39
-3.00	334.5	121.6	.0	54.5	184.9	.0	-63.3	0	0			1.31
-3.83	350.3	128.0	.0	70.3	228.5	.0	-100.5	0	0		.0	1.32
-3.83	350.3	128.0	.0	70.3	228.6	.0	-100.6	0	0			1.32
-4.00	353.5	129.3	.0	73.5	237.5	.0	-108.2	0	0			1.33
-4.85	369.6	135.8	.0	89.6	282.1	.0	-146.3	0	0			1.39
-4.85	369.7	135.8	.0	89.6	282.2	.0	-146.4	0	0			1.39
-5.00	371.0	136.4	1.5	91.0	286.0	1.5	-149.6	0	0			1.40
-6.00	380.2	140.1	11.3	100.2	311.5	11.3	-171.4	0	0			1.49
-7.00	389.4	143.8	21.1	109.4	336.9	21.1	-193.1	0	0			1.58
-8.00	398.6	147.5	30.9	118.6	362.4	30.9	-214.9	0	0			1.66
-9.00	407.8	151.3	40.7	127.8	387.9	40.7	-236.6	0	0			1.73
-10.00	417.0	155.0	50.5	137.0	413.4	50.5	-258.4	0	0			1.80
-11.00	426.2	158.7	60.3	146.2	438.8	60.3	-280.1	0	0			1.86
-12.00	435.4	162.4	70.1	155.4	464.3	70.1	-301.9	0	0			1.92
-12.41	439.2	163.9	74.1	159.2	474.7	74.1	-310.8	0	0			1.94
-13.00	444.6	166.1	79.9	164.6	489.8	79.9	-323.6	0	0			1.98
-14.00	453.8	169.9	89.7	173.8	515.3	89.7	-345.4	0	0			2.03
-14.35	457.1	171.2	93.1	177.1	524.2	93.1	-353.0	0	0			2.05
-15.00	463.0	173.6	99.5	183.0	540.7	99.5	-367.1	0	0			2.08
-16.00	472.2	177.3	109.3	192.2	566.2	109.3	-388.9	0	0			2.13

Graphical results from analysis of stage ref 2

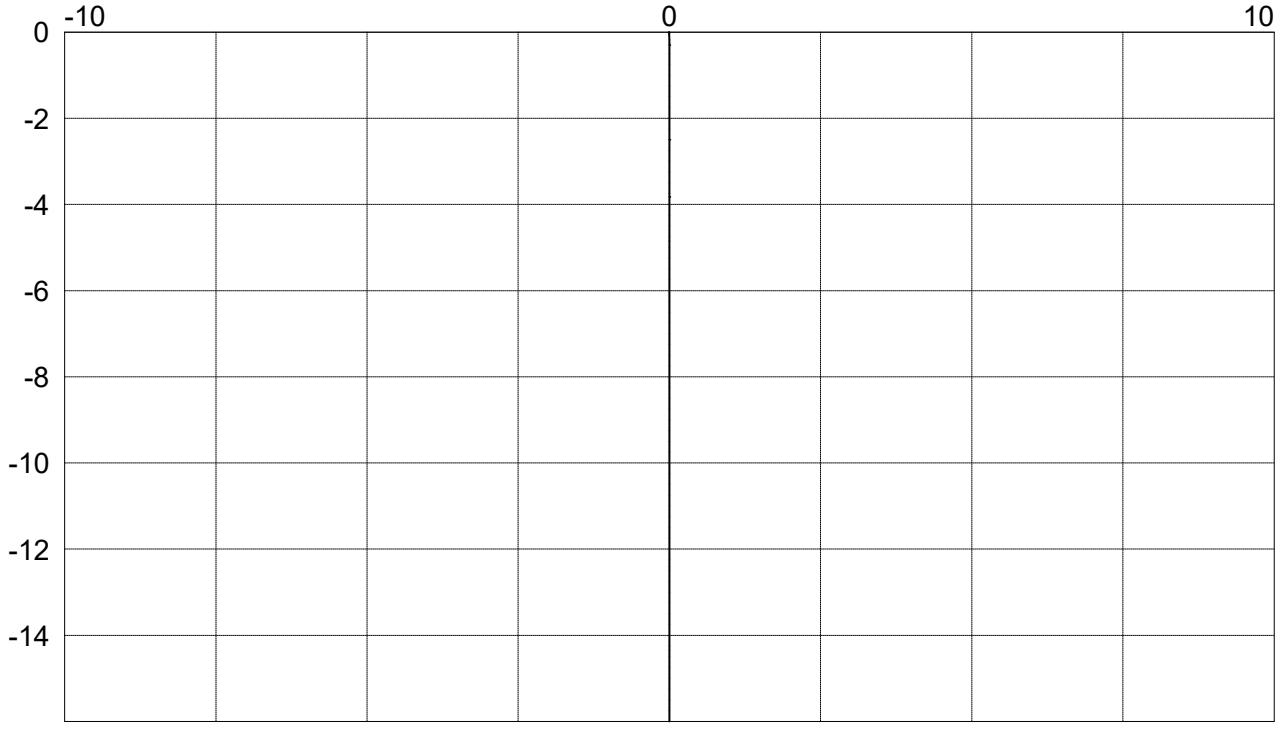


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 2 continued

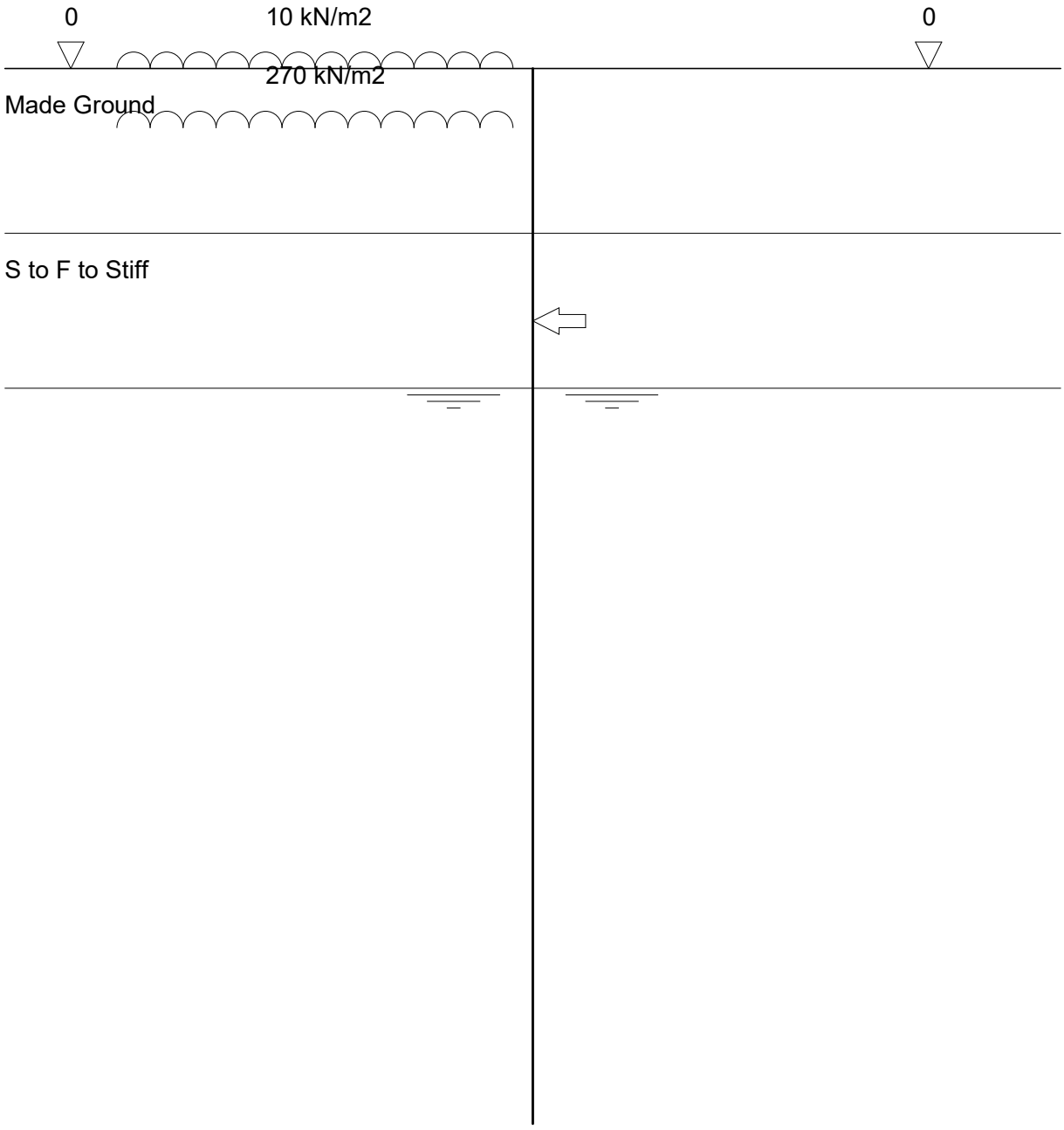


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **3**
Stage type **Insert prop**

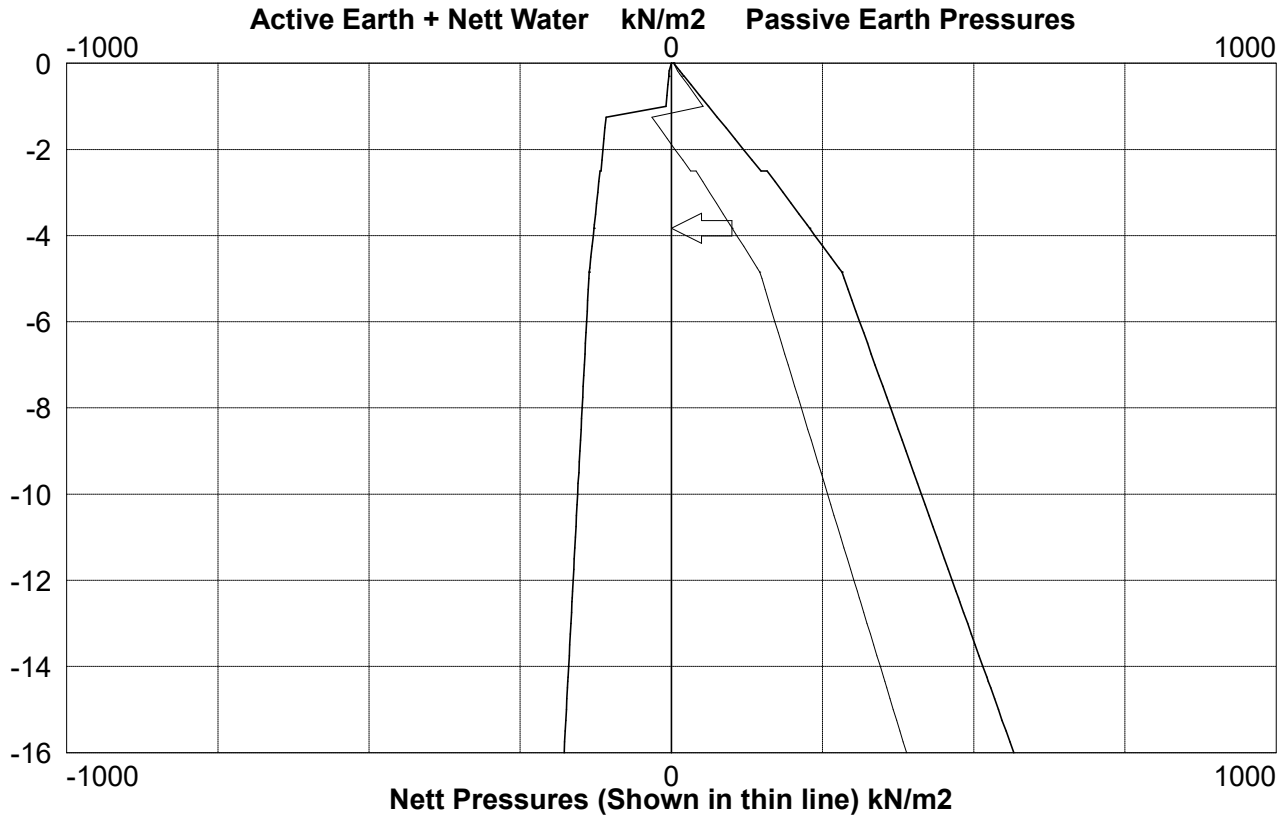


Tabular results from analysis of stage ref 3

strength.
analysis.

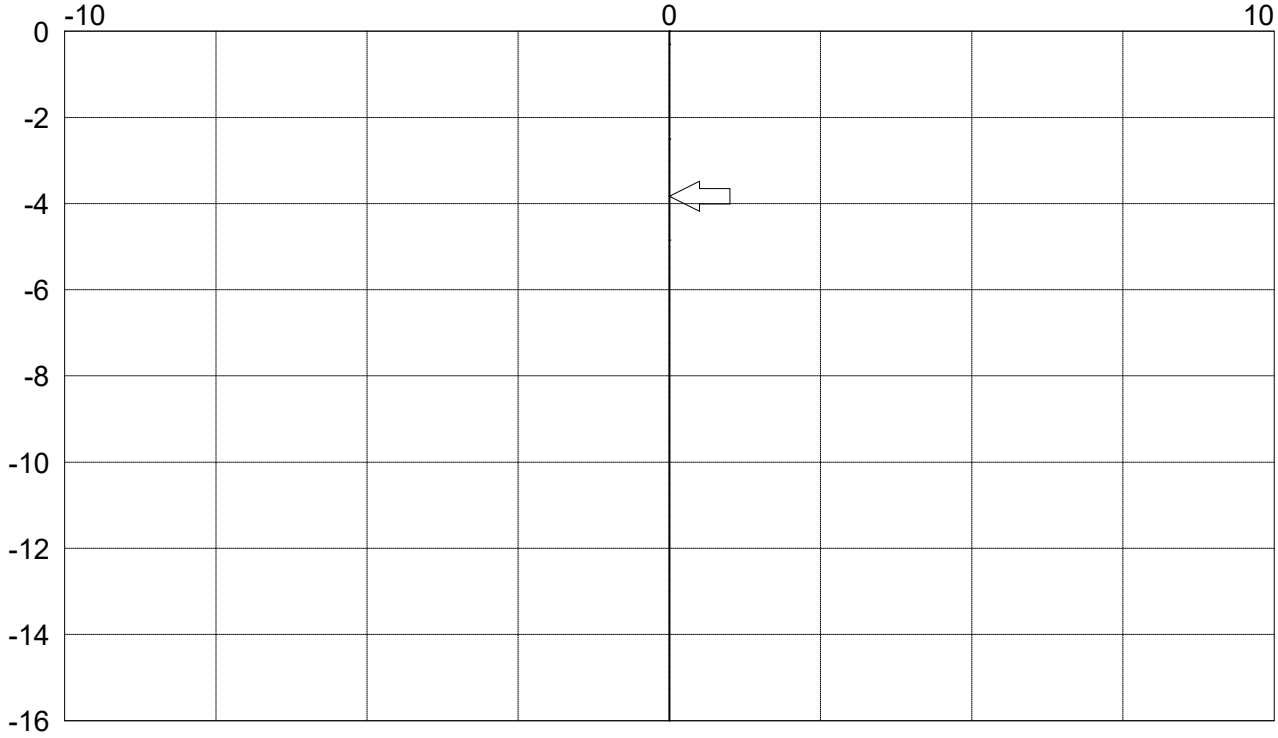
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	3.7	.0	-3.7	0	0			.00
t .00	.0	.0	.0	.0	3.8	.0	-3.8	0	0			>100.00
-.17	13.1	3.5	.0	3.1	13.7	.0	-10.2	0	0			6.15
-.30	15.4	4.3	.0	5.4	21.0	.0	-16.7	0	0		.0	5.01
-.30	15.4	4.3	.0	5.4	21.1	.0	-16.8	0	0			5.01
-1.00	28.0	8.8	.0	18.0	61.4	.0	-52.6	0	0			5.57
-2.00	316.0	113.0	.0	36.0	119.2	.0	-6.2	0	0			1.67
-2.50	325.0	116.3	.0	45.0	148.1	.0	-31.8	0	0			1.39
-2.50	325.0	117.8	.0	45.0	158.6	.0	-40.8	0	0			1.39
-3.00	334.5	121.6	.0	54.5	184.9	.0	-63.3	0	0			1.31
-3.83	350.3	128.0	.0	70.3	228.5	.0	-100.5	0	0		.0	1.32
-3.83	350.3	128.0	.0	70.3	228.6	.0	-100.6	0	0			1.32
-4.00	353.5	129.3	.0	73.5	237.5	.0	-108.2	0	0			1.33
-4.85	369.6	135.8	.0	89.6	282.1	.0	-146.3	0	0			1.39
-4.85	369.7	135.8	.0	89.6	282.2	.0	-146.4	0	0			1.39
-5.00	371.0	136.4	1.5	91.0	286.0	1.5	-149.6	0	0			1.40
-6.00	380.2	140.1	11.3	100.2	311.5	11.3	-171.4	0	0			1.49
-7.00	389.4	143.8	21.1	109.4	336.9	21.1	-193.1	0	0			1.58
-8.00	398.6	147.5	30.9	118.6	362.4	30.9	-214.9	0	0			1.66
-9.00	407.8	151.3	40.7	127.8	387.9	40.7	-236.6	0	0			1.73
-10.00	417.0	155.0	50.5	137.0	413.4	50.5	-258.4	0	0			1.80
-11.00	426.2	158.7	60.3	146.2	438.8	60.3	-280.1	0	0			1.86
-12.00	435.4	162.4	70.1	155.4	464.3	70.1	-301.9	0	0			1.92
-12.41	439.2	163.9	74.1	159.2	474.7	74.1	-310.8	0	0			1.94
-13.00	444.6	166.1	79.9	164.6	489.8	79.9	-323.6	0	0			1.98
-14.00	453.8	169.9	89.7	173.8	515.3	89.7	-345.4	0	0			2.03
-14.35	457.1	171.2	93.1	177.1	524.2	93.1	-353.0	0	0			2.05
-15.00	463.0	173.6	99.5	183.0	540.7	99.5	-367.1	0	0			2.08
-16.00	472.2	177.3	109.3	192.2	566.2	109.3	-388.9	0	0			2.13

Graphical results from analysis of stage ref 3

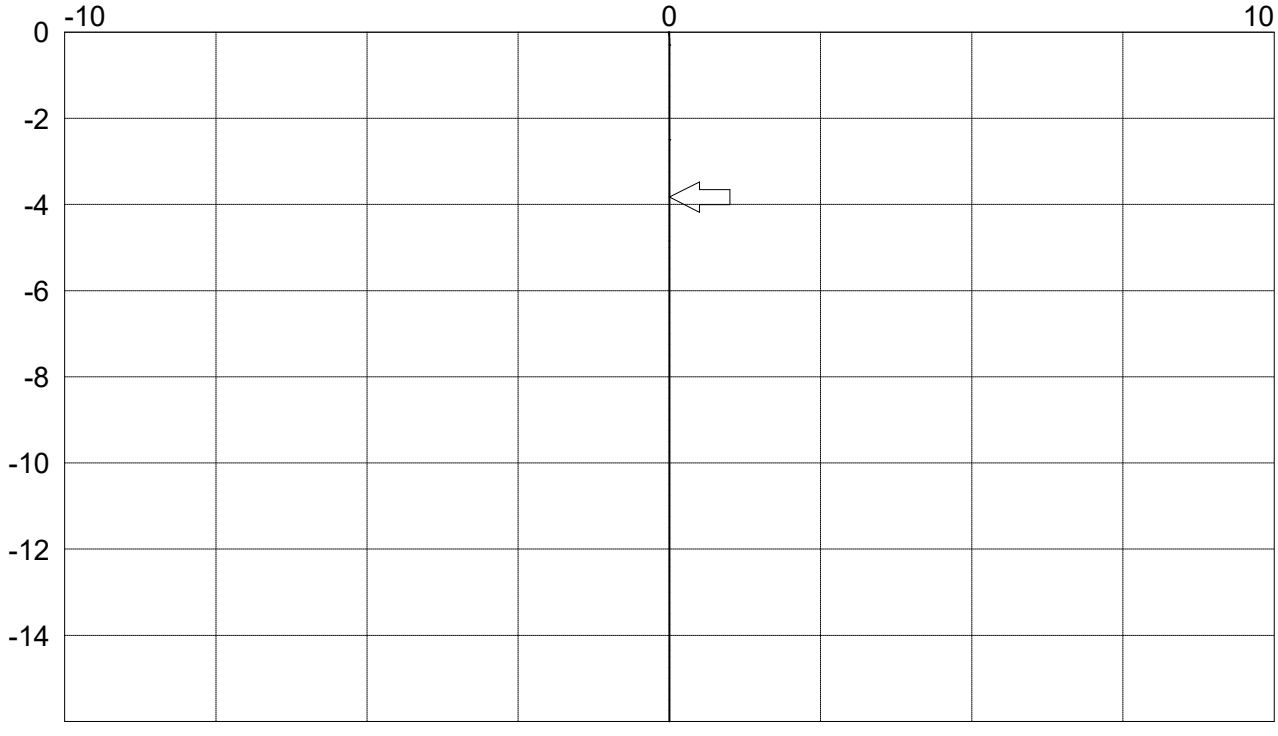


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 3 continued

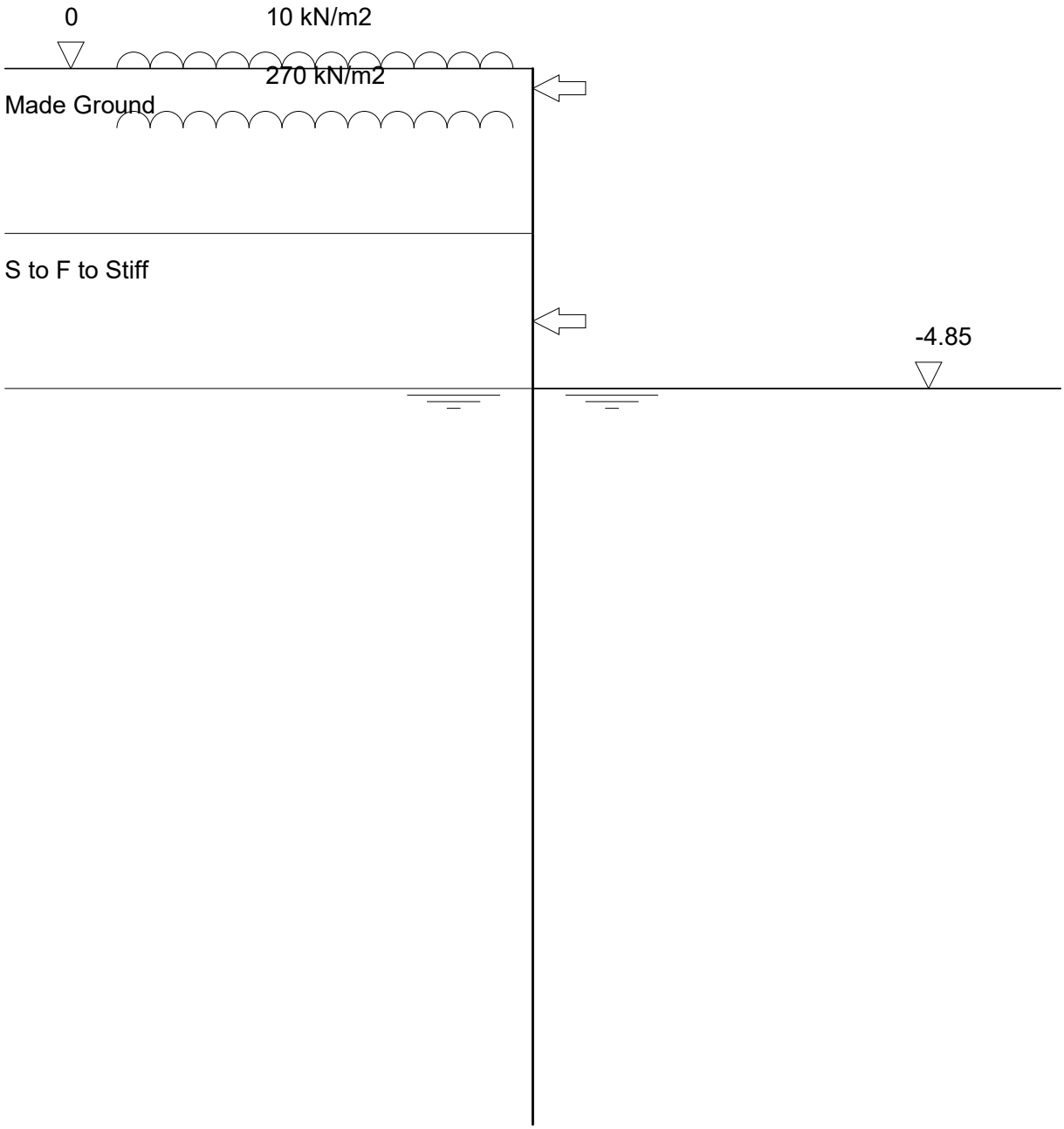


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **5**
Stage type **Passive side excavation**

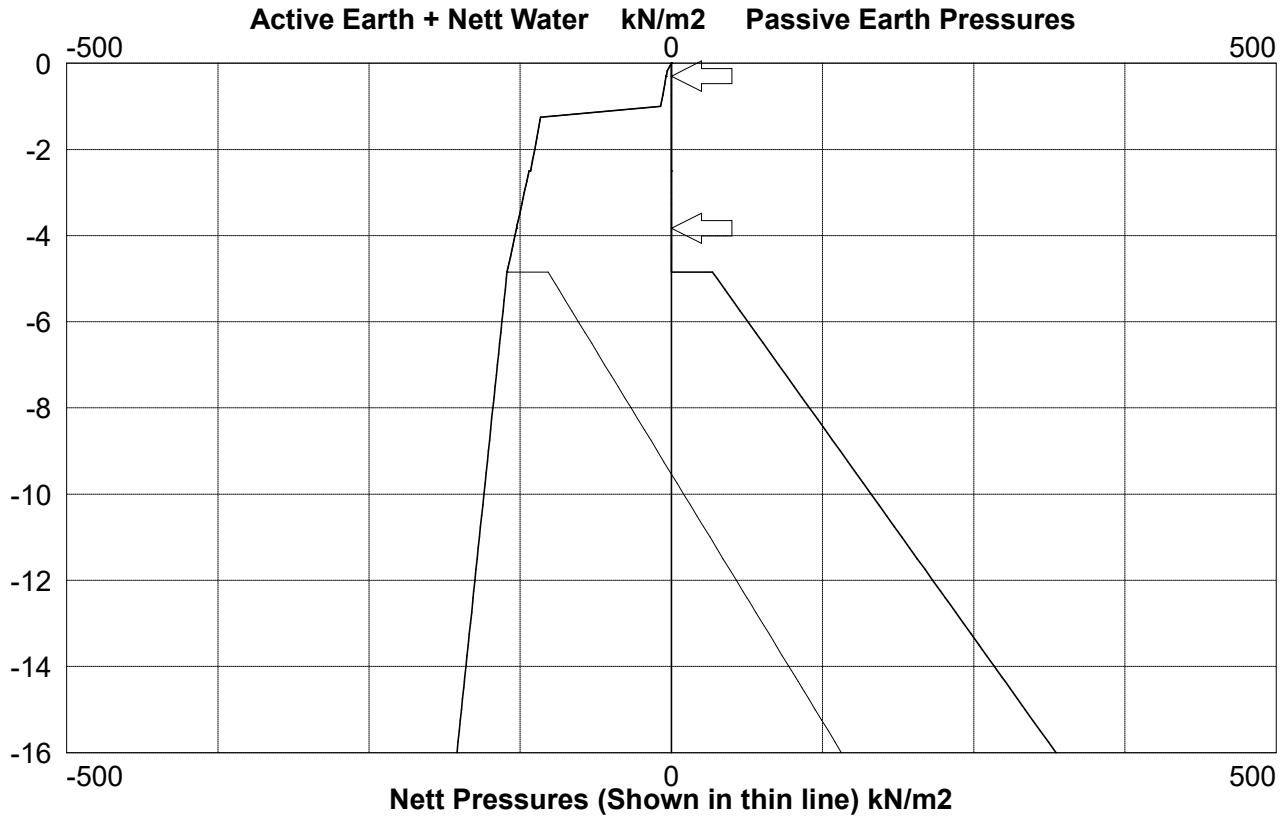


Tabular results from analysis of stage ref 5

strength.
analysis.

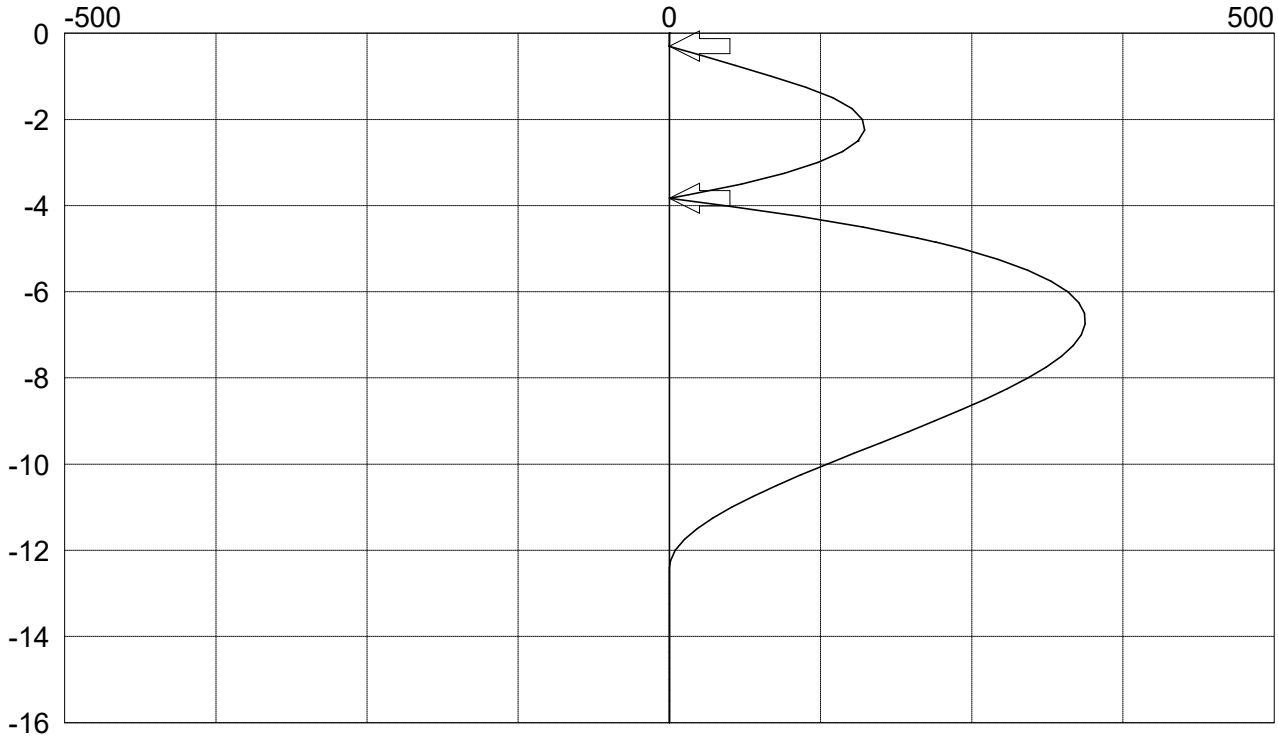
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	3.5	.0	.0	.0	.0	3.5	0	-.3			.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	-.8		123.9	.00
-.30	15.4	4.3	.0	.0	.0	.0	4.3	.1	123.1			.00
-1.00	28.0	8.8	.0	.0	.0	.0	8.8	-84.4	118.5			.00
-2.00	316.0	113.0	.0	.0	.0	.0	113.0	-159.8	20.9			.00
-2.50	325.0	116.3	.0	.0	.0	.0	116.3	-156.0	-36.4			.00
-2.50	325.0	117.8	.0	.0	.0	.0	117.8	-155.9	-36.4			.00
-3.00	334.5	121.6	.0	.0	.0	.0	121.6	-122.9	-96.2			.00
-3.83	350.3	128.0	.0	.0	.0	.0	128.0	-.4	-199.8		483.0	.00
-3.83	350.3	128.0	.0	.0	.0	.0	128.0	0	282.9			.00
-4.00	353.5	129.3	.0	.0	.0	.0	129.3	-45.7	261.3			.00
-4.85	369.6	135.8	.0	.0	.0	.0	135.8	-220.0	148.9			.00
-4.85	369.7	135.8	.0	.0	34.0	.0	101.8	-220.3	148.7			.00
-5.00	371.0	136.4	1.5	1.4	37.8	1.5	98.6	-241.5	133.6			.06
-6.00	380.2	140.1	11.3	10.6	63.3	11.3	76.8	-329.4	45.9			.29
-7.00	389.4	143.8	21.1	19.8	88.7	21.1	55.1	-340.6	-20.0			.42
-8.00	398.6	147.5	30.9	29.0	114.2	30.9	33.3	-296.6	-64.3			.54
-9.00	407.8	151.3	40.7	38.2	139.7	40.7	11.6	-219.3	-86.7			.65
-10.00	417.0	155.0	50.5	47.4	165.1	50.5	-10.2	-130.4	-87.4			.76
-11.00	426.2	158.7	60.3	56.6	190.6	60.3	-31.9	-51.7	-66.4			.86
-12.00	435.4	162.4	70.1	65.8	216.1	70.1	-53.7	-4.9	-23.6			.96
-12.41	439.2	163.9	74.1	69.5	226.5	74.1	-62.5	0	0			1.00
-13.00	444.6	166.1	79.9	75.0	241.6	79.9	-75.4	0	0			1.06
-14.00	453.8	169.9	89.7	84.2	267.0	89.7	-97.2	0	0			1.15
-14.35	457.1	171.2	93.1	87.4	276.0	93.1	-104.8	0	0			1.18
-15.00	463.0	173.6	99.5	93.4	292.5	99.5	-118.9	0	0			1.24
-16.00	472.2	177.3	109.3	102.6	318.0	109.3	-140.7	0	0			1.32

Graphical results from analysis of stage ref 5

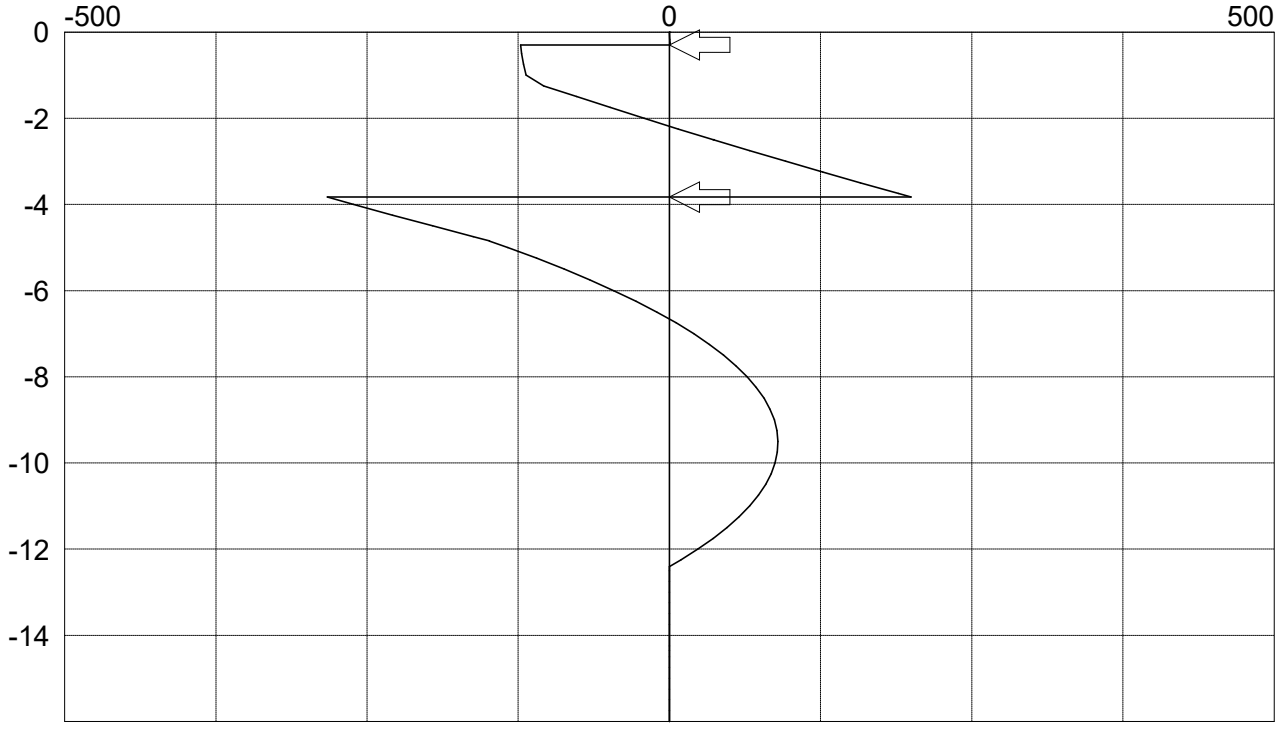


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 5 continued

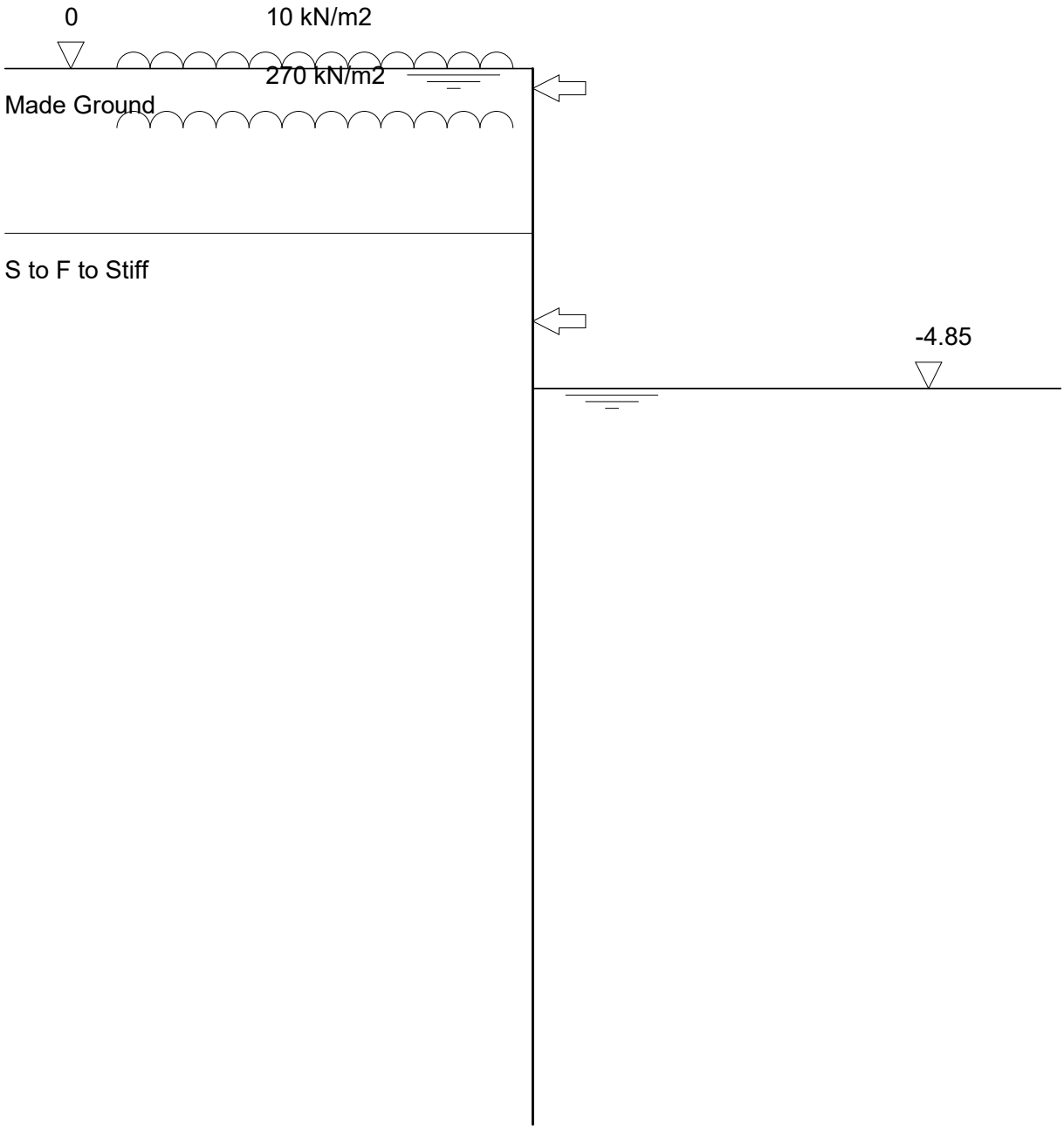


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. **6**
Stage type **Active water level**

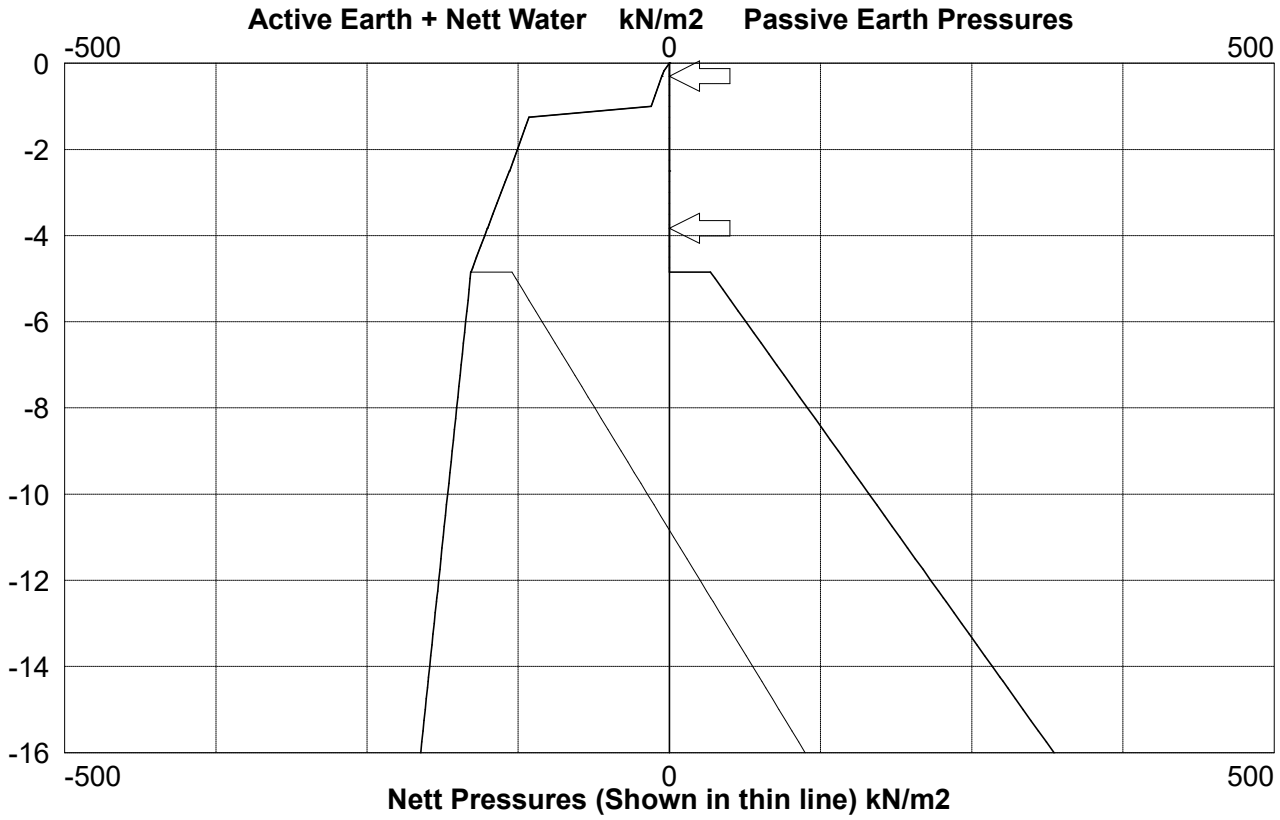


Tabular results from analysis of stage ref 6

strength.
analysis.

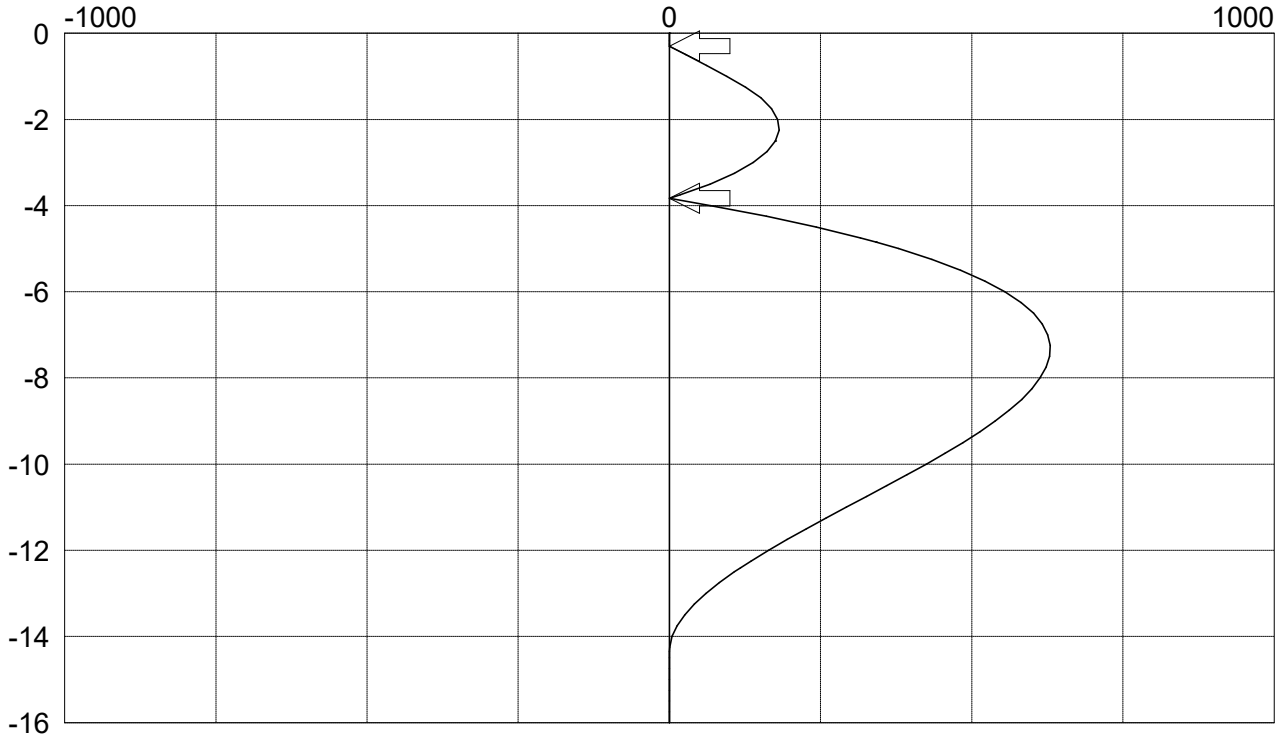
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	11.4	2.8	1.7	.0	.0	.0	4.5	0	-.4			.00
-.30	12.5	3.2	2.9	.0	.0	.0	6.2	.1	-1.1		140.2	.00
-.30	12.5	3.2	3.0	.0	.0	.0	6.2	.1	139.1			.00
-1.00	18.2	5.3	9.8	.0	.0	.0	15.1	-94.7	131.7			.00
-2.00	296.4	105.9	19.6	.0	.0	.0	125.5	-179.1	24.7			.00
-2.50	300.5	107.4	24.5	.0	.0	.0	131.9	-175.5	-39.6			.00
-2.50	300.5	107.8	24.5	.0	.0	.0	132.3	-175.5	-39.6			.00
-3.00	305.1	109.7	29.4	.0	.0	.0	139.1	-138.9	-107.5			.00
-3.83	312.7	112.8	37.5	.0	.0	.0	150.3	-.5	-227.6		643.0	.00
-3.83	312.8	112.8	37.6	.0	.0	.0	150.4	0	415.1			.00
-4.00	314.3	113.4	39.2	.0	.0	.0	152.6	-67.6	389.6			.00
-4.85	322.1	116.6	47.5	.0	.0	.0	164.1	-341.7	255.3			.00
-4.85	322.1	116.6	47.5	.0	34.0	.0	130.2	-342.3	255.0			.00
-5.00	323.5	117.1	49.0	1.4	37.8	1.5	126.9	-379.1	235.8			.05
-6.00	332.7	120.9	58.8	10.6	63.3	11.3	105.1	-555.0	119.7			.24
-7.00	341.9	124.6	68.6	19.8	88.7	21.1	83.4	-625.8	25.5			.35
-8.00	351.1	128.3	78.4	29.0	114.2	30.9	61.6	-613.2	-47.0			.45
-9.00	360.3	132.0	88.2	38.2	139.7	40.7	39.9	-539.0	-97.8			.55
-10.00	369.5	135.8	98.0	47.4	165.1	50.5	18.1	-424.8	-126.8			.64
-11.00	378.7	139.5	107.8	56.6	190.6	60.3	-3.6	-292.6	-134.1			.73
-12.00	387.9	143.2	117.6	65.8	216.1	70.1	-25.4	-163.9	-119.6			.81
-12.41	391.7	144.7	121.6	69.5	226.5	74.1	-34.2	-117.5	-107.4			.84
-13.00	397.1	146.9	127.4	75.0	241.6	79.9	-47.1	-60.7	-83.3			.89
-14.00	406.3	150.6	137.2	84.2	267.0	89.7	-68.9	-4.5	-25.4			.97
-14.35	409.5	151.9	140.6	87.4	276.0	93.1	-76.5	0	0			1.00
-15.00	415.5	154.4	147.0	93.4	292.5	99.5	-90.6	0	0			1.05
-16.00	424.7	158.1	156.8	102.6	318.0	109.3	-112.4	0	0			1.13

Graphical results from analysis of stage ref 6

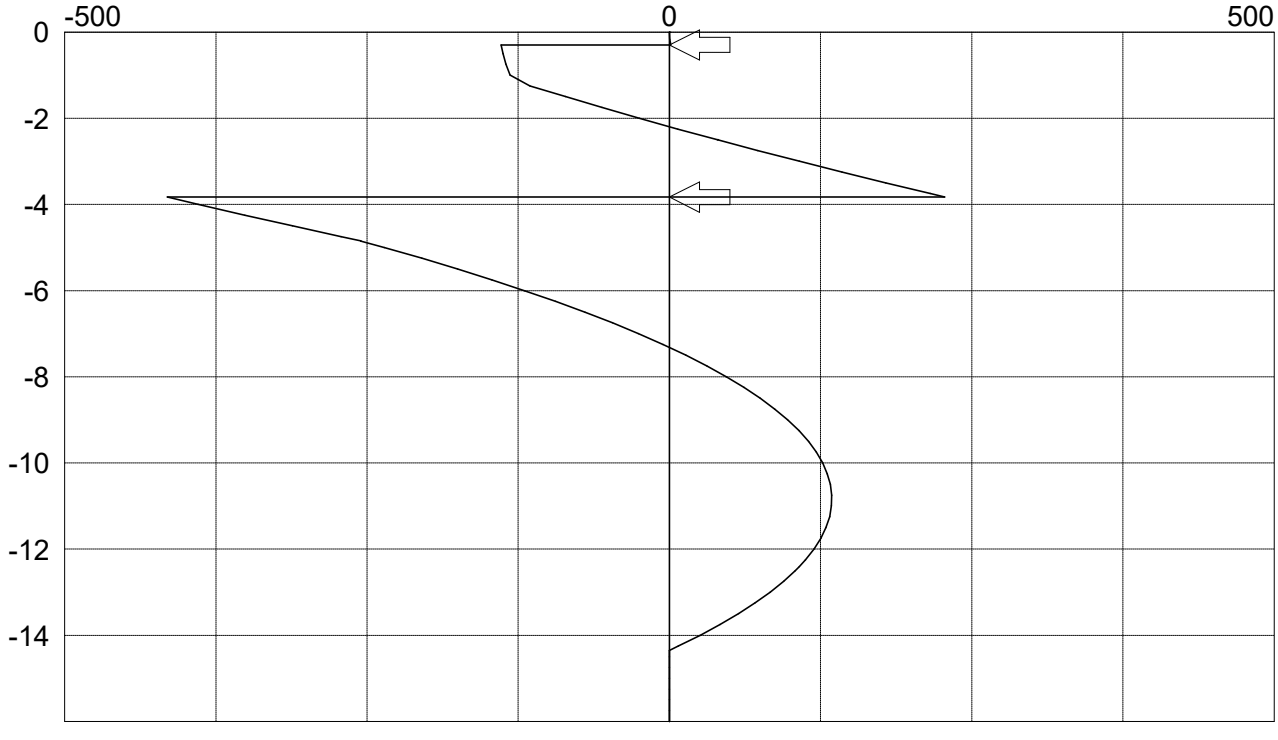


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 6 continued

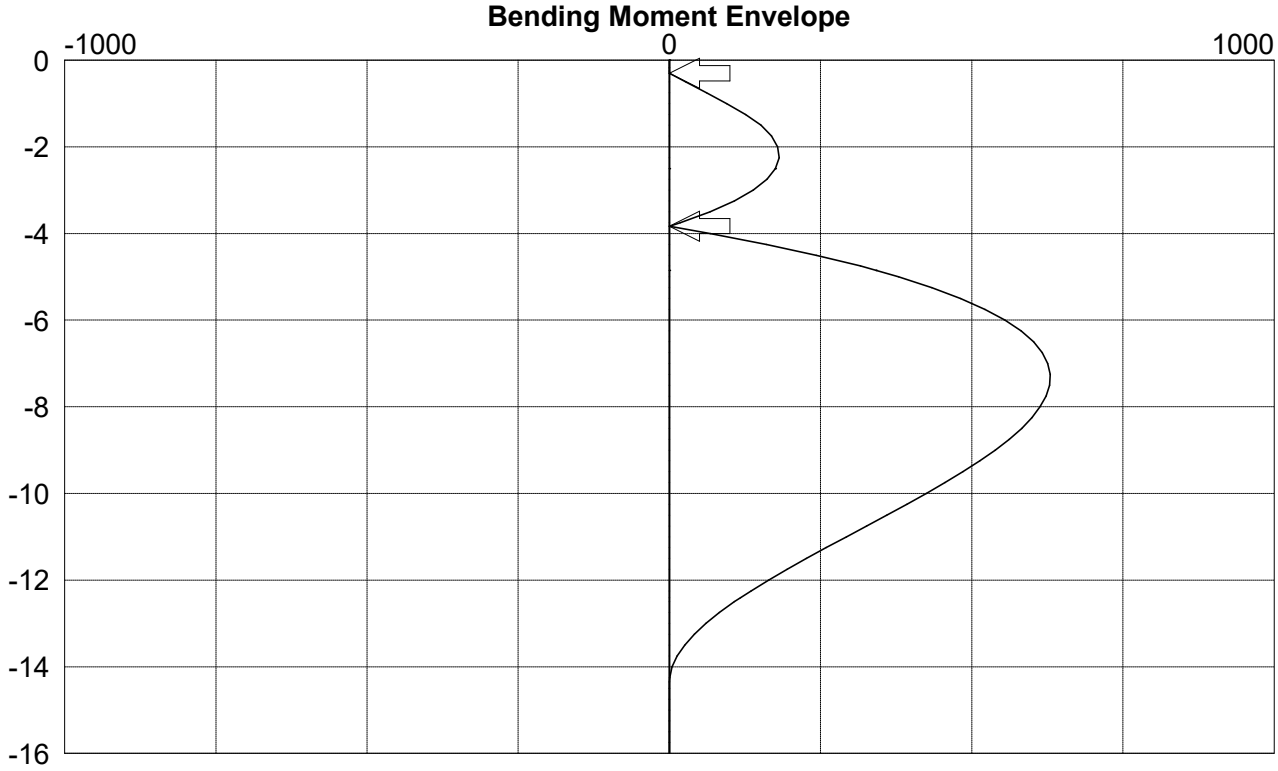


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Graphical plot of envelope from selected construction stages



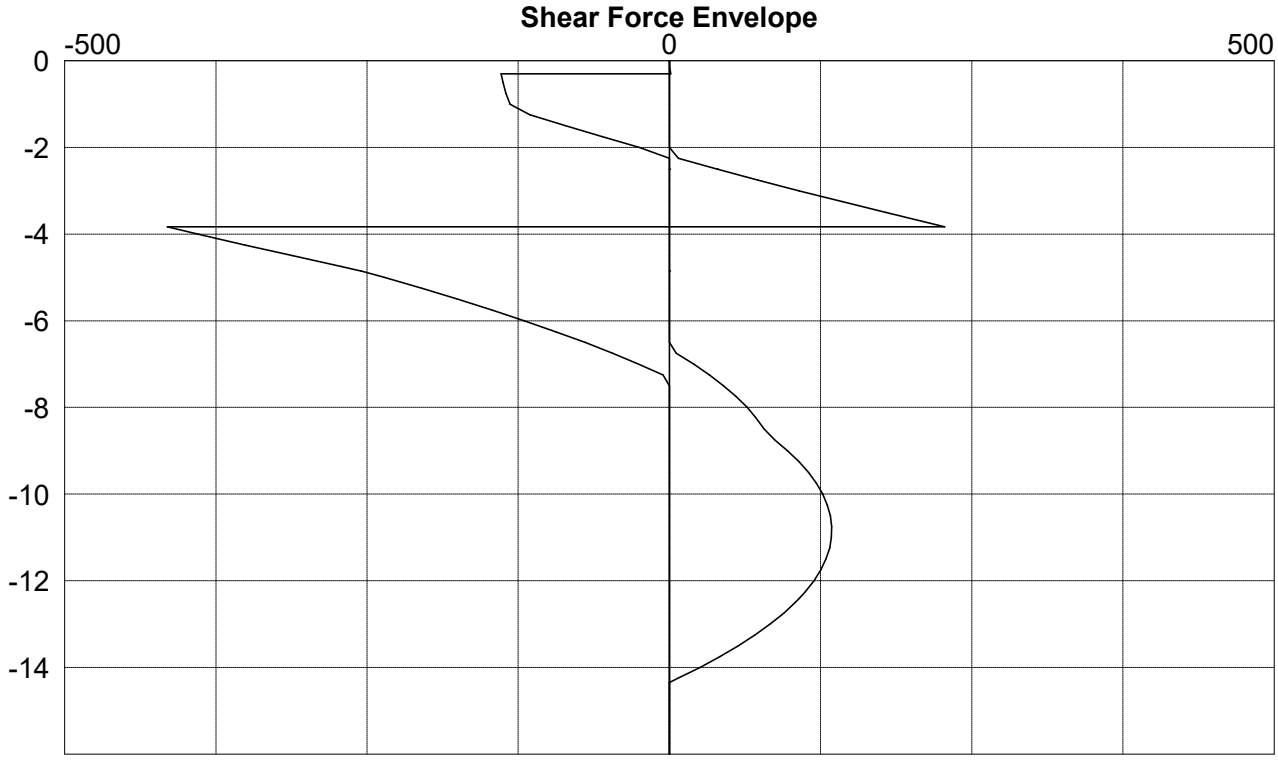


Table of envelope for wall forces

Calc Level m	Bending Minimum kNm/m	Bending Maximum kNm/m	Shear Minimum kN/m	Shear Maximum kN/m	Prop Force kN/m
.00	.0	.0	.0	.0	
.00	.0	.0	.0	.0	
-.17	.0	.0	-.4	.0	
-.30	.0	.1	-1.1	.0	140.2
-.30	.0	.1	.0	139.1	
-1.00	-94.7	.0	.0	131.7	
-2.00	-179.1	.0	.0	24.7	
-2.50	-175.5	.0	-39.6	.0	
-2.50	-175.5	.0	-39.6	.0	
-3.00	-138.9	.0	-107.5	.0	
-3.83	-.5	.0	-227.6	.0	643.0
-3.83	.0	.0	.0	415.1	
-4.00	-67.6	.0	.0	389.6	
-4.85	-341.7	.0	.0	255.3	
-4.85	-342.3	.0	.0	255.0	
-5.00	-379.1	.0	.0	235.8	
-6.00	-555.0	.0	.0	119.7	
-7.00	-625.8	.0	-20.0	25.5	
-8.00	-613.2	.0	-64.3	.0	
-9.00	-539.0	.0	-97.8	.0	
-10.00	-424.8	.0	-126.8	.0	
-11.00	-292.6	.0	-134.1	.0	
-12.00	-163.9	.0	-119.6	.0	
-12.41	-117.5	.0	-107.4	.0	
-13.00	-60.7	.0	-83.3	.0	
-14.00	-4.5	.0	-25.4	.0	
-14.35	.0	.0	.0	.0	
-15.00	.0	.0	.0	.0	
-16.00	.0	.0	.0	.0	

Structural design of wall

Wall section properties

Primary pile diameter	600	mm
Primary pile spacing	700	mm
Infill pile diameter		mm
Main rebar bar diameter	40	mm
Main rebar number of bars	12	
Links/Helix bar diameter	16	mm
Links/Helix spacing/pitch	150	mm

Wall material properties

Concrete cube strength	35	N/mm2
Concrete cover	50	mm
Main rebar steel grade	500	N/mm2
Link rebar steel grade	500	N/mm2
Ultimate load factor	1.00	

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Bending resistance. BS8110 plane strain analysis	441	996	kNm
Max longitudinal steel. BS8110 max 6% by area	16965	15080	mm2
Min longitudinal steel. BS8110 min 0.4% by area	1131	15080	mm2
Shear resistance. BS8110	291	696	kN
Min link dia. BS8110 6mm or 0.25x bar dia	10	16	mm
Max link spacing. BS8110 12x main bar dia or 0.75d	311	150	mm
Min shear link area. BS8110 Clause 3.4.5	432	2681	mm2/m

Pile Wall Section B-B Temporary Condition	Page No 1 Analysis Temp Condition
CADS Piled Wall Suite Version 6.10 Design of embedded retaining walls and cofferdams	Project ULS Analysis File Name B-B -Temp Condn.pws"
Broxwood View, 29 St. Edmund's Terrace London NW8 450mm Dia. Secant Pile Retaining Wall	Engineer AA Date 14/02/2023

Pile geometry

Pile top Level	0	m
Pile Length	8	m
Pile toe level	-8	m

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level -5.35

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
.00	Made Ground	18.00	18.00	15000	0			28	.67	.30	
								28	.50	4.15	
-2.50	S to F to Stiff	19.00	19.00	24000	9600	30	12.0		.67	1.00	2.58
						30	12.0		.50	1.00	2.45
	Granular Fill	19.00	20.00	70000	0			37	.67	.20	
								37	.50	7.92	

Construction sequence

Stage Ref		Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	A	Active surcharge	0.00	10.0	.3		
2	A	Passive side excavation	-1.00				
3		Insert prop	-0.50				
4	A	Passive side excavation	-5.35				
5	A	Passive side fill	-4.85				
6	A	Active water level	-4.85				
7	A	Passive water level	-4.85				
8		Insert prop	-3.83				
9	A	Remove prop	-0.50				
10		Insert prop	-0.30				
11	A	Active water level	0.00				
12	A	Active surcharge	0.00	50.0	.3		
13	A	Horizontal load					

Code of practice

Code of practice or reference document	
Application of pressures for stability	Not applicable for FOS=1 on moments
FOS on moments (stability check)	1.00
ULS factor on Tan(Phi) values	1.20
ULS fFactor on drained cohesion values	1.20
ULS factor on undrained cohesion values	1.50
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.00

Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	9.8	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	.0	m
Continuity model for wall analysis	Pins at second and lower props	

Deflection parameters

Wall moment of inertia	335482	cm4/m
Wall Youngs modulus	27000000	kN/m2

Properties for prop at -0.5

Prop/Tie cross sectional area	3	cm2 each
Prop/Tie Youngs modulus	200000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Properties for prop at -3.83

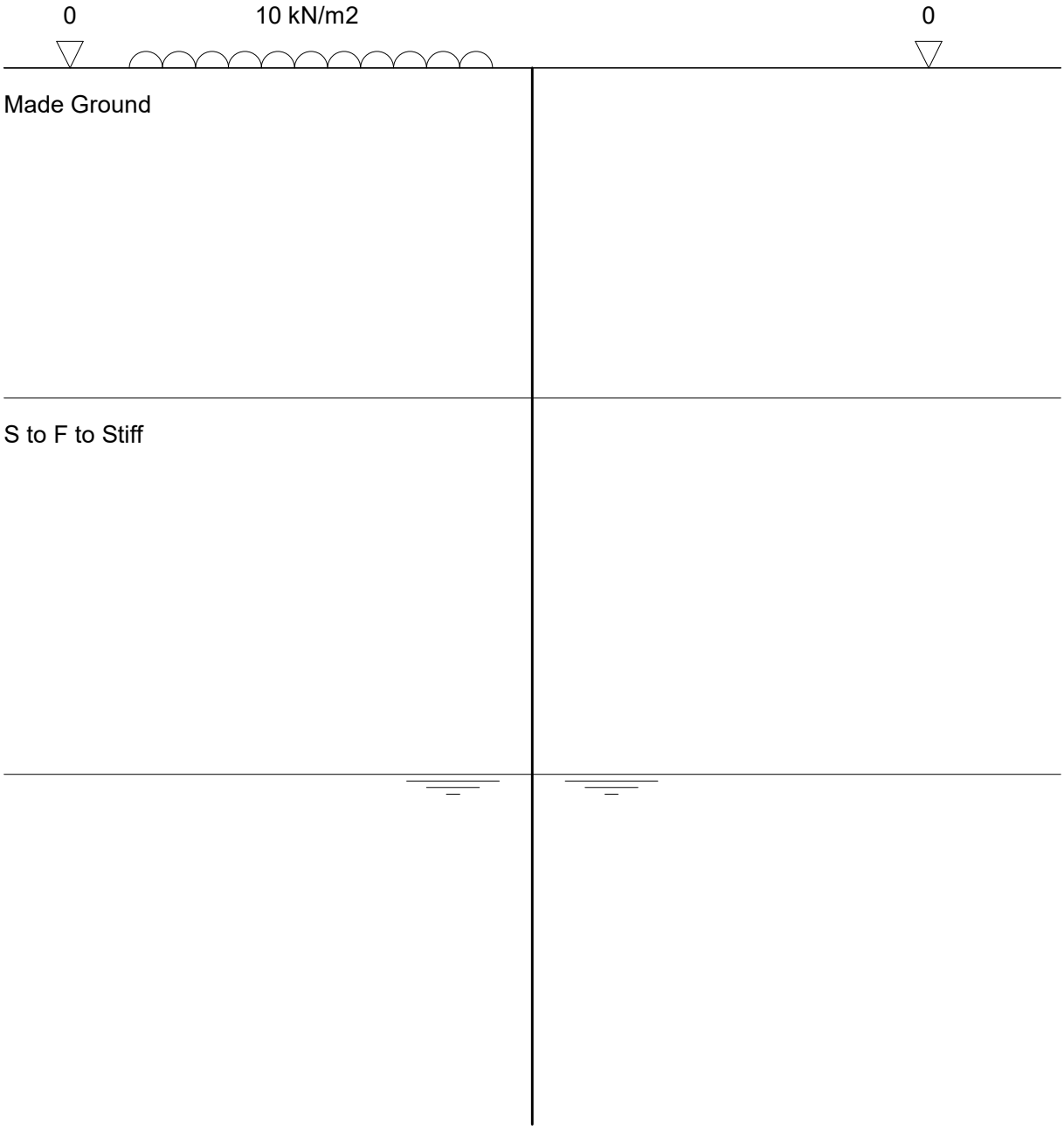
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Deflection parameters - continued

Properties for prop at -0.3

Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Stage ref. 1
Stage type Active surcharge

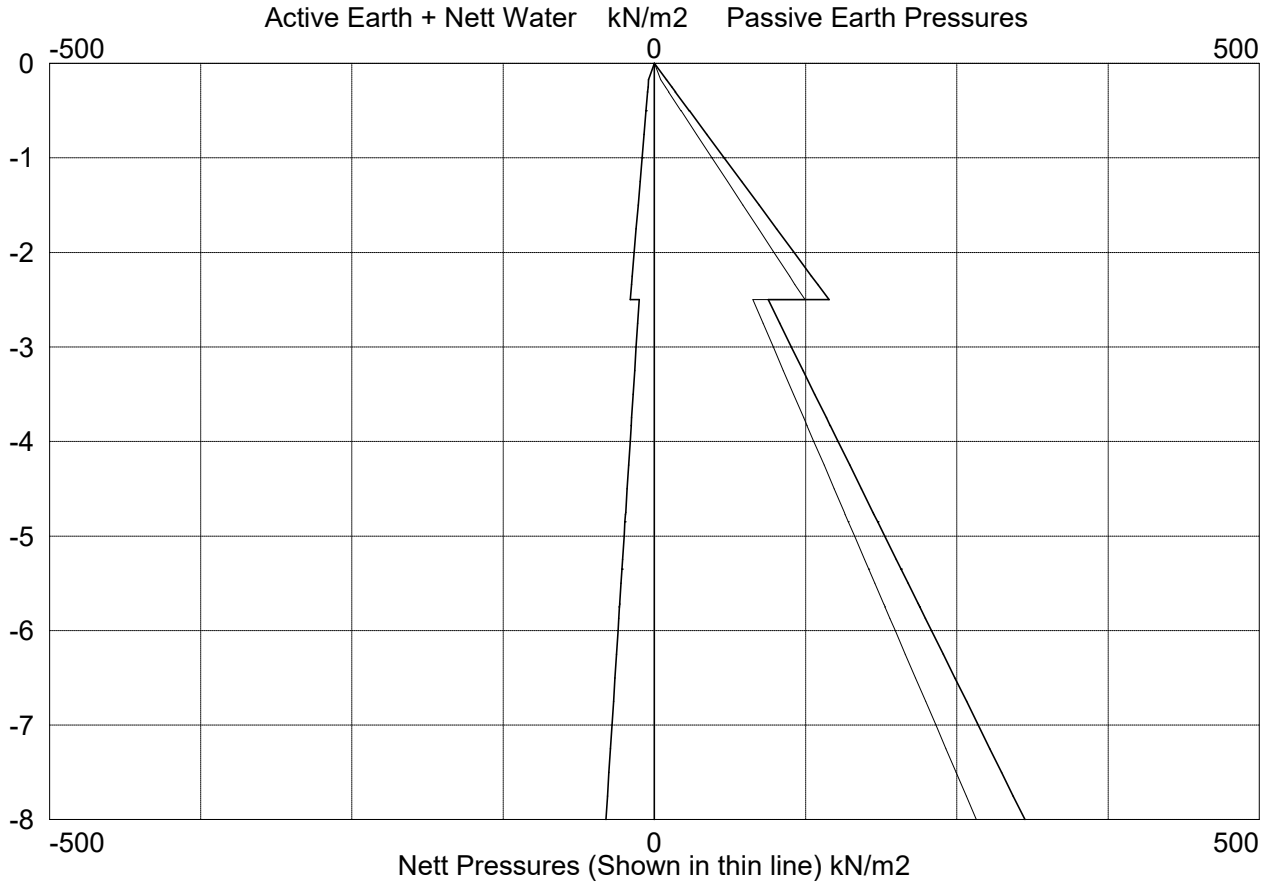


Tabular results from analysis of stage ref 1

strength.
analysis.

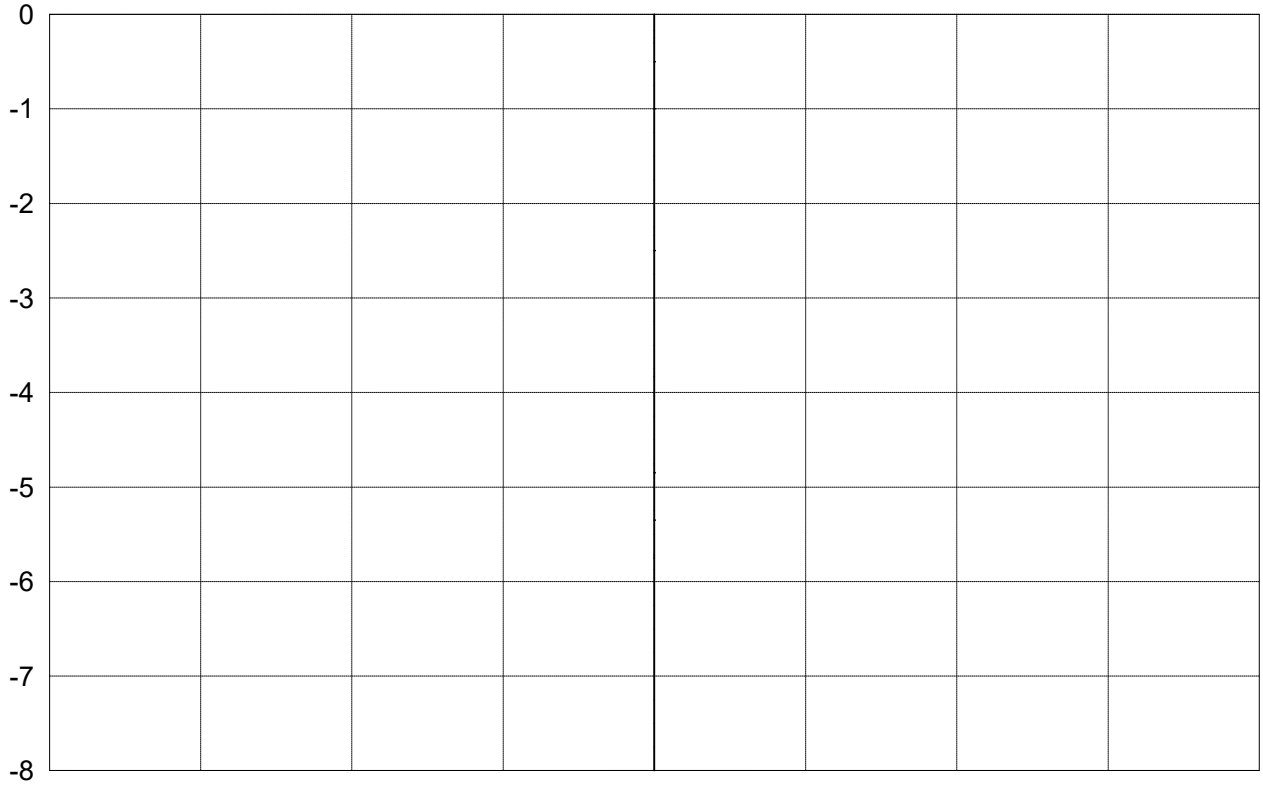
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.1	.0	-.1	0	0			>100.00
-.17	13.1	4.7	.0	3.1	10.0	.0	-5.3	0	0			>100.00
-.30	15.4	5.6	.0	5.4	17.3	.0	-11.8	0	0		.0	>100.00
-.30	15.4	5.6	.0	5.4	17.4	.0	-11.9	0	0			>100.00
-.50	19.0	6.9	.0	9.0	28.9	.0	-22.0	0	0		.0	>100.00
-.50	19.0	6.9	.0	9.0	29.0	.0	-22.1	0	0			>100.00
-1.00	28.0	10.1	.0	18.0	57.7	.0	-47.5	0	0			>100.00
-1.00	28.0	10.1	.0	18.0	57.8	.0	-47.6	0	0			>100.00
-2.00	46.0	16.6	.0	36.0	115.5	.0	-98.9	0	0			>100.00
-2.34	52.1	18.8	.0	42.1	135.1	.0	-116.2	0	0			>100.00
-2.50	55.0	19.9	.0	45.0	144.4	.0	-124.5	0	0			>100.00
m -2.50	55.0	12.5	.0	45.0	94.0	.0	-81.5	0	0			>100.00
m -3.00	64.5	15.0	.0	54.5	113.3	.0	-98.3	0	0			>100.00
m -3.83	80.3	19.2	.0	70.3	145.3	.0	-126.2	0	0		.0	>100.00
m -3.83	80.3	19.2	.0	70.3	145.4	.0	-126.2	0	0			>100.00
m -4.00	83.5	20.0	.0	73.5	151.9	.0	-131.9	0	0			>100.00
m -4.77	98.1	23.9	.0	88.1	181.6	.0	-157.8	0	0			>100.00
m -4.85	99.6	24.2	.0	89.6	184.6	.0	-160.4	0	0			>100.00
m -4.85	99.6	24.3	.0	89.6	184.7	.0	-160.4	0	0			>100.00
m -5.00	102.5	25.0	.0	92.5	190.5	.0	-165.5	0	0			>100.00
m -5.35	109.1	26.7	.0	99.1	203.9	.0	-177.2	0	0			>100.00
m -5.35	109.2	26.8	.0	99.1	204.0	.0	-177.2	0	0			>100.00
m -5.71	116.0	28.6	.0	106.0	218.0	.0	-189.4	0	0			>100.00
m -5.73	116.3	28.6	.0	106.3	218.5	.0	-189.9	0	0			>100.00
m -5.75	116.7	28.7	.0	106.7	219.3	.0	-190.6	0	0			>100.00
m -5.75	116.8	28.8	.0	106.8	219.6	.0	-190.8	0	0			>100.00
m -5.87	119.1	29.4	.0	109.1	224.1	.0	-194.8	0	0			>100.00
m -6.00	121.5	30.0	.0	111.5	229.1	.0	-199.1	0	0			>100.00
m -7.00	140.5	35.0	.0	130.5	267.7	.0	-232.7	0	0			>100.00
m -8.00	159.5	40.0	.0	149.5	306.3	.0	-266.3	0	0			>100.00

Graphical results from analysis of stage ref 1

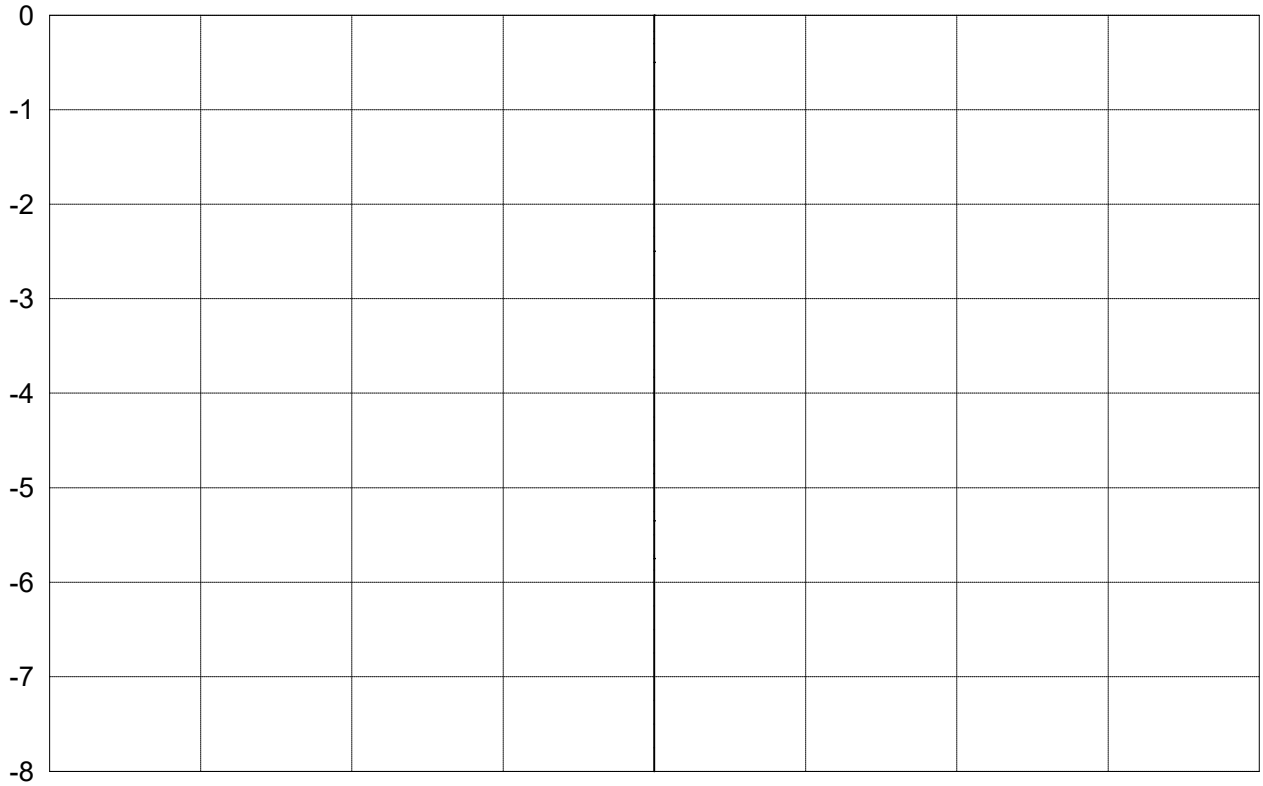


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 1 continued

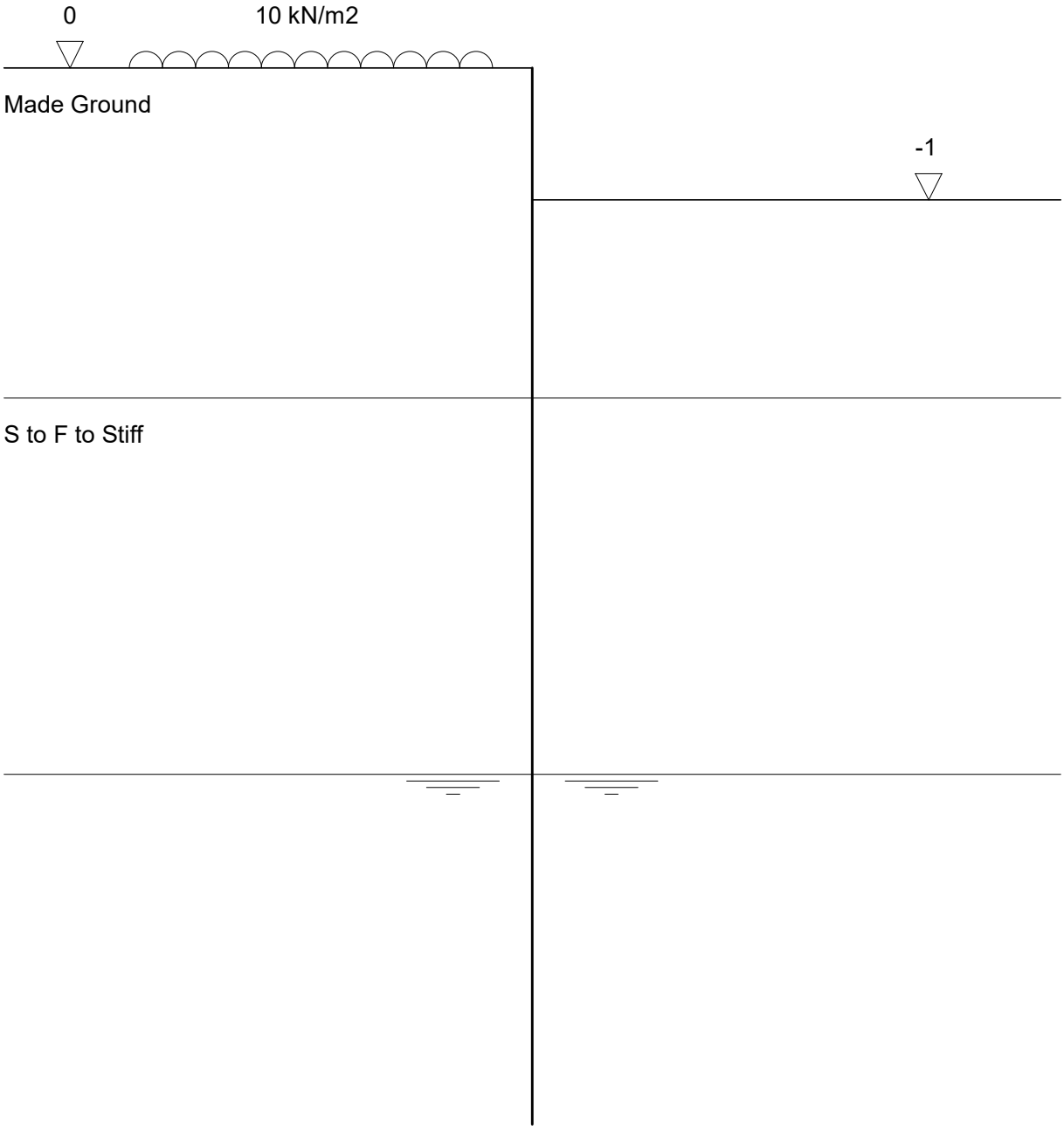


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 2
Stage type Passive side excavation

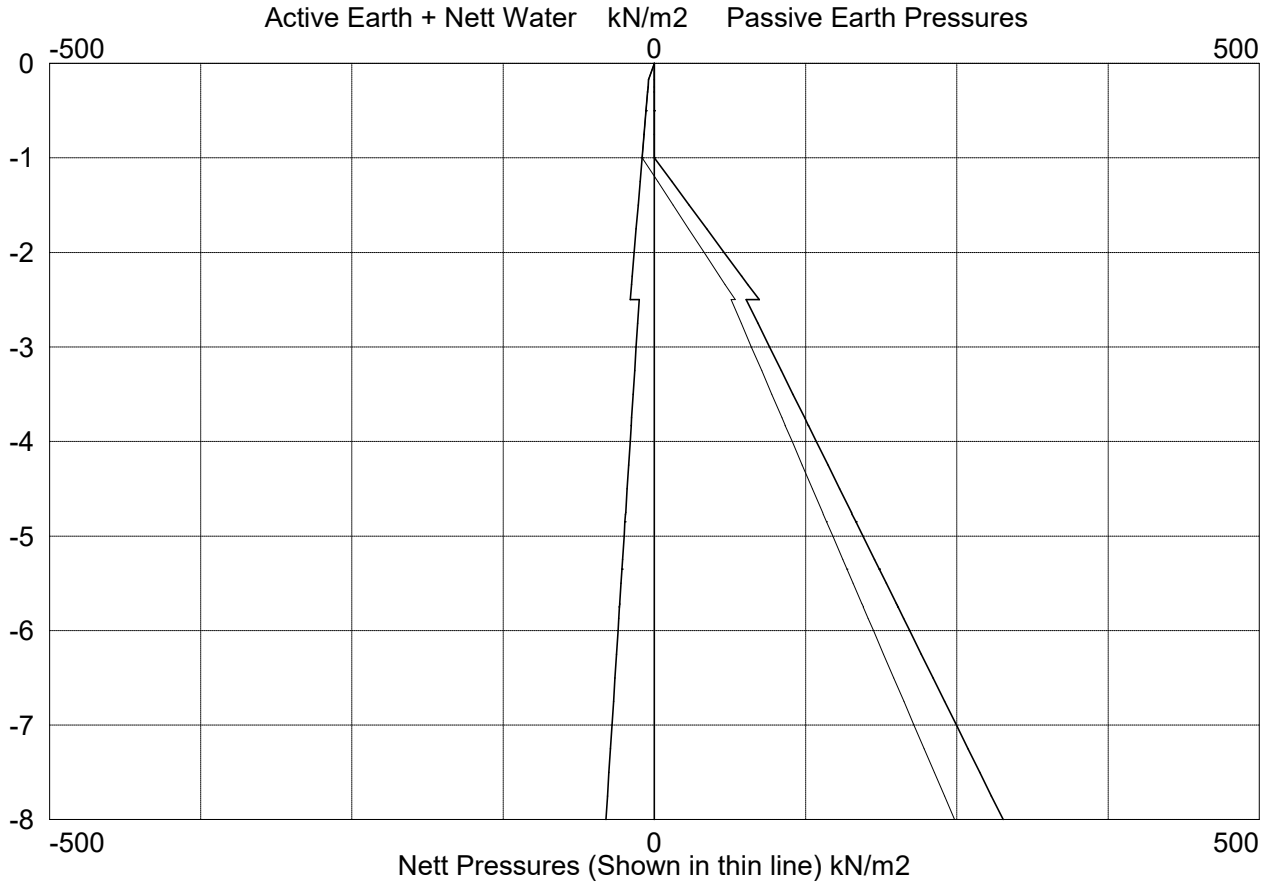


Tabular results from analysis of stage ref 2

strength.
analysis.

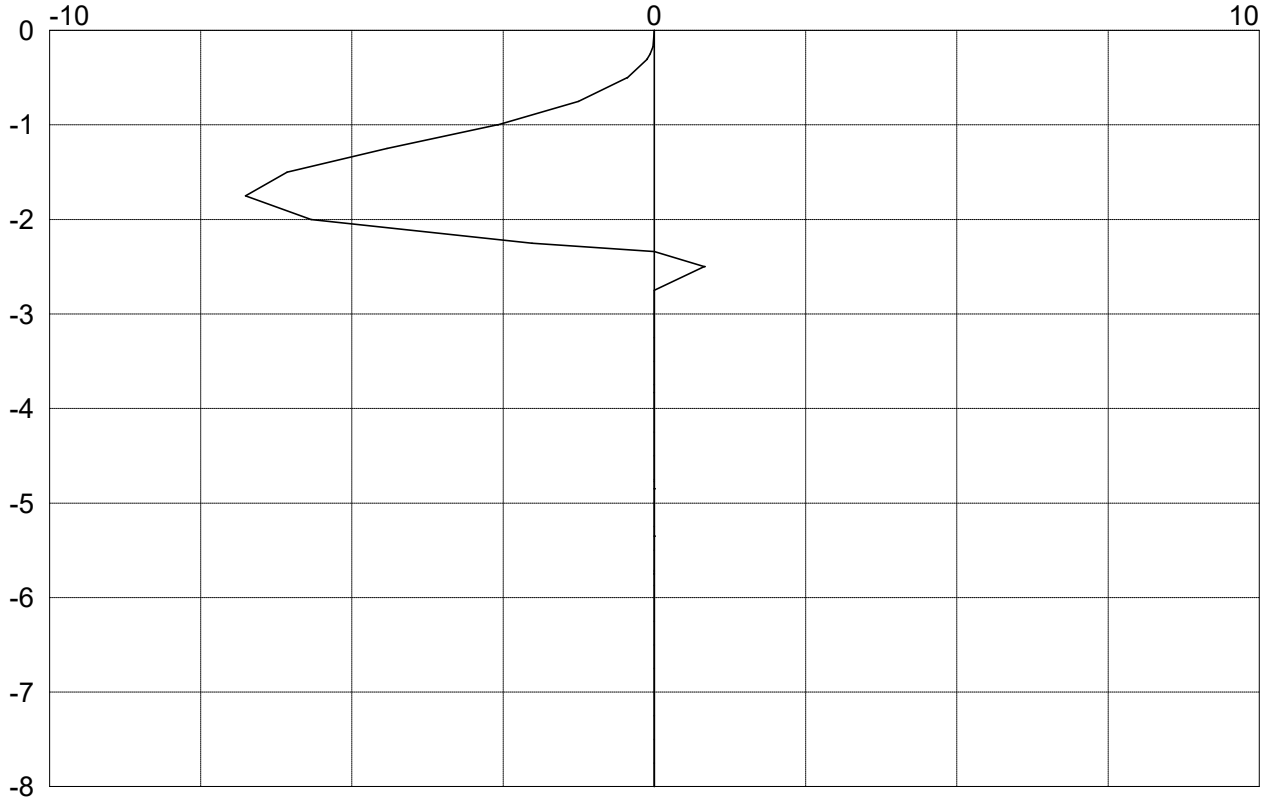
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	4.7	.0	.0	.0	.0	4.7	0	-.4			.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1		.0	.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1			.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.4	-2.3		.0	.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.5	-2.3			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	2.6	-6.5			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	2.6	-6.6			.00
-2.00	46.0	16.6	.0	18.0	57.8	.0	-41.1	5.7	8.9			.63
-2.34	52.1	18.8	.0	24.1	77.3	.0	-58.5	0	25.8			1.00
-2.50	55.0	19.9	.0	27.0	86.7	.0	-66.8	-.8	10.2			1.18
m -2.50	55.0	12.5	.0	27.0	76.0	.0	-63.5	-.8	10.2			1.18
m -3.00	64.5	15.0	.0	36.5	95.3	.0	-80.3	0	0			1.72
m -3.83	80.3	19.2	.0	52.3	127.3	.0	-108.2	0	0		.0	2.54
m -3.83	80.3	19.2	.0	52.3	127.4	.0	-108.2	0	0			2.54
m -4.00	83.5	20.0	.0	55.5	133.9	.0	-113.9	0	0			2.70
m -4.77	98.1	23.9	.0	70.1	163.6	.0	-139.8	0	0			3.33
m -4.85	99.6	24.2	.0	71.6	166.6	.0	-142.4	0	0			3.39
m -4.85	99.6	24.3	.0	71.6	166.7	.0	-142.4	0	0			3.39
m -5.00	102.5	25.0	.0	74.5	172.5	.0	-147.5	0	0			3.50
m -5.35	109.1	26.7	.0	81.1	185.9	.0	-159.2	0	0			3.74
m -5.35	109.2	26.8	.0	81.1	186.0	.0	-159.2	0	0			3.74
m -5.71	116.0	28.6	.0	88.0	200.0	.0	-171.4	0	0			3.97
m -5.73	116.3	28.6	.0	88.3	200.5	.0	-171.9	0	0			3.98
m -5.75	116.7	28.7	.0	88.7	201.3	.0	-172.6	0	0			4.00
m -5.75	116.8	28.8	.0	88.8	201.6	.0	-172.8	0	0			4.00
m -5.87	119.1	29.4	.0	91.1	206.1	.0	-176.8	0	0			4.07
m -6.00	121.5	30.0	.0	93.5	211.1	.0	-181.1	0	0			4.14
m -7.00	140.5	35.0	.0	112.5	249.7	.0	-214.7	0	0			4.66
m -8.00	159.5	40.0	.0	131.5	288.3	.0	-248.3	0	0			5.07

Graphical results from analysis of stage ref 2

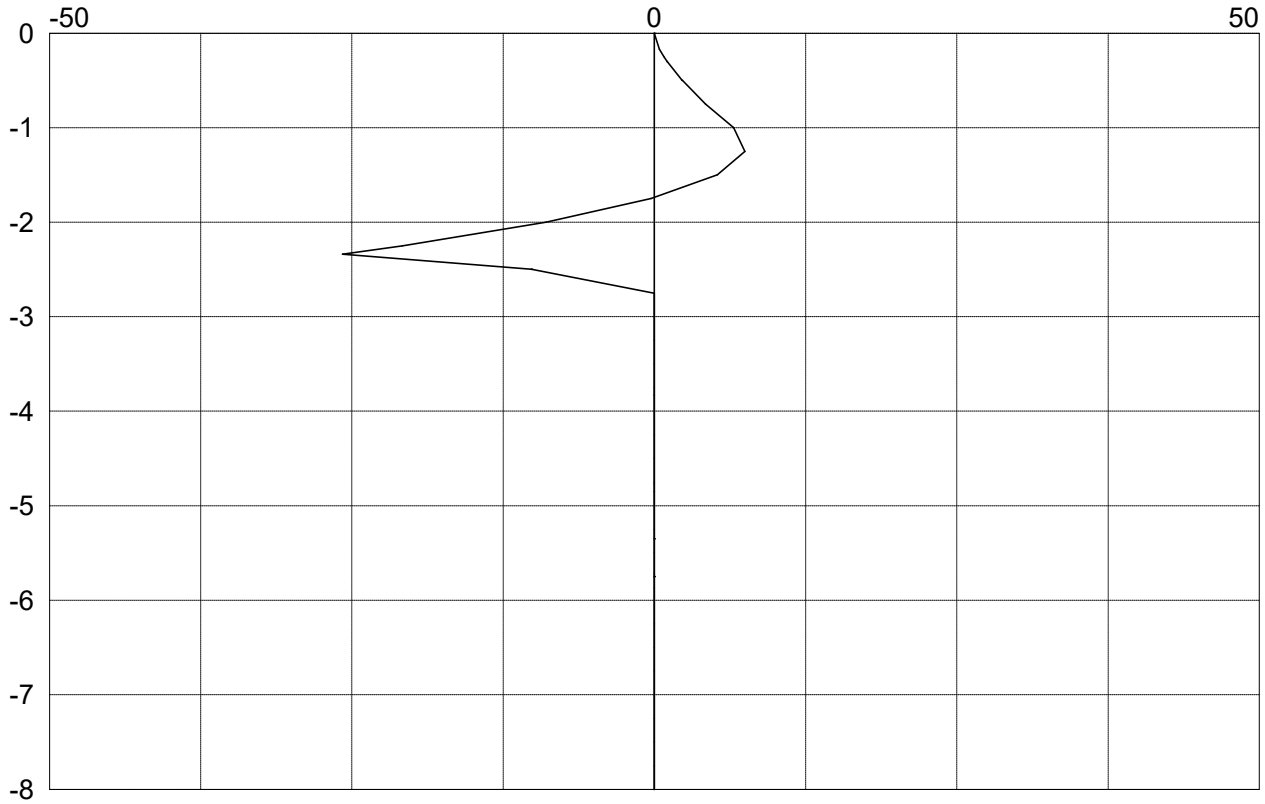


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 2 continued

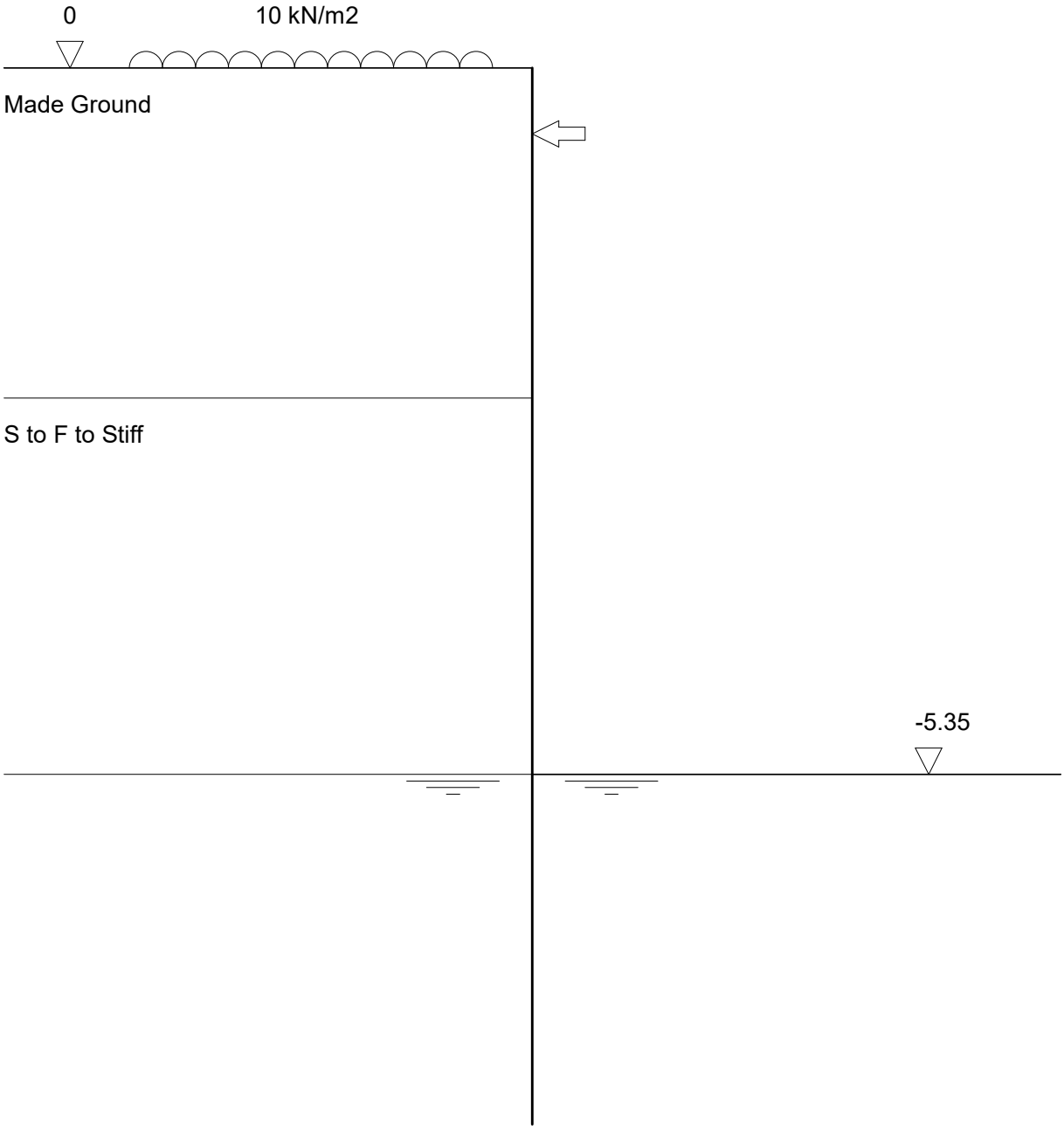


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 4
Stage type Passive side excavation

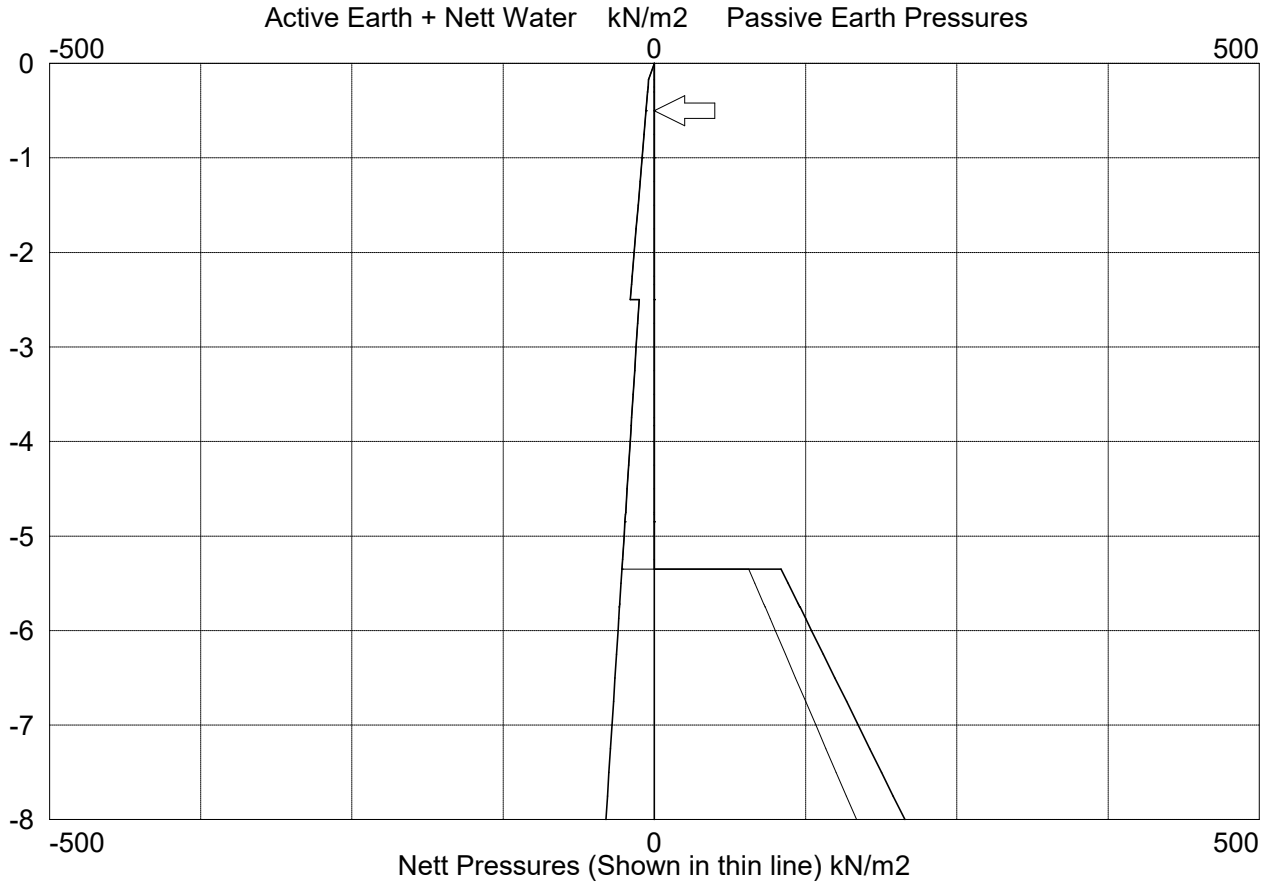


Tabular results from analysis of stage ref 4

strength.
analysis.

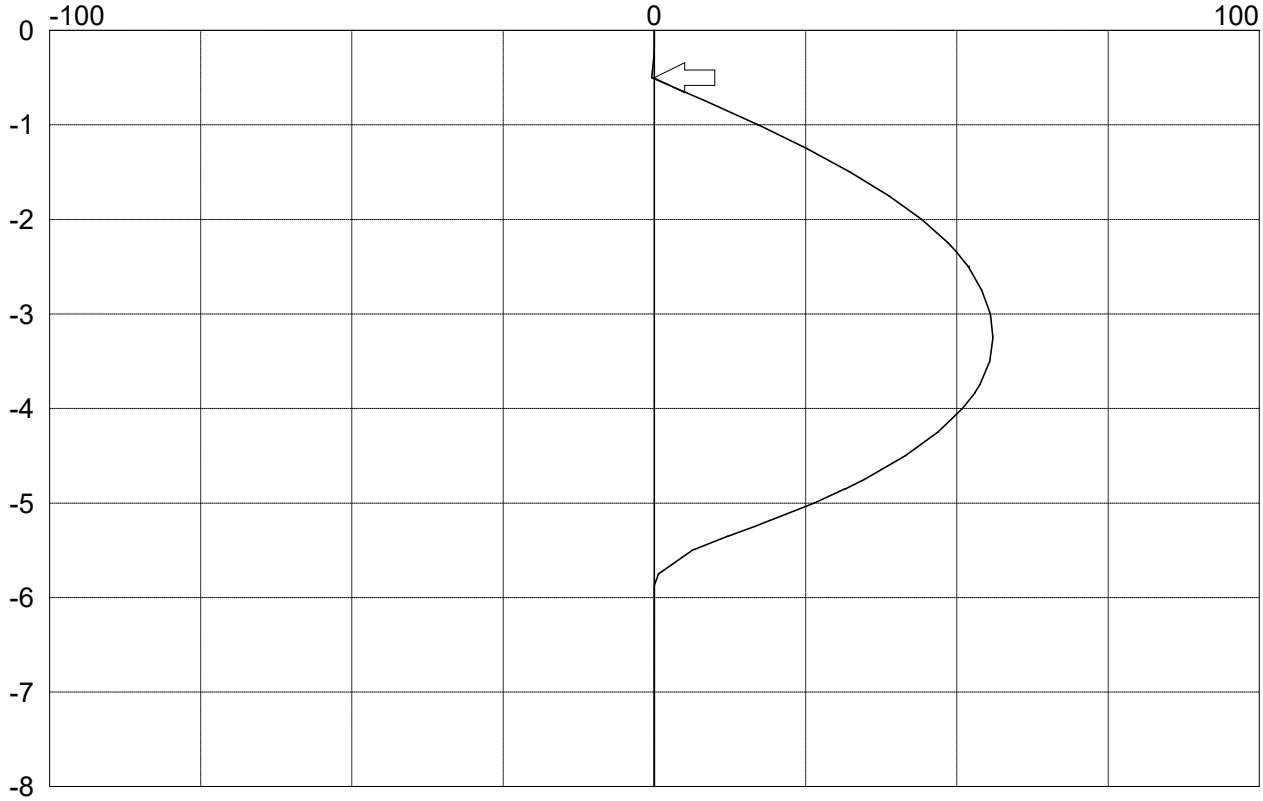
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	4.7	.0	.0	.0	.0	4.7	0	-.4			.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1		.0	.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1			.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.4	-2.3		39.7	.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.5	37.4			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-17.1	33.2			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-17.2	33.2			.00
-2.00	46.0	16.6	.0	.0	.0	.0	16.6	-44.2	19.8			.00
-2.34	52.1	18.8	.0	.0	.0	.0	18.8	-49.9	13.8			.00
-2.50	55.0	19.9	.0	.0	.0	.0	19.9	-51.9	10.6			.00
m -2.50	55.0	12.5	.0	.0	.0	.0	12.5	-51.9	10.6			.00
m -3.00	64.5	15.0	.0	.0	.0	.0	15.0	-55.5	3.8			.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-53.0	-10.4		.0	.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-53.0	-10.4			.00
m -4.00	83.5	20.0	.0	.0	.0	.0	20.0	-51.0	-13.7			.00
m -4.77	98.1	23.9	.0	.0	.0	.0	23.9	-34.1	-30.6			.00
m -4.85	99.6	24.2	.0	.0	.0	.0	24.2	-31.6	-32.5			.00
m -4.85	99.6	24.3	.0	.0	.0	.0	24.3	-31.6	-32.5			.00
m -5.00	102.5	25.0	.0	.0	.0	.0	25.0	-26.4	-36.2			.00
m -5.35	109.1	26.7	.0	.0	.0	.0	26.7	-12.2	-45.2			.00
m -5.35	109.2	26.8	.0	.0	104.8	.0	-78.1	-12.2	-45.2			.00
m -5.71	116.0	28.6	.0	6.9	118.8	.0	-90.2	-1.5	-14.6			.72
m -5.73	116.3	28.6	.0	7.1	119.4	.0	-90.7	-1.2	-13.4			.75
m -5.75	116.7	28.7	.0	7.6	120.2	.0	-91.5	-.7	-11.4			.79
m -5.75	116.8	28.8	.0	7.7	120.4	.0	-91.7	-.7	-10.9			.80
m -5.87	119.1	29.4	.0	9.9	125.0	.0	-95.6	0	0			1.00
m -6.00	121.5	30.0	.0	12.4	129.9	.0	-99.9	0	0			1.21
m -7.00	140.5	35.0	.0	31.4	168.5	.0	-133.5	0	0			2.48
m -8.00	159.5	40.0	.0	50.4	207.1	.0	-167.1	0	0			3.33

Graphical results from analysis of stage ref 4

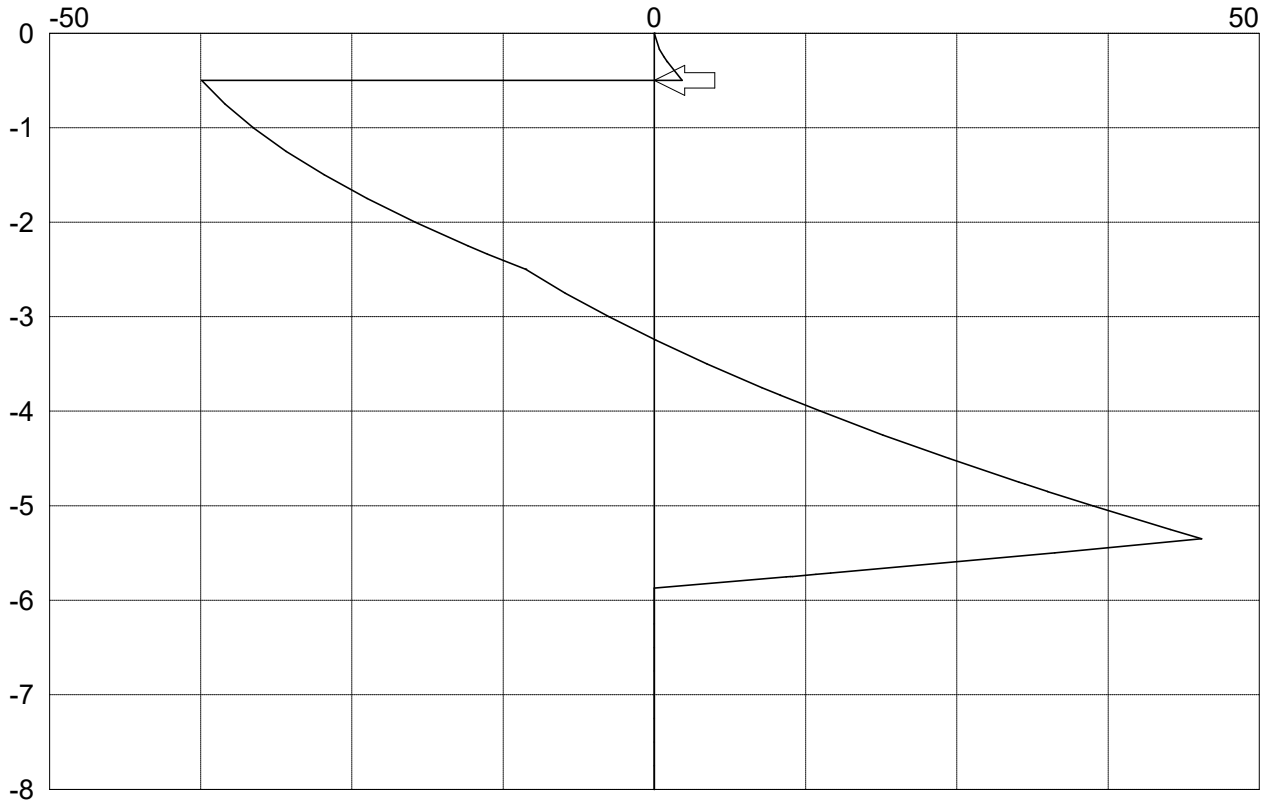


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 4 continued

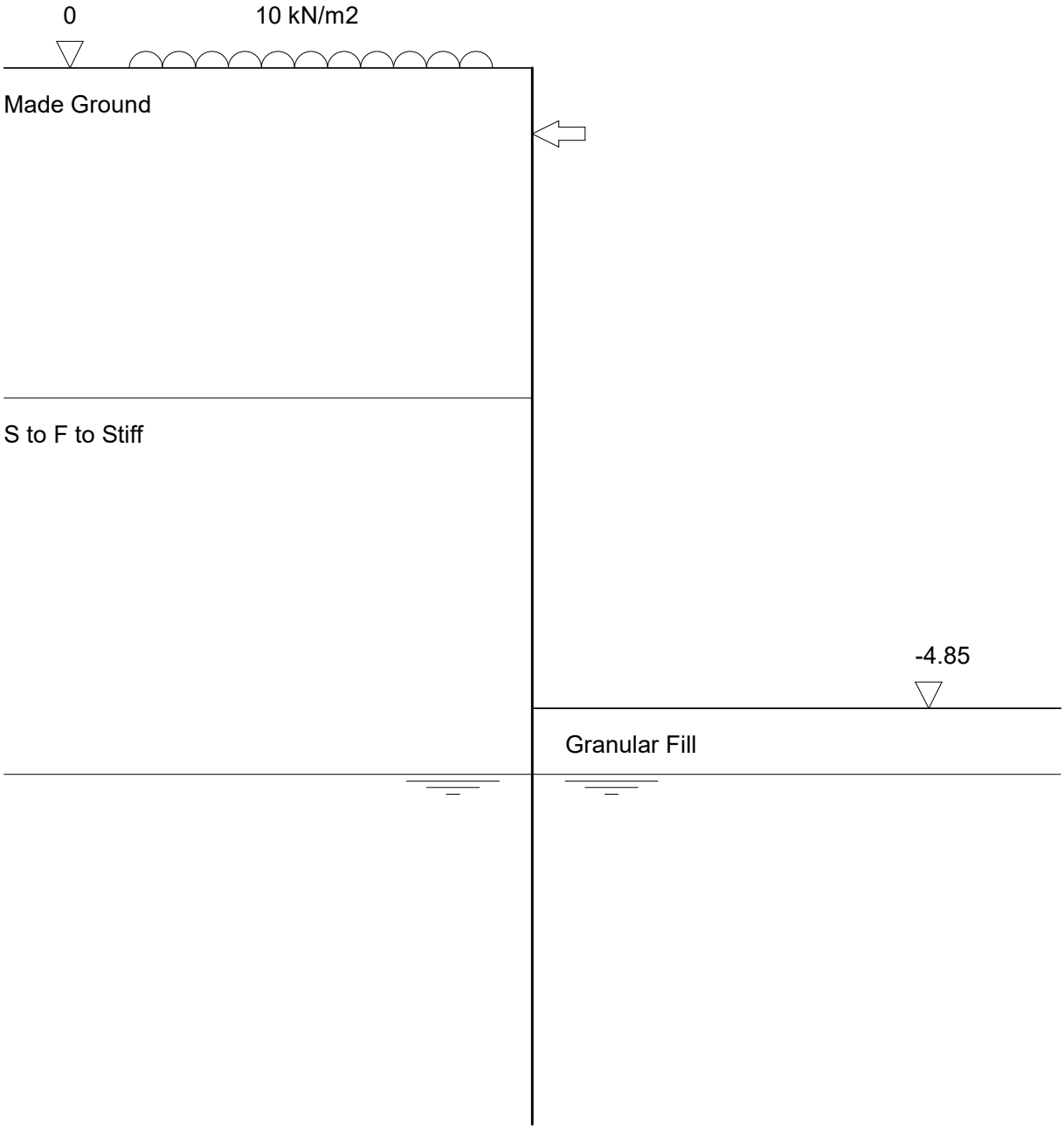


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 5
Stage type Passive side fill

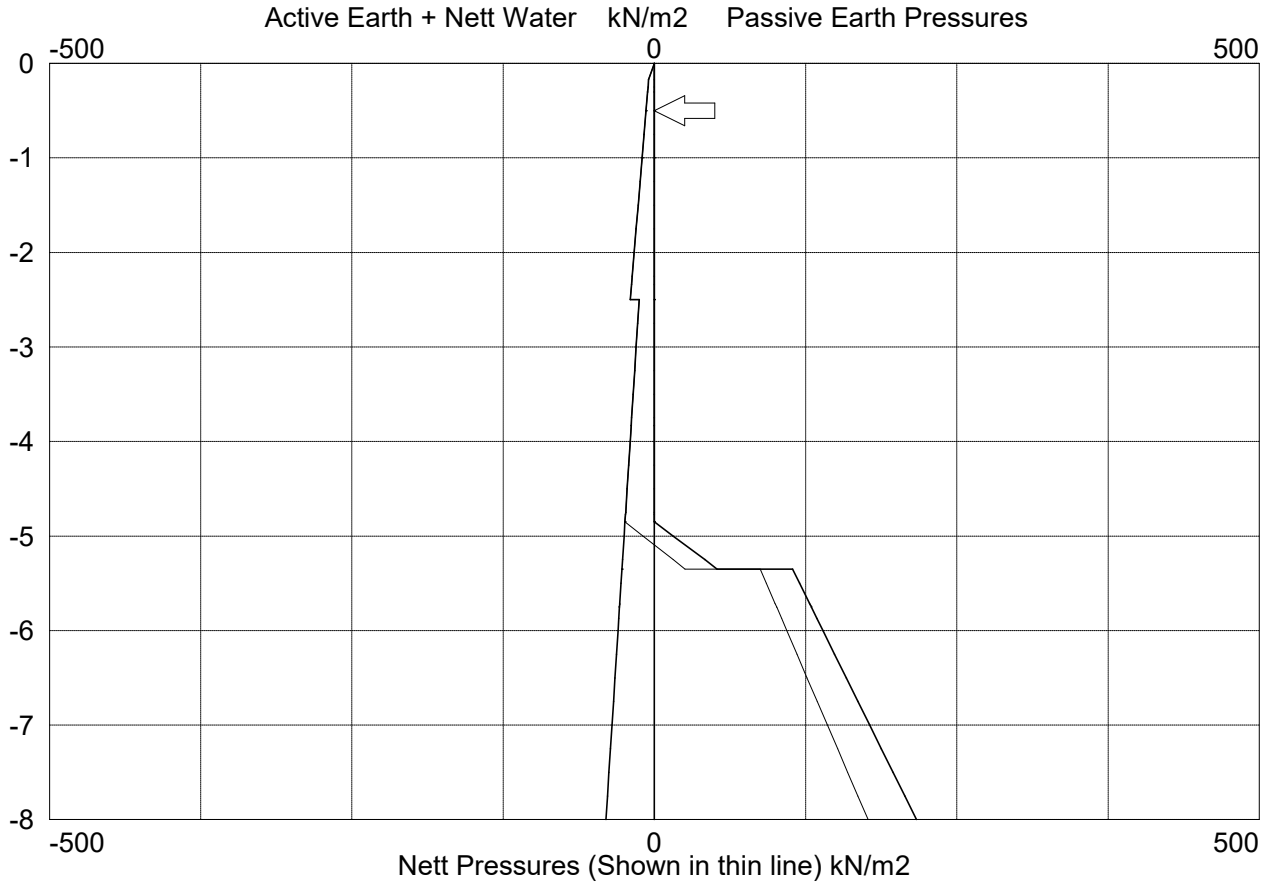


Tabular results from analysis of stage ref 5

strength.
analysis.

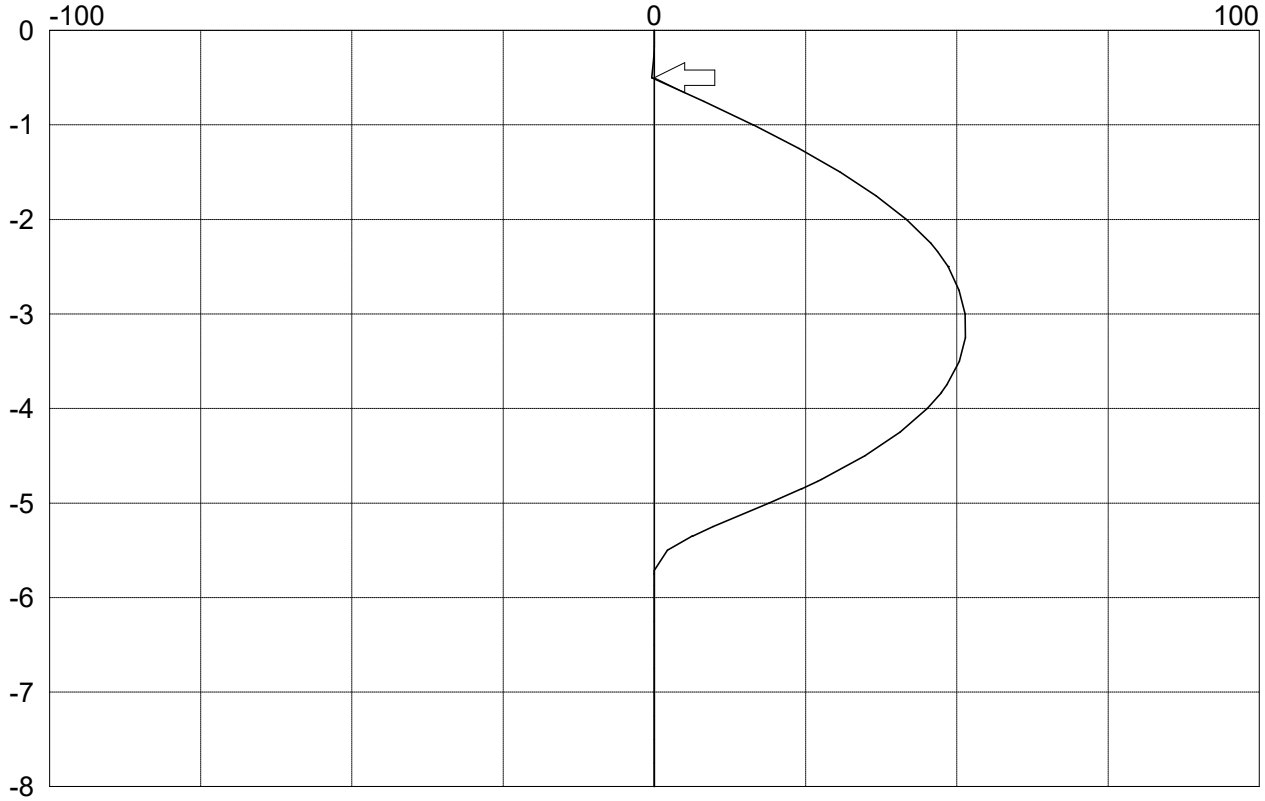
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	4.7	.0	.0	.0	.0	4.7	0	-.4			.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1		.0	.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1			.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.4	-2.3		38.1	.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.5	35.7			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-16.3	31.5			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-16.4	31.5			.00
-2.00	46.0	16.6	.0	.0	.0	.0	16.6	-41.7	18.1			.00
-2.34	52.1	18.8	.0	.0	.0	.0	18.8	-46.8	12.1			.00
-2.50	55.0	19.9	.0	.0	.0	.0	19.9	-48.5	9.0			.00
m -2.50	55.0	12.5	.0	.0	.0	.0	12.5	-48.6	9.0			.00
m -3.00	64.5	15.0	.0	.0	.0	.0	15.0	-51.4	2.1			.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-47.5	-12.1		.0	.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-47.4	-12.1			.00
m -4.00	83.5	20.0	.0	.0	.0	.0	20.0	-45.1	-15.4			.00
m -4.77	98.1	23.9	.0	.0	.0	.0	23.9	-27.0	-32.3			.00
m -4.85	99.6	24.2	.0	.0	.0	.0	24.2	-24.4	-34.2			.00
m -4.85	99.6	24.3	.0	.0	.0	.0	24.3	-24.3	-34.2			.00
m -5.00	102.5	25.0	.0	2.9	15.7	.0	9.3	-19.0	-36.7			.03
m -5.35	109.1	26.7	.0	9.5	52.0	.0	-25.2	-6.3	-34.0			.26
m -5.35	109.2	26.8	.0	9.5	114.3	.0	-87.6	-6.2	-33.9			.26
m -5.71	116.0	28.6	.0	16.4	128.3	.0	-99.7	0	0			1.00
m -5.73	116.3	28.6	.0	16.6	128.9	.0	-100.2	0	0			1.02
m -5.75	116.7	28.7	.0	17.1	129.7	.0	-101.0	0	0			1.07
m -5.75	116.8	28.8	.0	17.2	129.9	.0	-101.2	0	0			1.08
m -5.87	119.1	29.4	.0	19.4	134.5	.0	-105.1	0	0			1.28
m -6.00	121.5	30.0	.0	21.9	139.4	.0	-109.4	0	0			1.49
m -7.00	140.5	35.0	.0	40.9	178.0	.0	-143.0	0	0			2.76
m -8.00	159.5	40.0	.0	59.9	216.6	.0	-176.6	0	0			3.60

Graphical results from analysis of stage ref 5

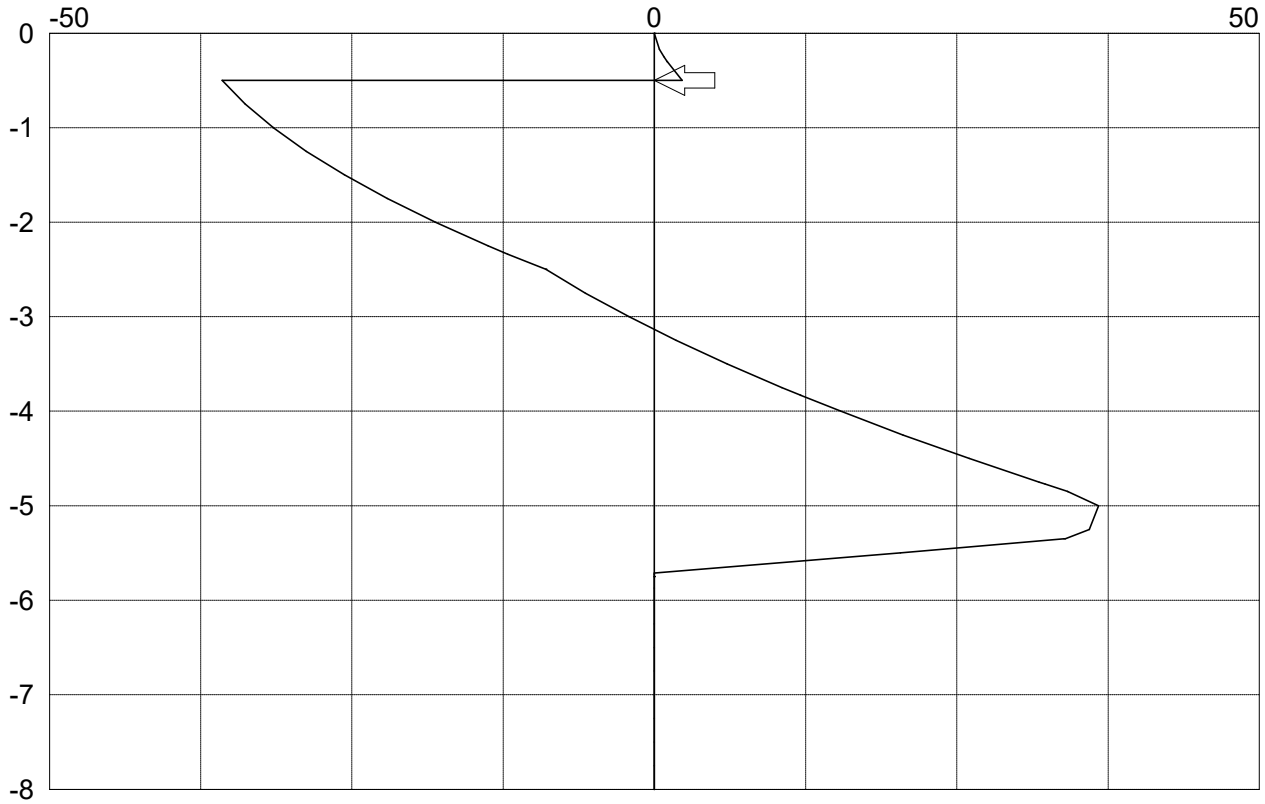


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 5 continued

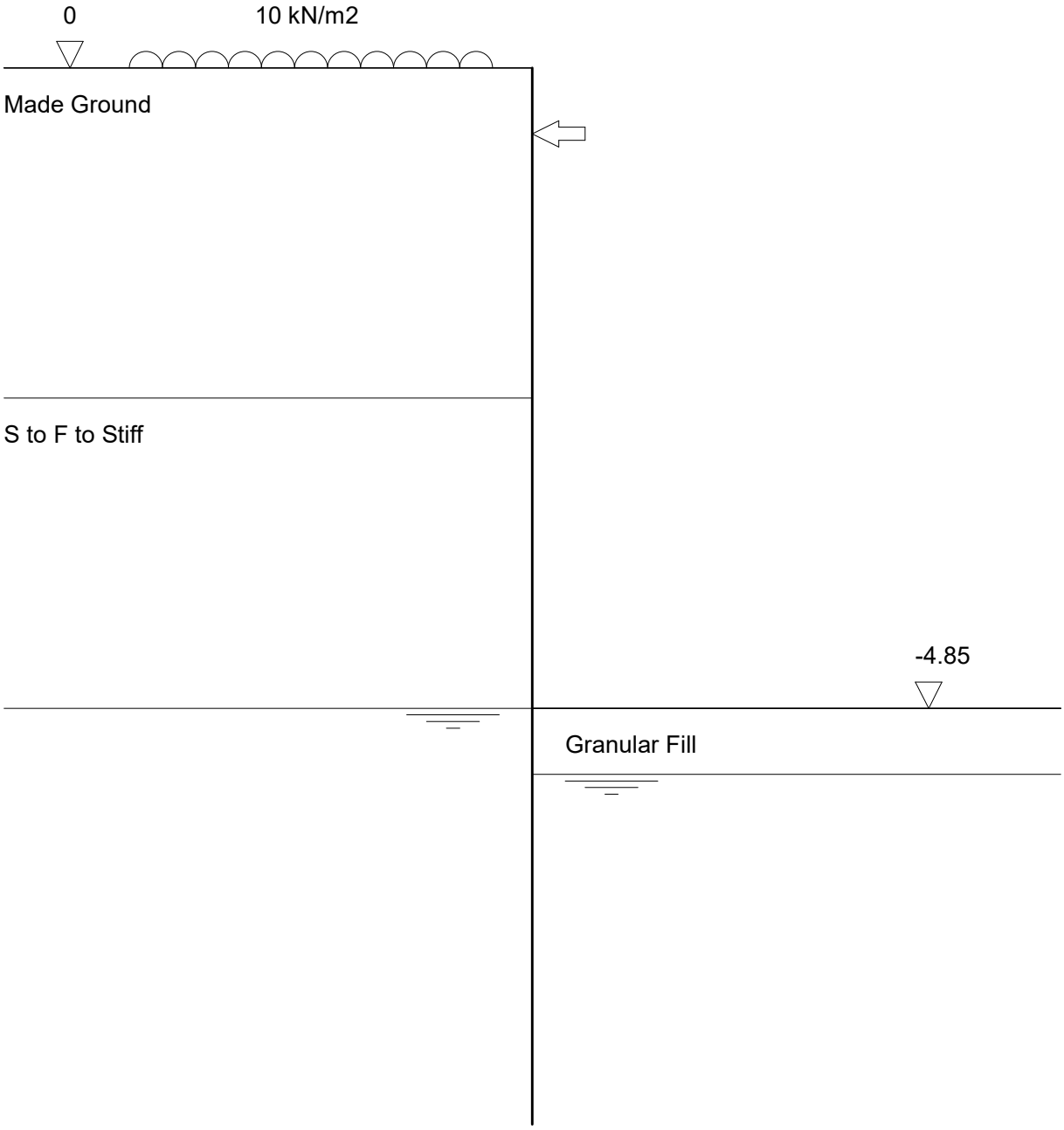


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 6
Stage type Active water level

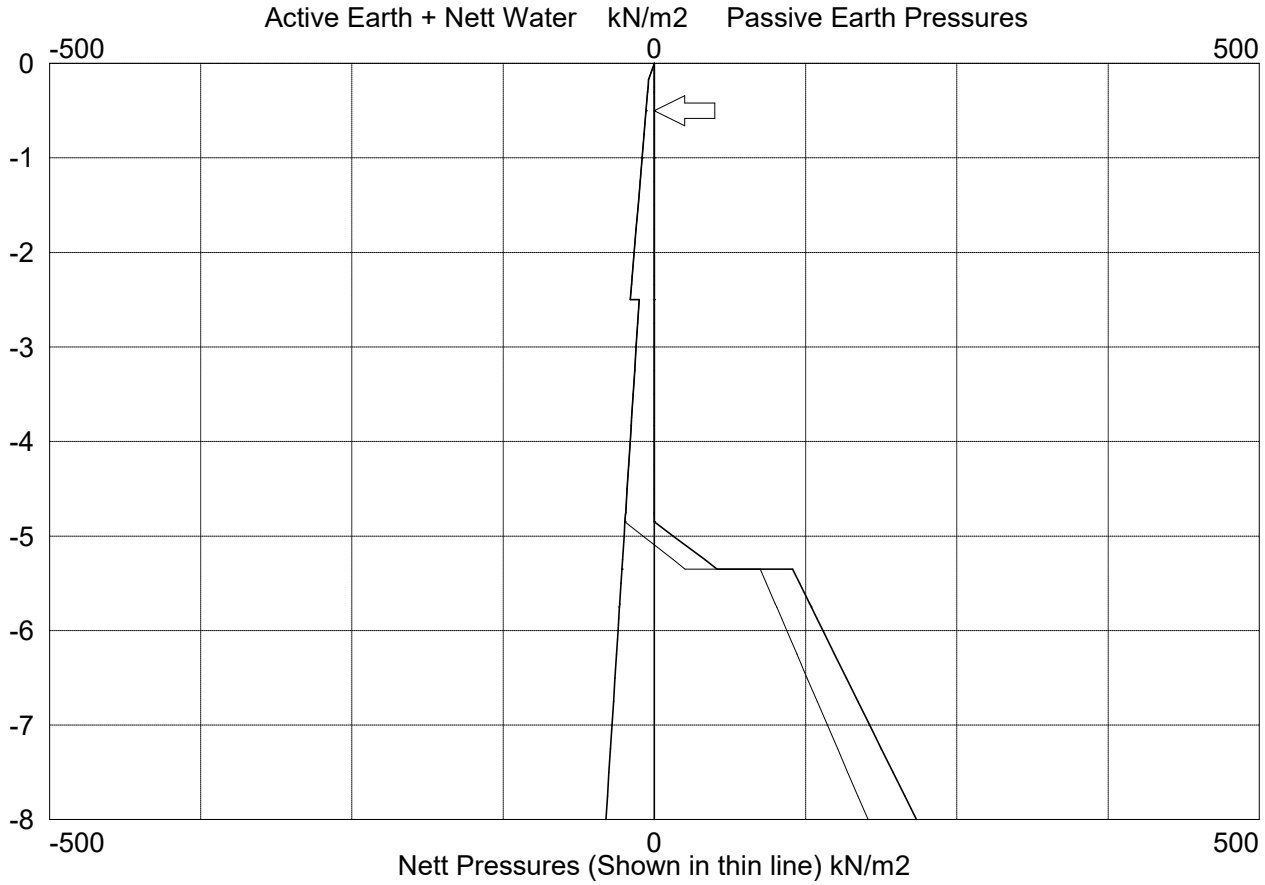


Tabular results from analysis of stage ref 6

strength.
analysis.

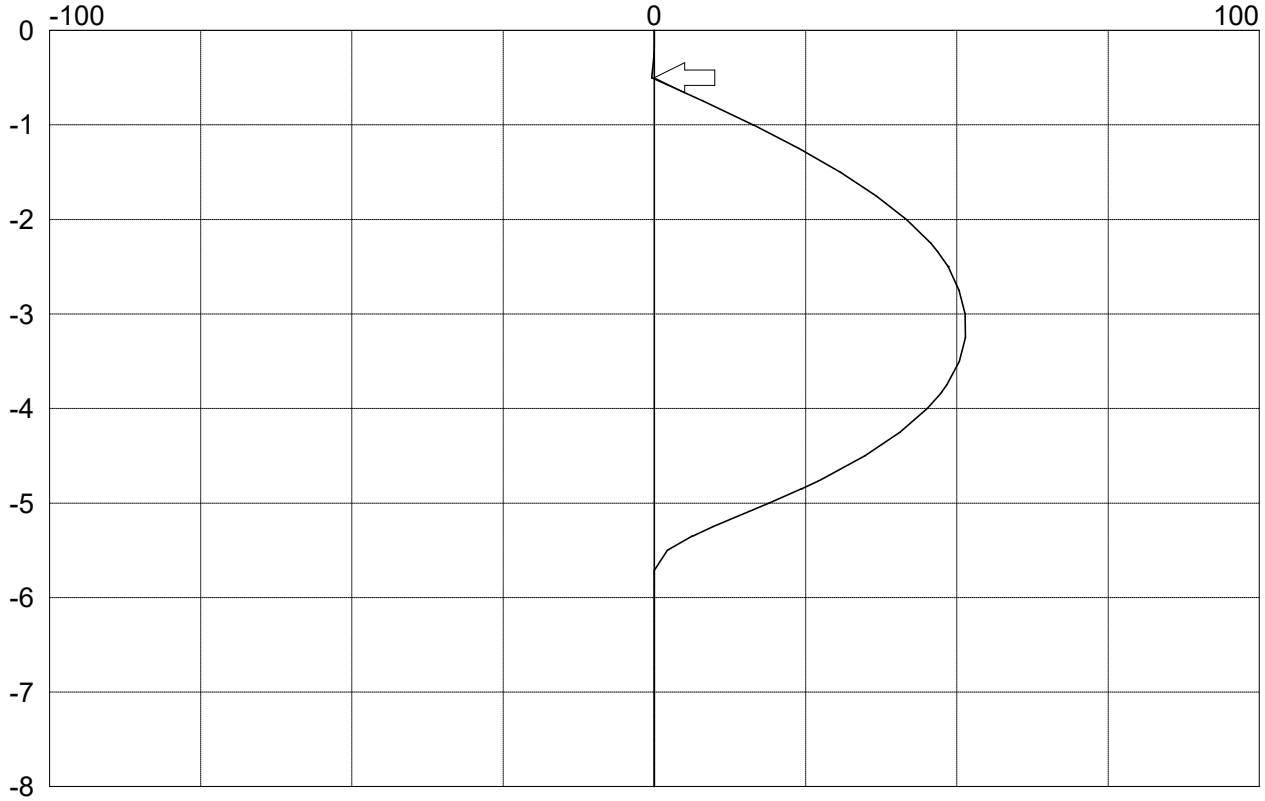
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	4.7	.0	.0	.0	.0	4.7	0	-.4			.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1		.0	.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1			.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.4	-2.3		38.1	.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.5	35.7			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-16.3	31.5			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-16.4	31.5			.00
-2.00	46.0	16.6	.0	.0	.0	.0	16.6	-41.7	18.1			.00
-2.34	52.1	18.8	.0	.0	.0	.0	18.8	-46.8	12.1			.00
-2.50	55.0	19.9	.0	.0	.0	.0	19.9	-48.5	9.0			.00
m -2.50	55.0	12.5	.0	.0	.0	.0	12.5	-48.6	9.0			.00
m -3.00	64.5	15.0	.0	.0	.0	.0	15.0	-51.4	2.1			.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-47.5	-12.1		.0	.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-47.4	-12.1			.00
m -4.00	83.5	20.0	.0	.0	.0	.0	20.0	-45.1	-15.4			.00
m -4.77	98.1	23.9	.0	.0	.0	.0	23.9	-27.0	-32.3			.00
m -4.85	99.6	24.2	.0	.0	.0	.0	24.2	-24.4	-34.2			.00
m -4.85	99.6	24.3	.0	.0	.0	.0	24.3	-24.3	-34.2			.00
m -5.00	102.5	25.0	.0	2.9	15.7	.0	9.3	-19.0	-36.7			.03
m -5.35	109.1	26.7	.0	9.5	52.0	.0	-25.2	-6.3	-34.0			.26
m -5.35	109.2	26.8	.0	9.5	114.3	.0	-87.6	-6.2	-33.9			.26
m -5.71	116.0	28.6	.0	16.4	128.3	.0	-99.7	0	0			1.00
m -5.73	116.3	28.6	.0	16.6	128.9	.0	-100.2	0	0			1.03
m -5.75	116.7	28.7	.0	17.1	129.7	.0	-101.0	0	0			1.07
m -5.75	116.8	28.8	.0	17.2	129.9	.0	-101.2	0	0			1.08
m -5.87	119.1	29.4	.0	19.4	134.5	.0	-105.1	0	0			1.28
m -6.00	121.5	30.0	.0	21.9	139.4	.0	-109.4	0	0			1.49
m -7.00	140.5	35.0	.0	40.9	178.0	.0	-143.0	0	0			2.76
m -8.00	159.5	40.0	.0	59.9	216.6	.0	-176.6	0	0			3.60

Graphical results from analysis of stage ref 6

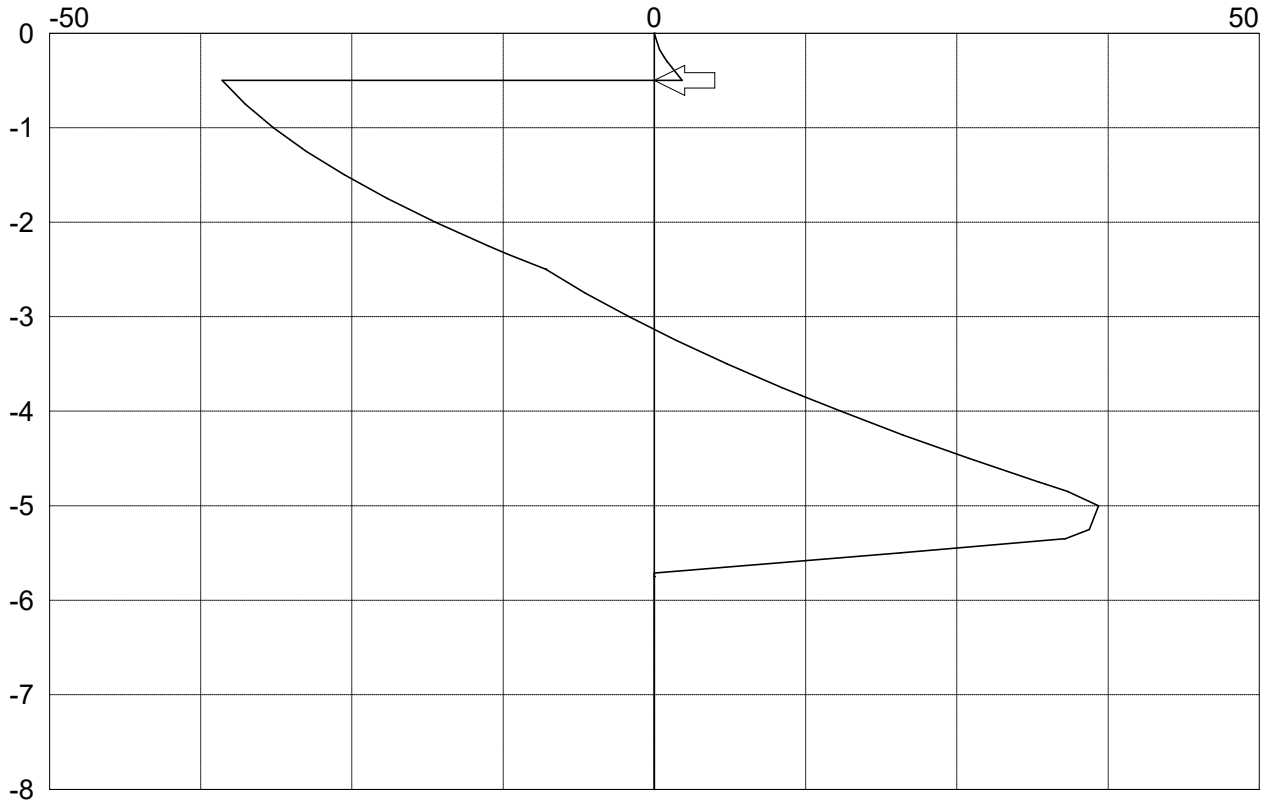


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 6 continued

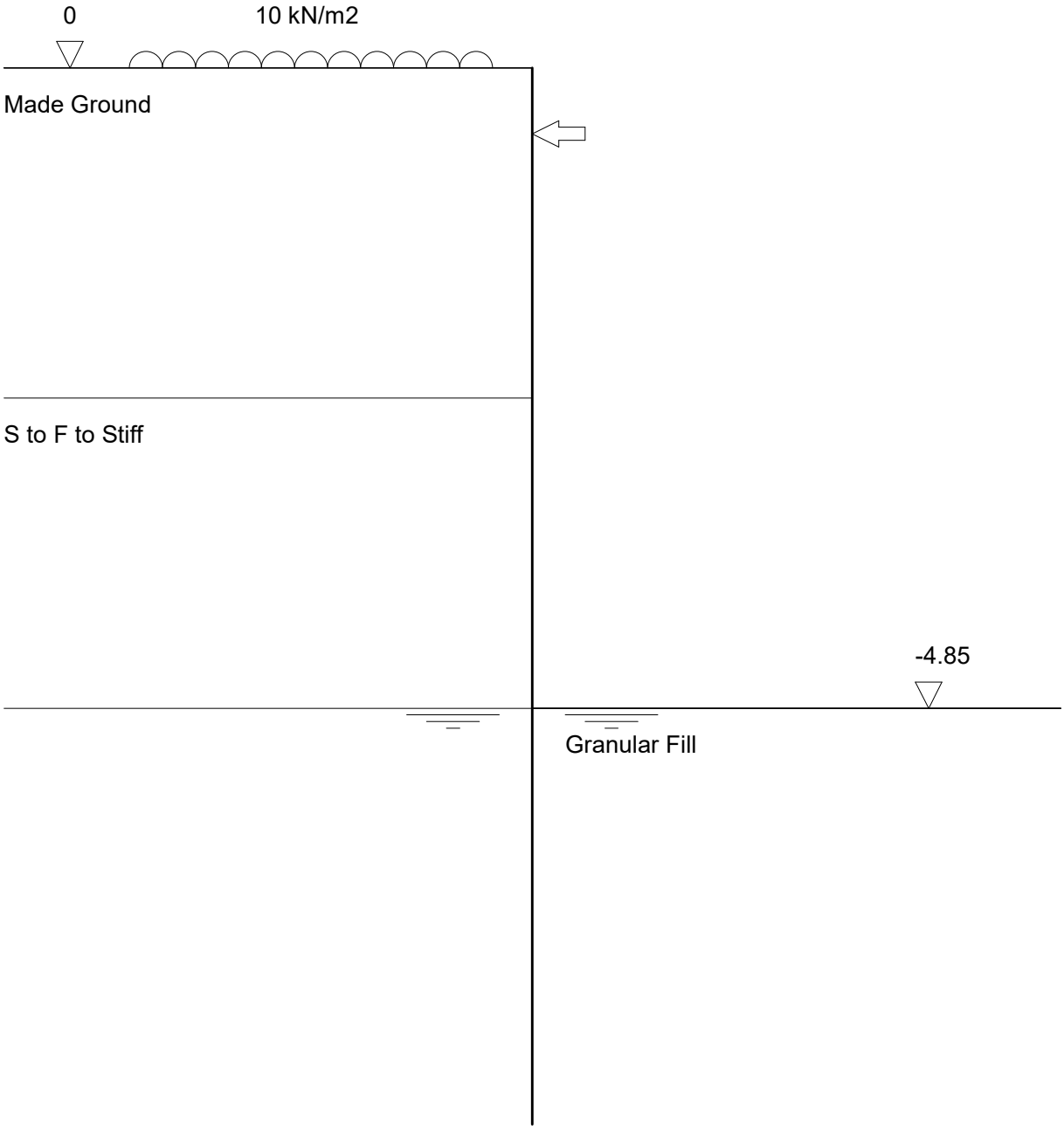


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 7
Stage type Passive water level

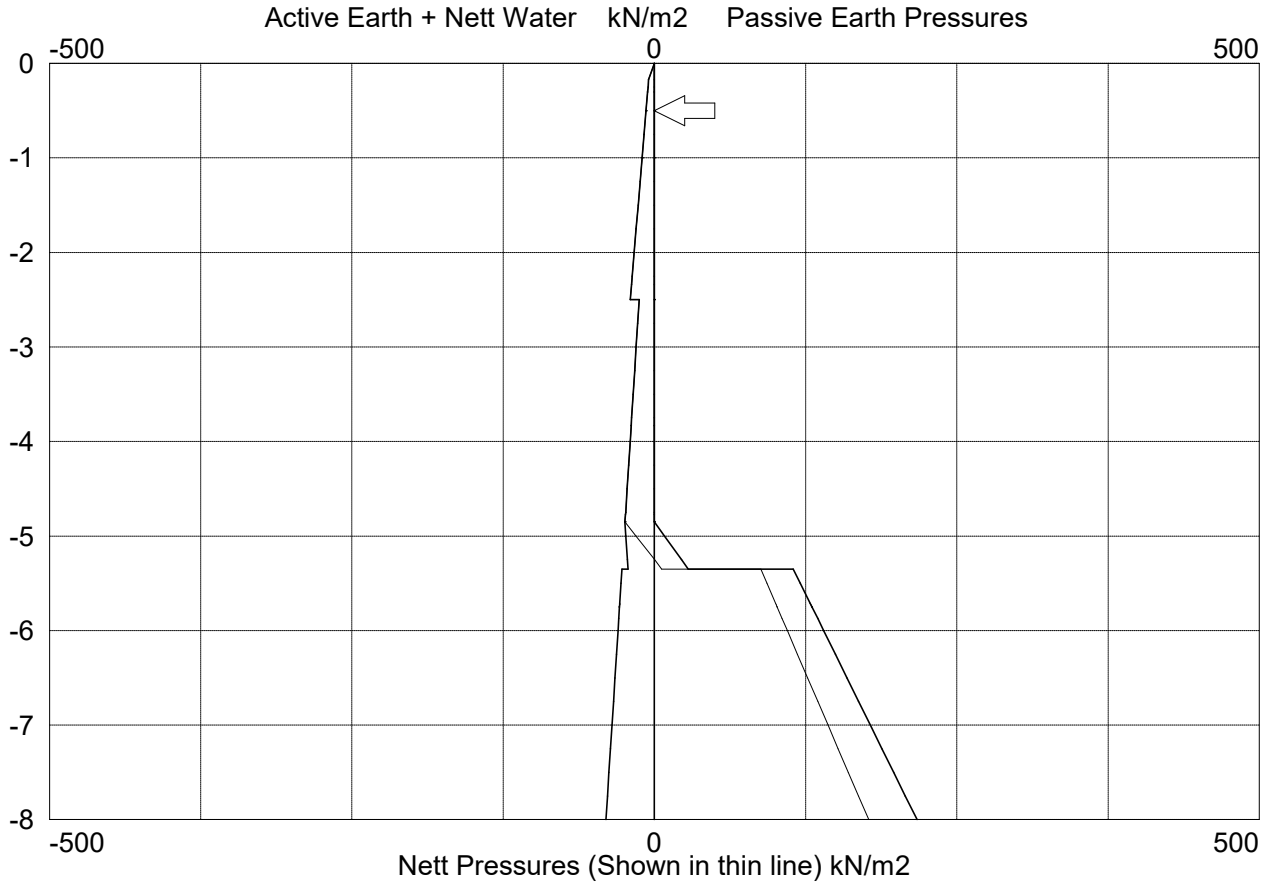


Tabular results from analysis of stage ref 7

strength.
analysis.

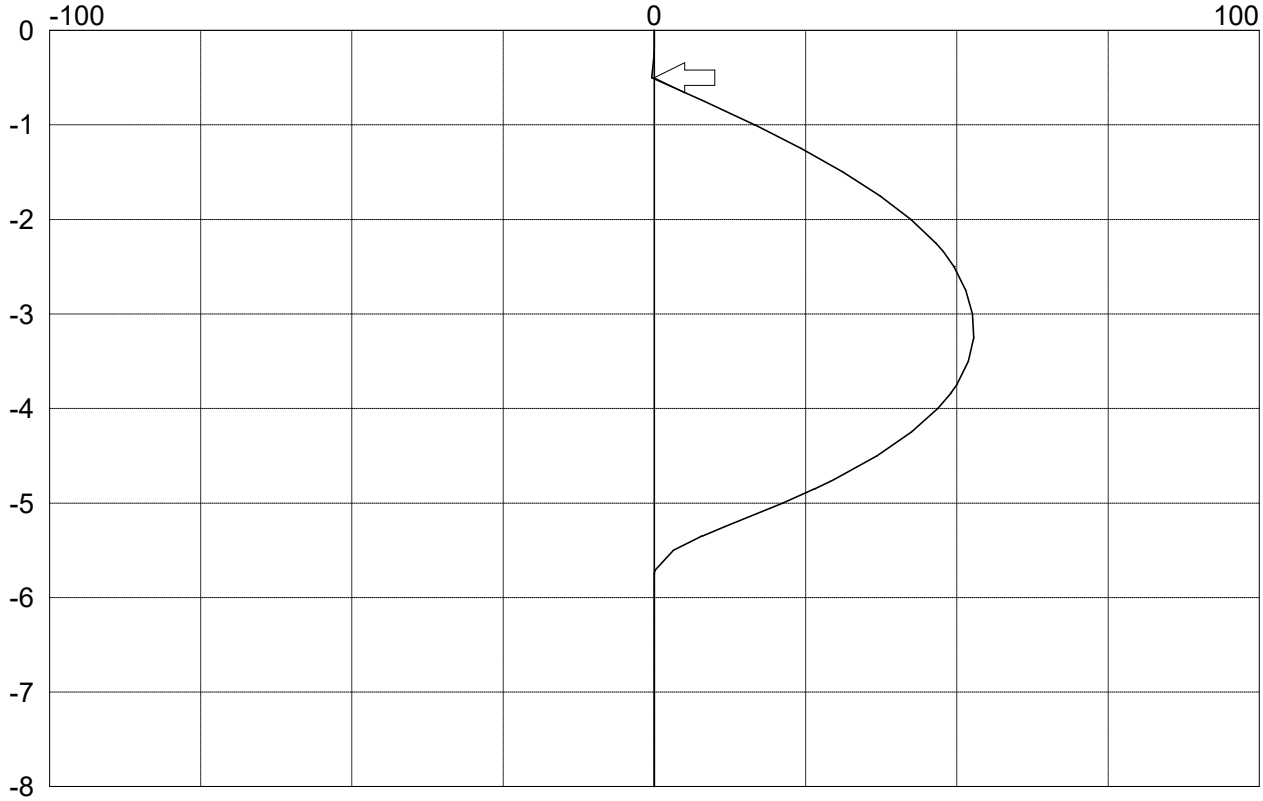
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	4.7	.0	.0	.0	.0	4.7	0	-.4			.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1		.0	.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1			.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.4	-2.3		38.6	.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.5	36.2			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-16.5	32.0			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	-16.6	32.0			.00
-2.00	46.0	16.6	.0	.0	.0	.0	16.6	-42.4	18.6			.00
-2.34	52.1	18.8	.0	.0	.0	.0	18.8	-47.7	12.6			.00
-2.50	55.0	19.9	.0	.0	.0	.0	19.9	-49.5	9.5			.00
m -2.50	55.0	12.5	.0	.0	.0	.0	12.5	-49.5	9.5			.00
m -3.00	64.5	15.0	.0	.0	.0	.0	15.0	-52.6	2.6			.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-49.1	-11.6		.0	.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	-49.1	-11.6			.00
m -4.00	83.5	20.0	.0	.0	.0	.0	20.0	-46.9	-14.9			.00
m -4.77	98.1	23.9	.0	.0	.0	.0	23.9	-29.1	-31.8			.00
m -4.85	99.6	24.2	.0	.0	.0	.0	24.2	-26.5	-33.7			.00
m -4.85	99.6	24.3	.0	.0	.0	.0	24.3	-26.5	-33.7			.00
m -5.00	102.5	25.0	.0	1.5	8.4	1.5	15.1	-21.2	-36.7			.01
m -5.35	109.1	26.7	.0	5.1	27.9	4.9	-6.0	-7.9	-38.2			.14
m -5.35	109.2	26.8	.0	10.0	114.8	.0	-88.1	-7.9	-38.1			.15
m -5.71	116.0	28.6	.0	16.9	128.8	.0	-100.2	-.1	-4.1			.92
m -5.73	116.3	28.6	.0	17.1	129.4	.0	-100.7	-.1	-2.6			.95
m -5.75	116.7	28.7	.0	17.6	130.2	.0	-101.5	0	-.4			.99
m -5.75	116.8	28.8	.0	17.7	130.4	.0	-101.7	0	0			1.00
m -5.87	119.1	29.4	.0	19.9	135.0	.0	-105.6	0	0			1.22
m -6.00	121.5	30.0	.0	22.4	139.9	.0	-109.9	0	0			1.44
m -7.00	140.5	35.0	.0	41.4	178.5	.0	-143.5	0	0			2.75
m -8.00	159.5	40.0	.0	60.4	217.1	.0	-177.1	0	0			3.60

Graphical results from analysis of stage ref 7

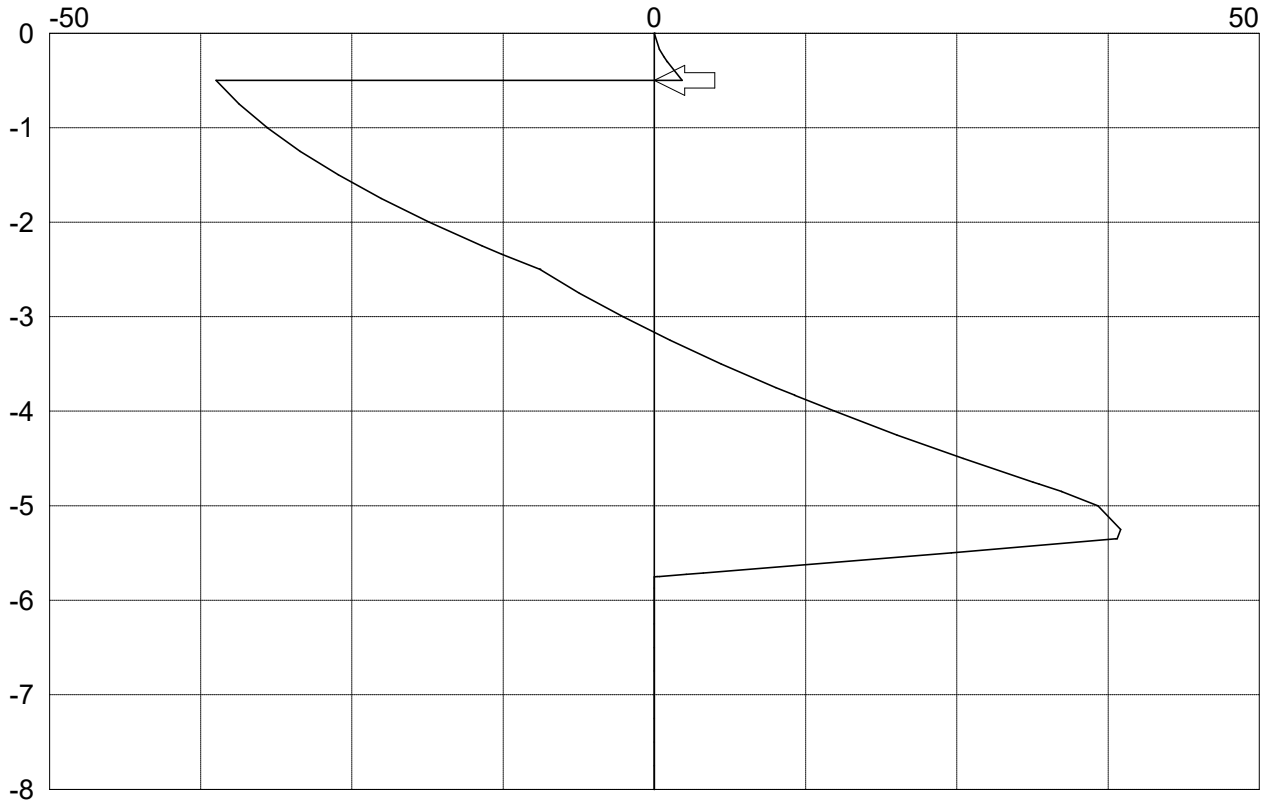


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 7 continued

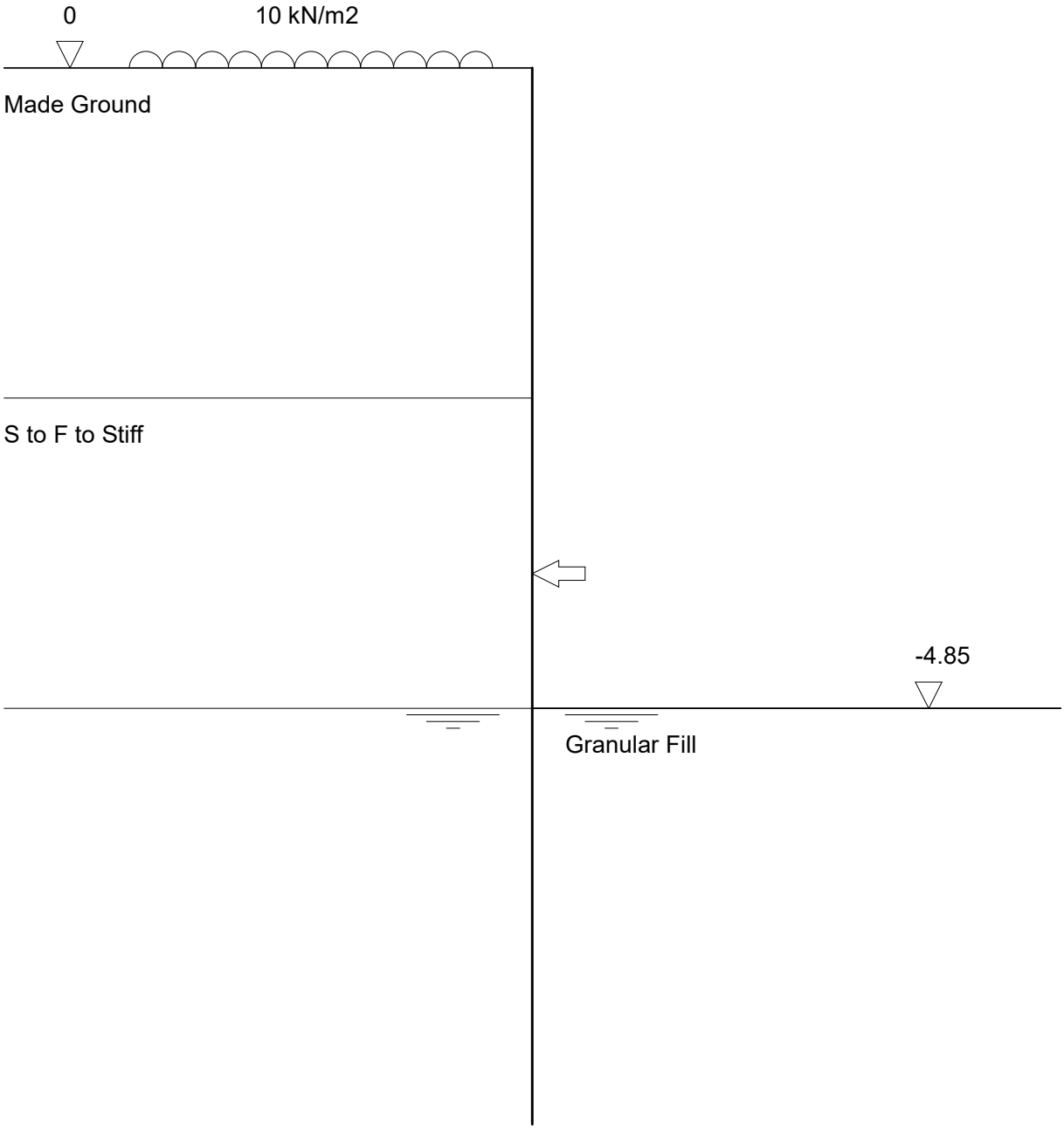


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 9
Stage type Remove prop

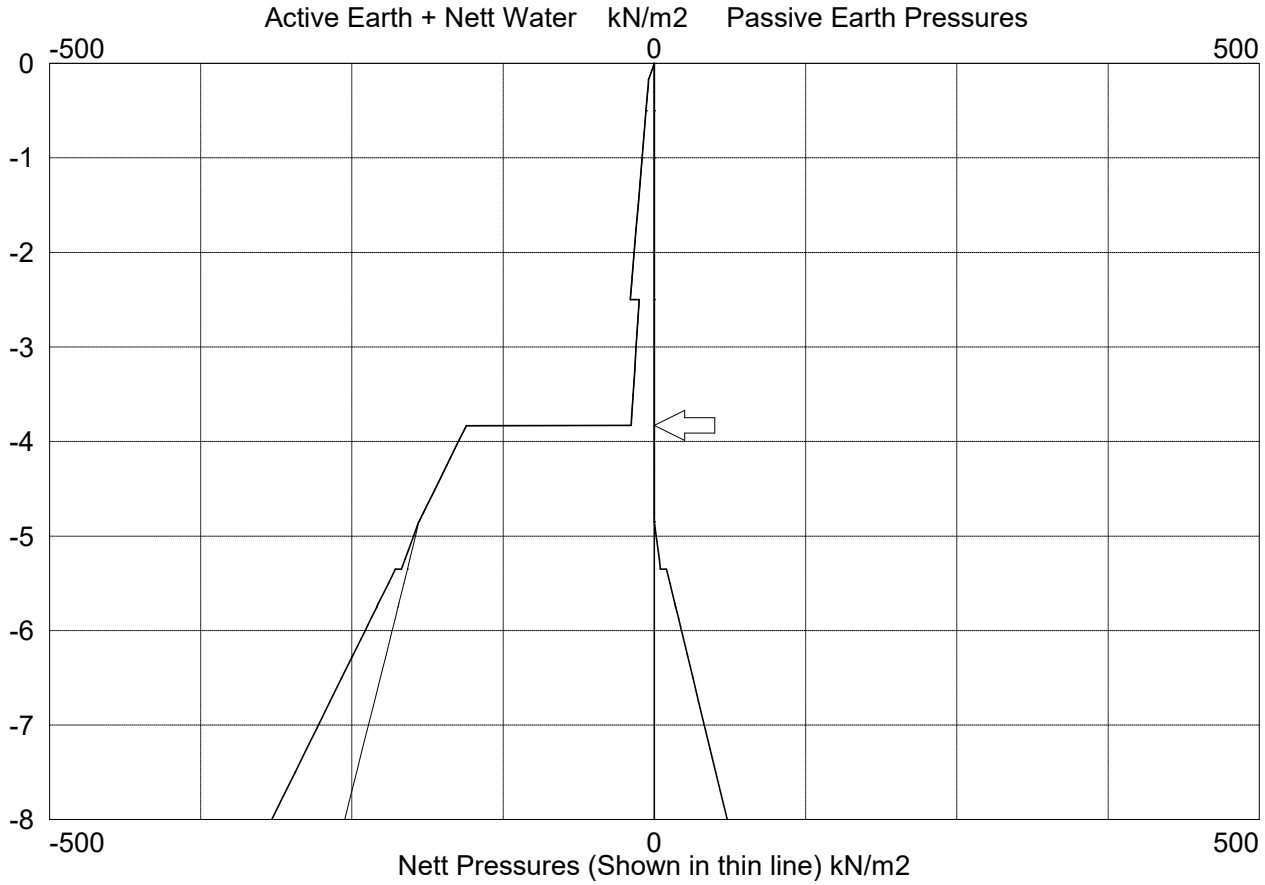


Tabular results from analysis of stage ref 9

strength.
analysis.

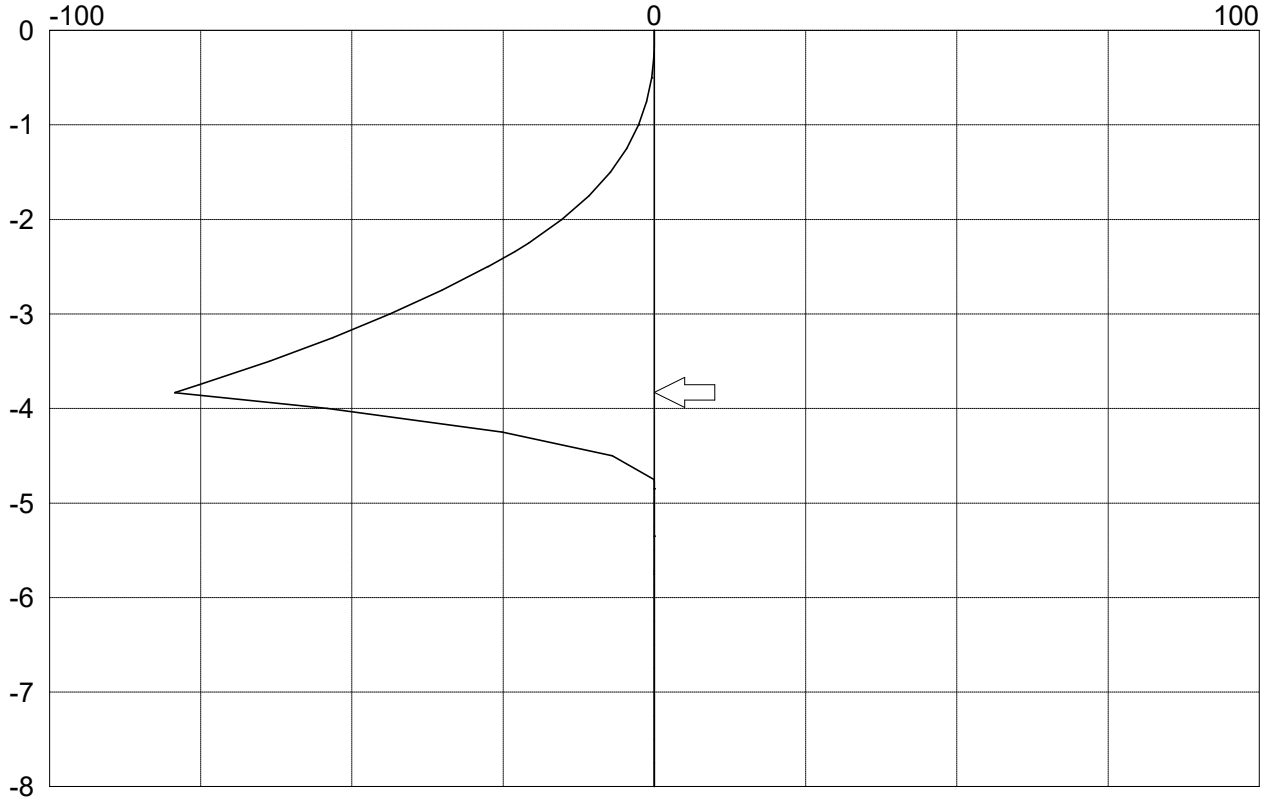
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	13.1	4.7	.0	.0	.0	.0	4.7	0	-.4			.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1		.0	.00
-.30	15.4	5.6	.0	.0	.0	.0	5.6	.1	-1.1			.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.4	-2.3		.0	.00
-.50	19.0	6.9	.0	.0	.0	.0	6.9	.5	-2.3			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	2.6	-6.5			.00
-1.00	28.0	10.1	.0	.0	.0	.0	10.1	2.6	-6.6			.00
-2.00	46.0	16.6	.0	.0	.0	.0	16.6	15.3	-19.9			.00
-2.34	52.1	18.8	.0	.0	.0	.0	18.8	23.0	-25.9			.00
-2.50	55.0	19.9	.0	.0	.0	.0	19.9	27.5	-29.1			.00
m -2.50	55.0	12.5	.0	.0	.0	.0	12.5	27.5	-29.1			.00
m -3.00	64.5	15.0	.0	.0	.0	.0	15.0	43.7	-36.0			.00
m -3.83	80.3	19.2	.0	.0	.0	.0	19.2	79.2	-50.1		213.4	.00
m -3.83	80.3	155.4	.0	.0	.0	.0	155.4	79.3	163.1			.00
m -4.00	83.5	161.9	.0	.0	.0	.0	161.9	54.1	136.4			.03
m -4.77	98.1	191.6	.0	.0	.0	.0	191.6	0	0			1.00
m -4.85	99.6	194.6	.0	.0	.0	.0	194.6	0	0			1.19
m -4.85	99.6	194.7	.0	.0	.0	.0	194.7	0	0			1.19
m -5.00	102.5	200.5	.0	1.5	1.5	1.5	197.5	0	0			1.60
m -5.35	109.1	213.9	.0	5.1	5.1	4.9	204.0	0	0			2.75
m -5.35	109.2	214.0	.0	10.0	10.0	.0	204.0	0	0			2.76
m -5.71	116.0	228.0	.0	16.9	16.9	.0	211.1	0	0			4.02
m -5.73	116.3	228.5	.0	17.1	17.1	.0	211.4	0	0			4.07
m -5.75	116.7	229.3	.0	17.6	17.6	.0	211.8	0	0			4.14
m -5.75	116.8	229.6	.0	17.7	17.7	.0	211.9	0	0			4.16
m -5.87	119.1	234.1	.0	19.9	19.9	.0	214.2	0	0			4.54
m -6.00	121.5	239.1	.0	22.4	22.4	.0	216.7	0	0			4.92
m -7.00	140.5	277.7	.0	41.4	41.4	.0	236.3	0	0			6.34
m -8.00	159.5	316.3	.0	60.4	60.4	.0	255.9	0	0			6.08

Graphical results from analysis of stage ref 9

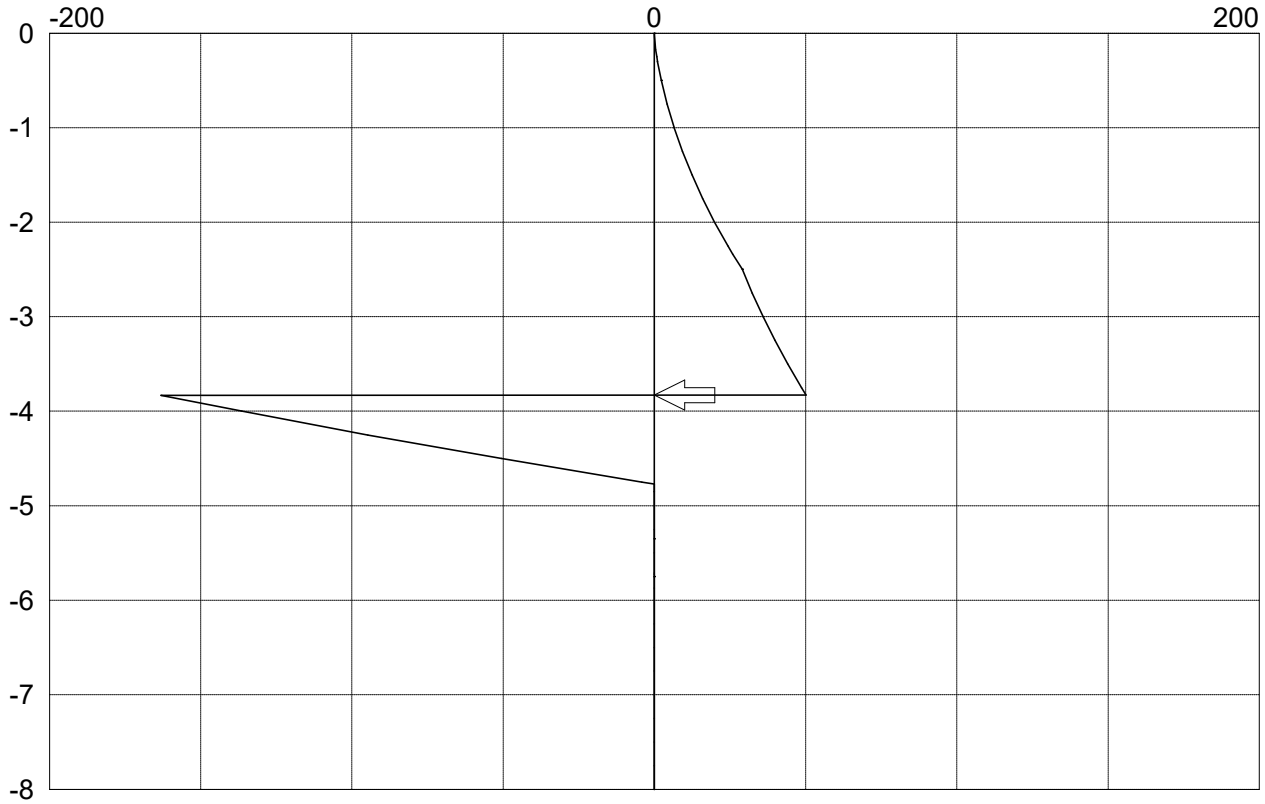


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 9 continued

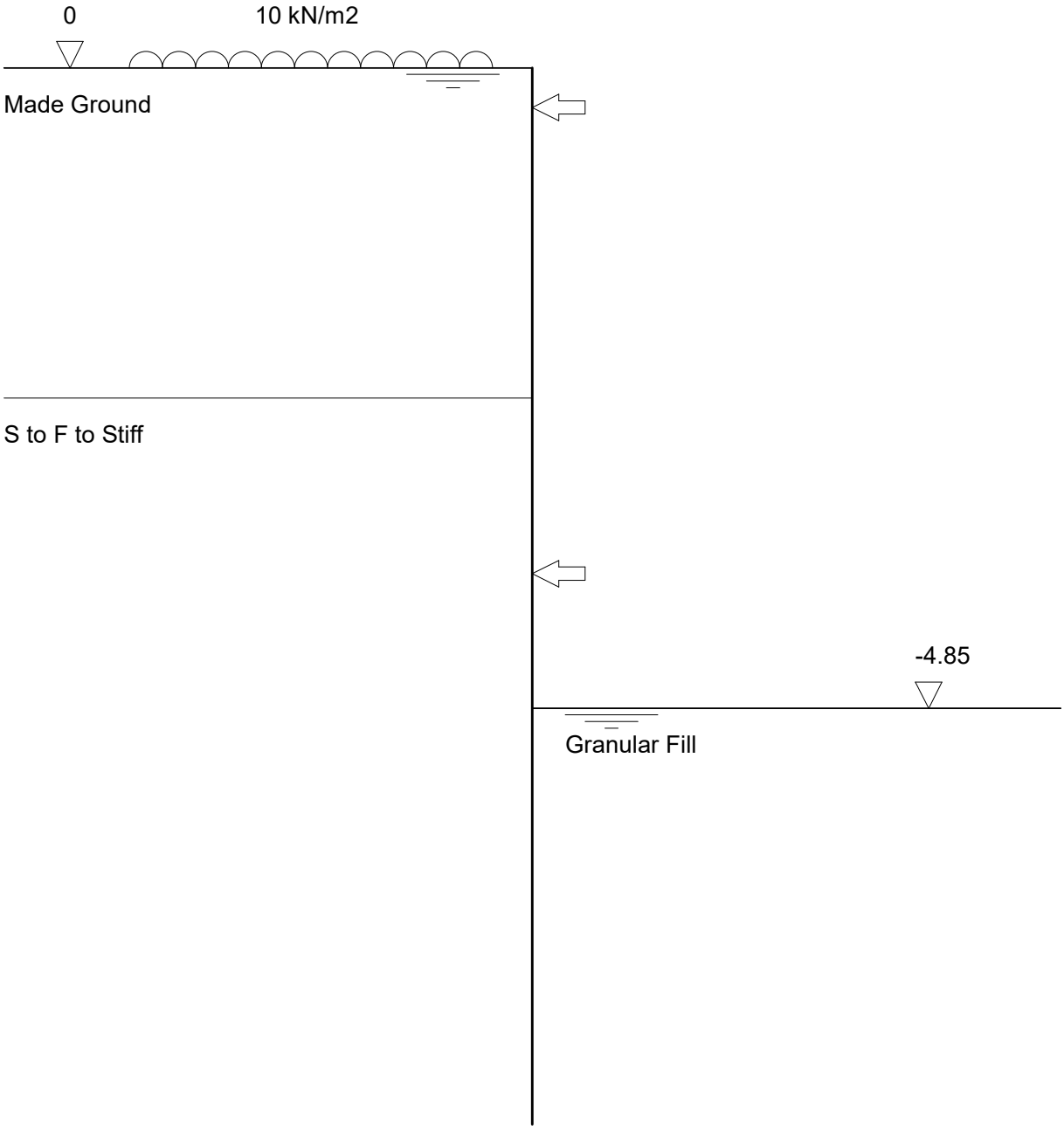


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 11
Stage type Active water level

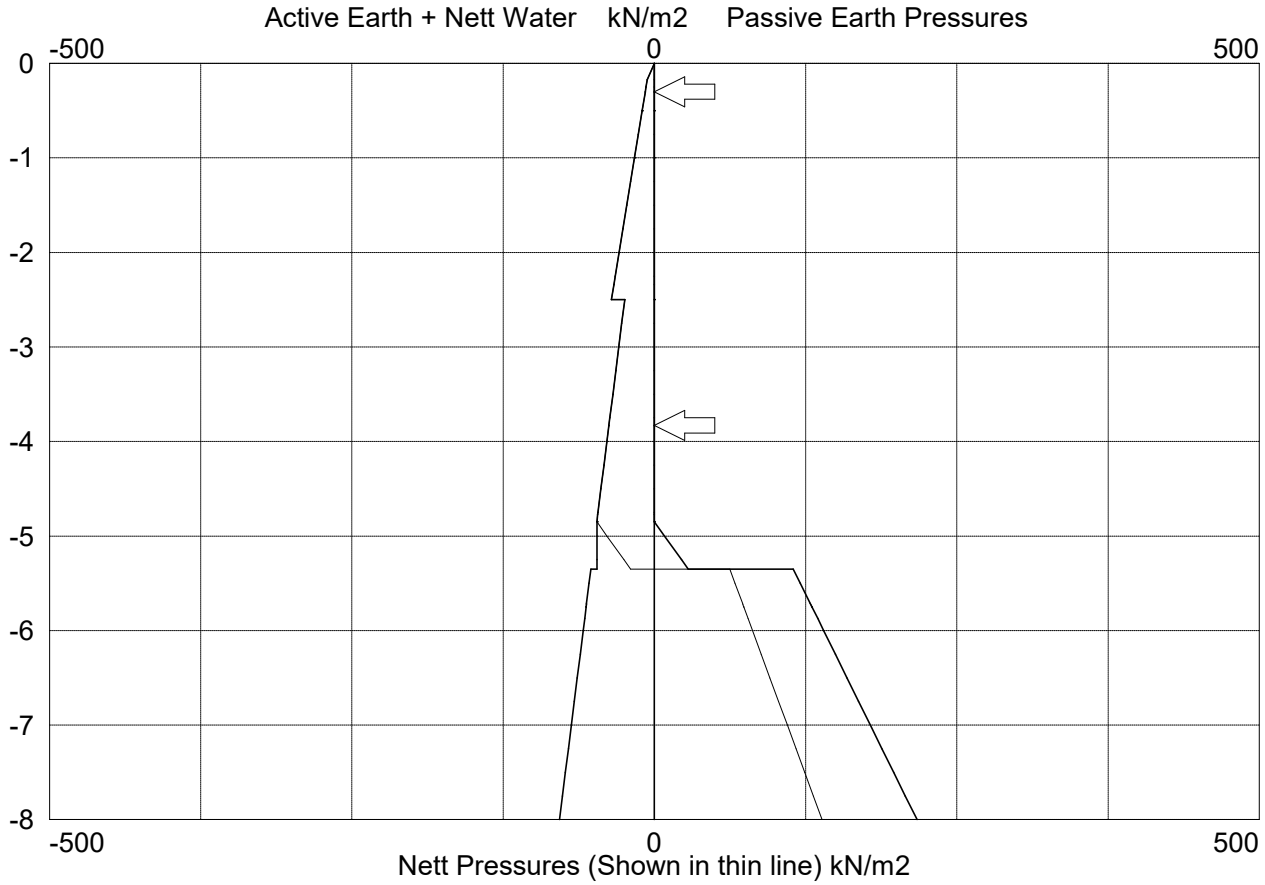


Tabular results from analysis of stage ref 11

strength.
analysis.

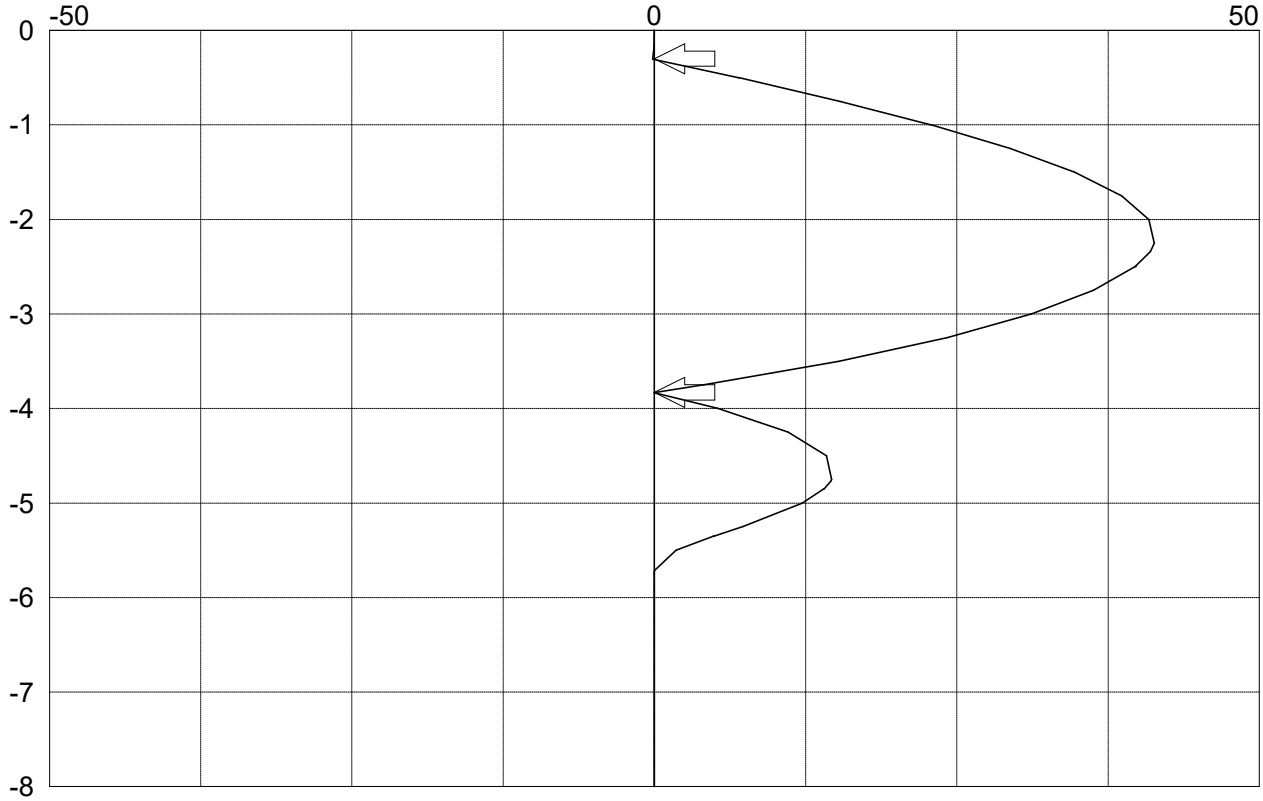
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	11.4	4.1	1.7	.0	.0	.0	5.8	0	-.5			.00
-.30	12.5	4.5	2.9	.0	.0	.0	7.4	.1	-1.3		38.0	.00
-.30	12.5	4.5	3.0	.0	.0	.0	7.5	.1	36.6			.00
-.50	14.1	5.1	4.9	.0	.0	.0	10.0	-6.9	34.9		.0	.00
-.50	14.1	5.1	4.9	.0	.0	.0	10.0	-7.0	34.9			.00
-1.00	18.2	6.6	9.8	.0	.0	.0	16.4	-22.8	28.3			.00
-1.00	18.2	6.6	9.8	.0	.0	.0	16.4	-22.9	28.3			.00
-2.00	26.4	9.6	19.6	.0	.0	.0	29.2	-40.9	5.5			.00
-2.34	29.2	10.6	22.9	.0	.0	.0	33.5	-41.0	-5.0			.00
-2.50	30.5	11.0	24.5	.0	.0	.0	35.5	-39.7	-10.6			.00
w -2.50	55.0	.0	24.5	.0	.0	.0	24.5	-39.7	-10.6			.00
w -3.00	64.5	.0	29.4	.0	.0	.0	29.4	-31.2	-24.1			.00
w -3.83	80.3	.0	37.5	.0	.0	.0	37.5	-.1	-51.9		86.5	.00
w -3.83	80.3	.0	37.6	.0	.0	.0	37.6	0	34.6			.00
w -4.00	83.5	.0	39.2	.0	.0	.0	39.2	-5.3	28.1			.00
w -4.77	98.1	.0	46.7	.0	.0	.0	46.7	-14.6	-5.0			.00
w -4.85	99.6	.0	47.5	.0	.0	.0	47.5	-14.0	-8.6			.00
w -4.85	99.6	.0	47.5	.0	.0	.0	47.5	-14.0	-8.7			.00
w -5.00	102.5	.0	49.0	1.5	8.4	1.5	39.1	-12.2	-15.2			.02
w -5.35	109.1	.0	52.4	5.1	27.9	4.9	19.6	-4.9	-25.4			.18
w -5.35	109.2	.0	52.4	10.0	114.8	.0	-62.4	-4.9	-25.4			.18
w -5.71	116.0	.0	56.0	16.9	128.8	.0	-72.8	0	-.9			.98
w -5.73	116.3	.0	56.1	17.1	129.4	.0	-73.2	0	0			1.00
w -5.75	116.7	.0	56.3	17.6	130.2	.0	-73.9	0	0			1.04
w -5.75	116.8	.0	56.4	17.7	130.4	.0	-74.0	0	0			1.04
w -5.87	119.1	.0	57.5	19.9	135.0	.0	-77.4	0	0			1.21
w -6.00	121.5	.0	58.8	22.4	139.9	.0	-81.1	0	0			1.36
w -7.00	140.5	.0	68.6	41.4	178.5	.0	-109.9	0	0			2.03
w -8.00	159.5	.0	78.4	60.4	217.1	.0	-138.7	0	0			2.35

Graphical results from analysis of stage ref 11

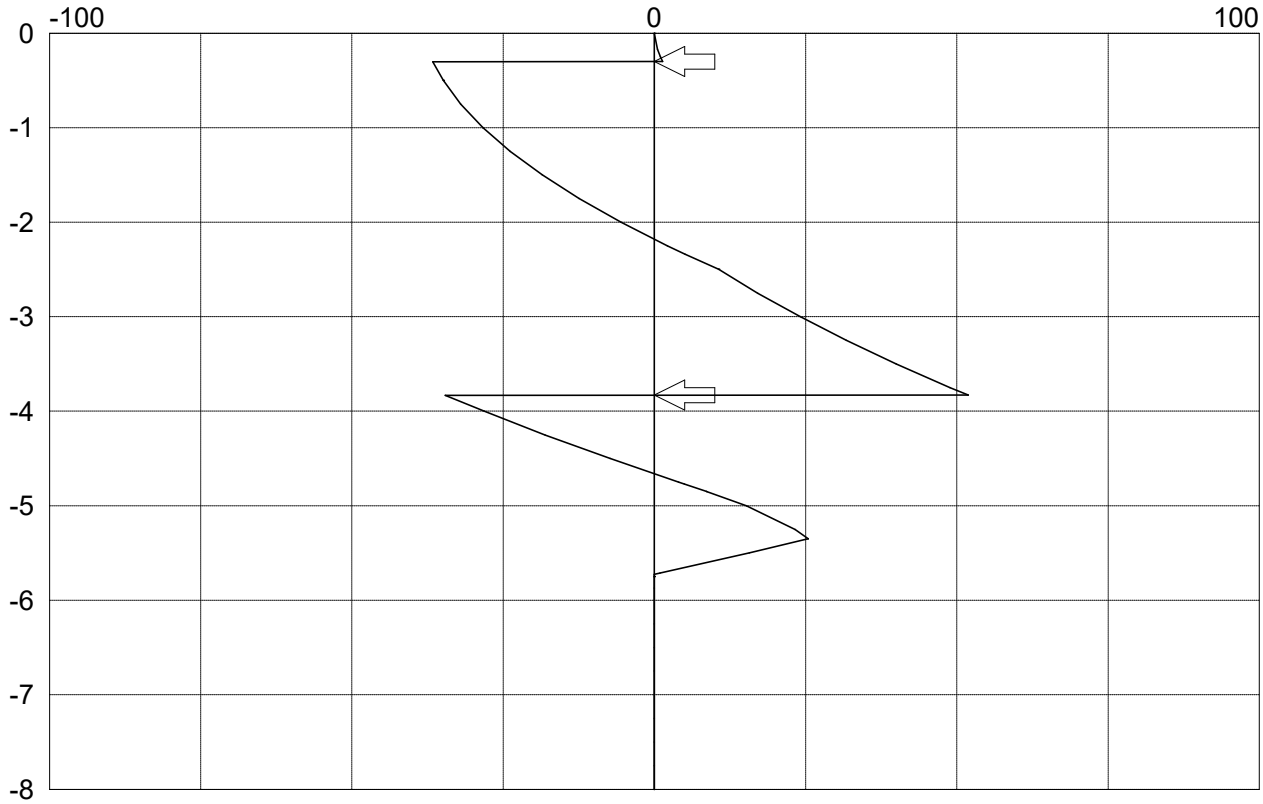


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 11 continued

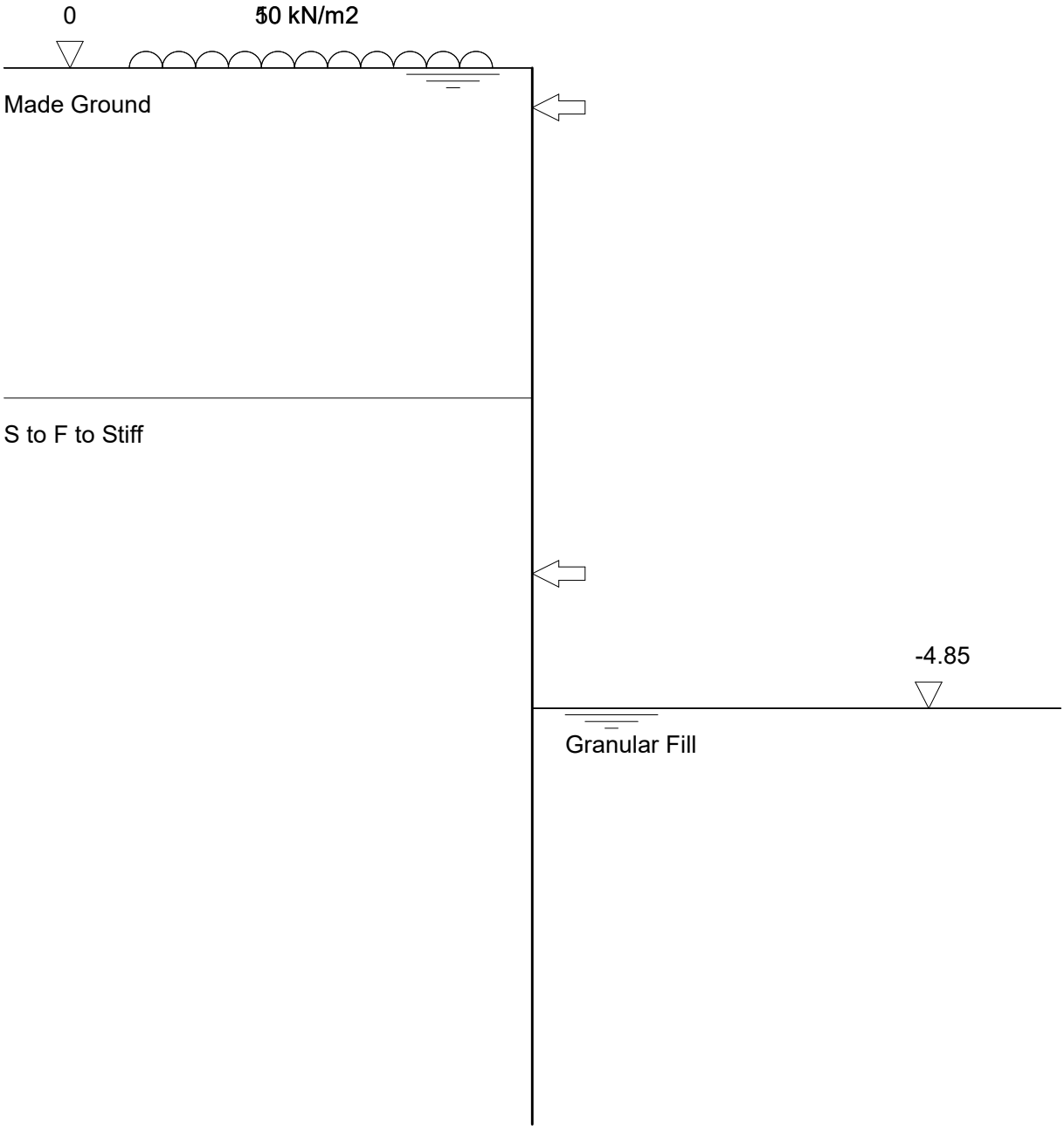


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 12
Stage type Active surcharge

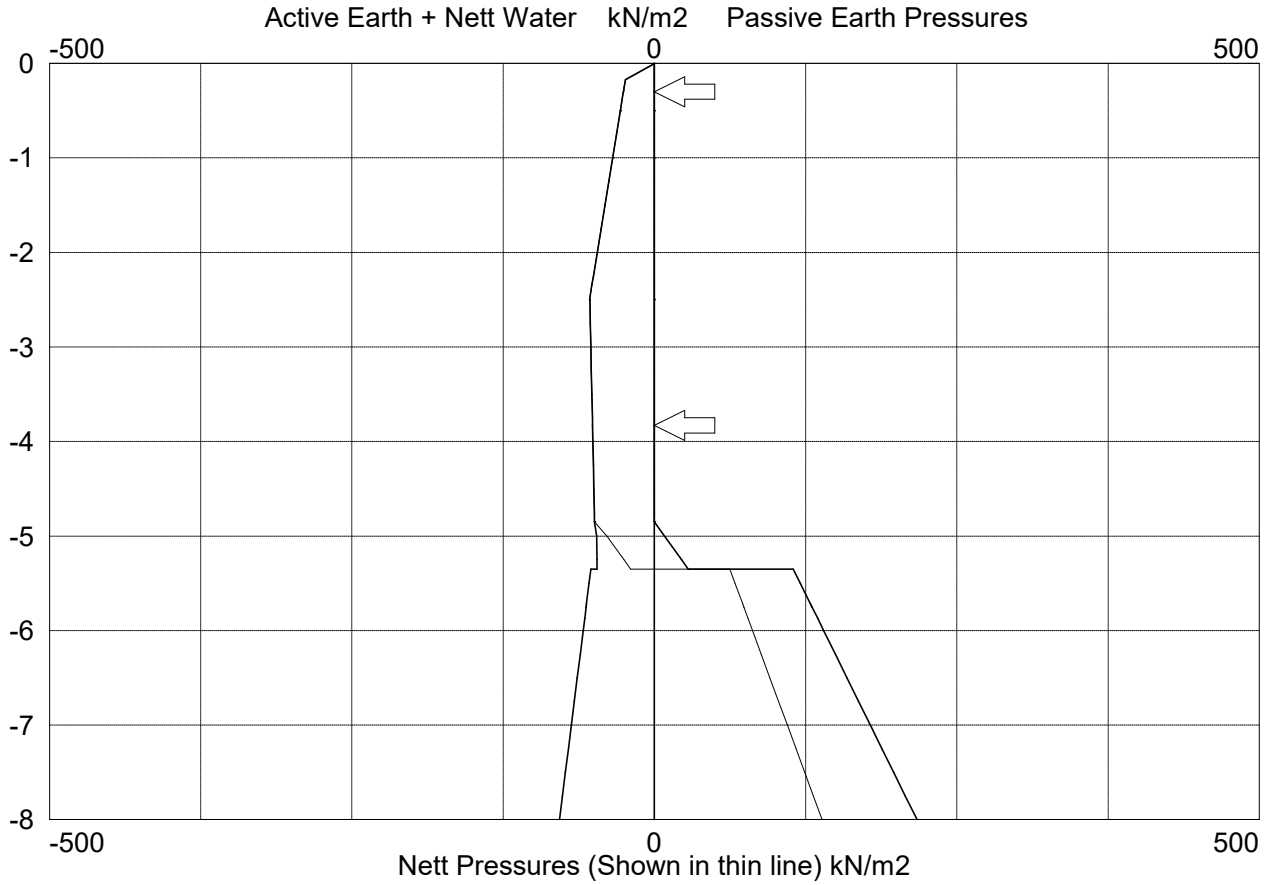


Tabular results from analysis of stage ref 12

strength.
analysis.

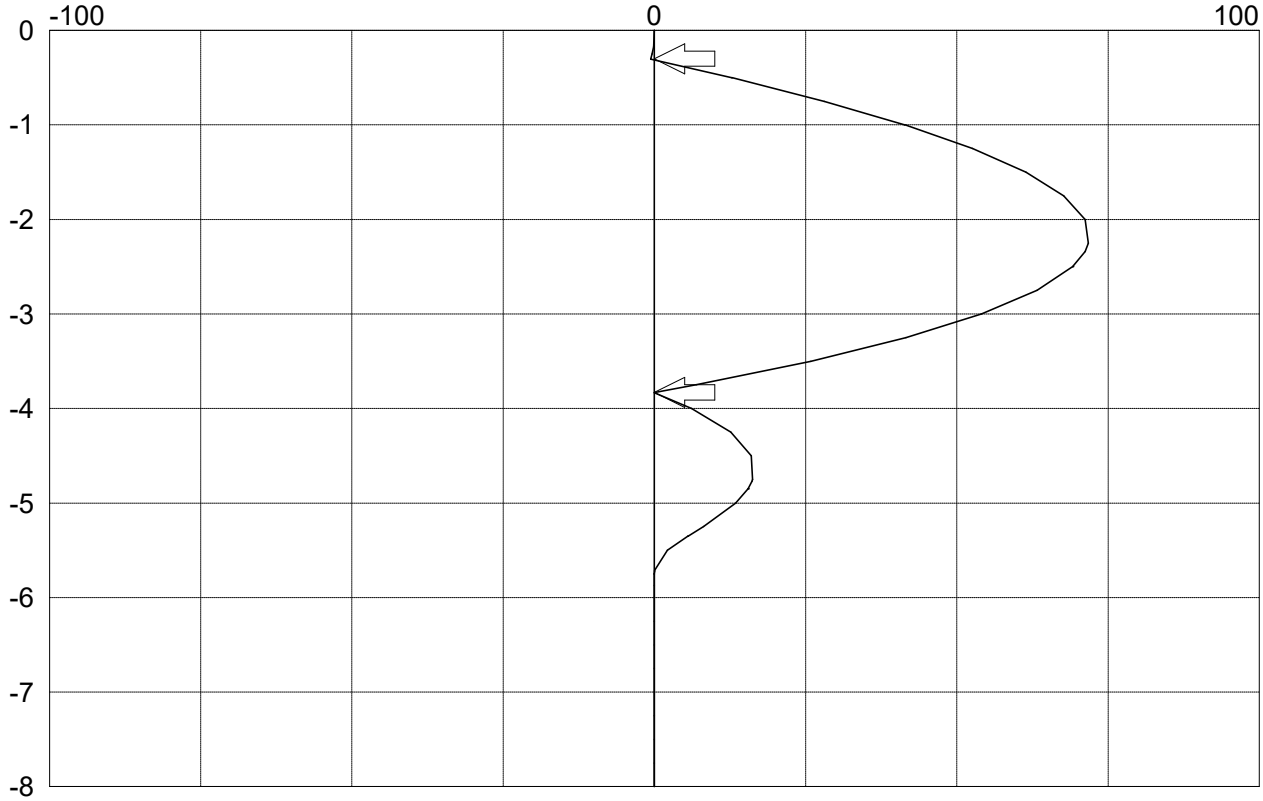
	Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
	.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
	.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
	-.17	61.4	22.2	1.7	.0	.0	.0	23.9	.1	-2.0			.00
	-.30	62.5	22.6	2.9	.0	.0	.0	25.5	.6	-5.2		75.3	.00
	-.30	62.5	22.6	3.0	.0	.0	.0	25.6	.6	70.1			.00
	-.50	64.1	23.2	4.9	.0	.0	.0	28.1	-12.8	64.8		.0	.00
	-.50	64.1	23.2	4.9	.0	.0	.0	28.1	-12.9	64.7			.00
	-1.00	68.2	24.7	9.8	.0	.0	.0	34.4	-41.3	49.2			.00
	-1.00	68.2	24.7	9.8	.0	.0	.0	34.5	-41.4	49.2			.00
	-2.00	76.4	27.6	19.6	.0	.0	.0	47.2	-71.2	8.3			.00
	-2.34	79.2	28.6	22.9	.0	.0	.0	51.6	-71.2	-8.4			.00
	-2.50	80.5	29.1	24.5	.0	.0	.0	53.6	-69.2	-16.9			.00
	-2.50	105.0	53.3	.0	.0	.0	.0	53.3	-69.1	-16.9			.00
	-3.00	114.5	52.5	.0	.0	.0	.0	52.5	-54.1	-43.4			.00
	-3.83	130.3	51.1	.0	.0	.0	.0	51.1	-.2	-86.3		127.4	.00
	-3.83	130.3	51.1	.0	.0	.0	.0	51.1	0	40.9			.00
	-4.00	133.5	50.8	.0	.0	.0	.0	50.8	-6.2	32.4			.00
	-4.77	148.1	49.5	.0	.0	.0	.0	49.5	-16.1	-6.3			.00
	-4.85	149.6	49.4	.0	.0	.0	.0	49.4	-15.5	-10.1			.00
	-4.85	149.7	49.4	.0	.0	.0	.0	49.4	-15.5	-10.2			.00
	-5.00	152.5	49.1	.0	1.5	8.4	1.5	39.2	-13.4	-16.9			.02
w	-5.35	159.1	.0	52.4	5.1	27.9	4.9	19.6	-5.6	-27.1			.17
w	-5.35	159.2	.0	52.4	10.0	114.8	.0	-62.4	-5.5	-27.1			.17
w	-5.71	166.0	.0	56.0	16.9	128.8	.0	-72.8	0	-2.6			.94
w	-5.73	166.3	.0	56.1	17.1	129.4	.0	-73.2	0	-1.6			.97
w	-5.75	166.7	.0	56.3	17.6	130.2	.0	-73.9	0	0			1.00
w	-5.75	166.8	.0	56.4	17.7	130.4	.0	-74.0	0	0			1.01
w	-5.87	169.1	.0	57.5	19.9	135.0	.0	-77.4	0	0			1.17
w	-6.00	171.5	.0	58.8	22.4	139.9	.0	-81.1	0	0			1.32
w	-7.00	190.5	.0	68.6	41.4	178.5	.0	-109.9	0	0			2.01
w	-8.00	209.5	.0	78.4	60.4	217.1	.0	-138.7	0	0			2.34

Graphical results from analysis of stage ref 12

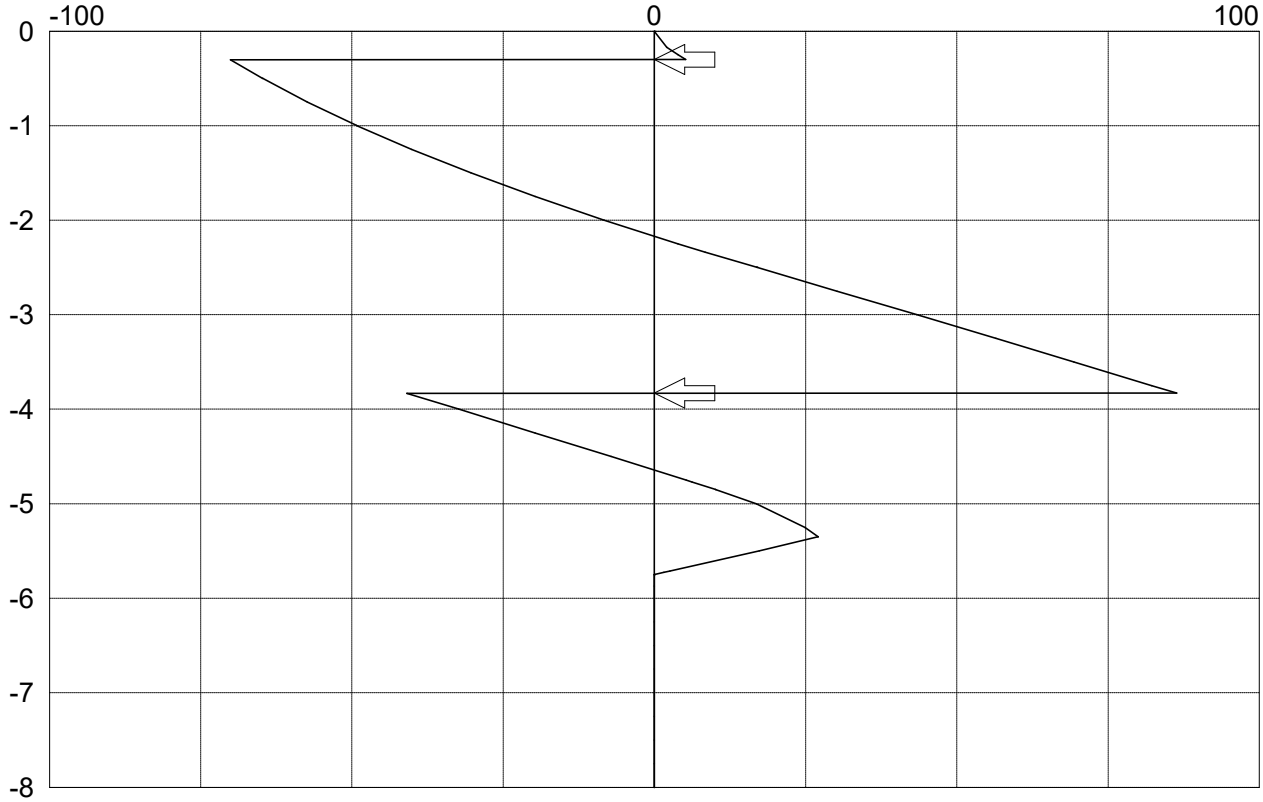


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 12 continued

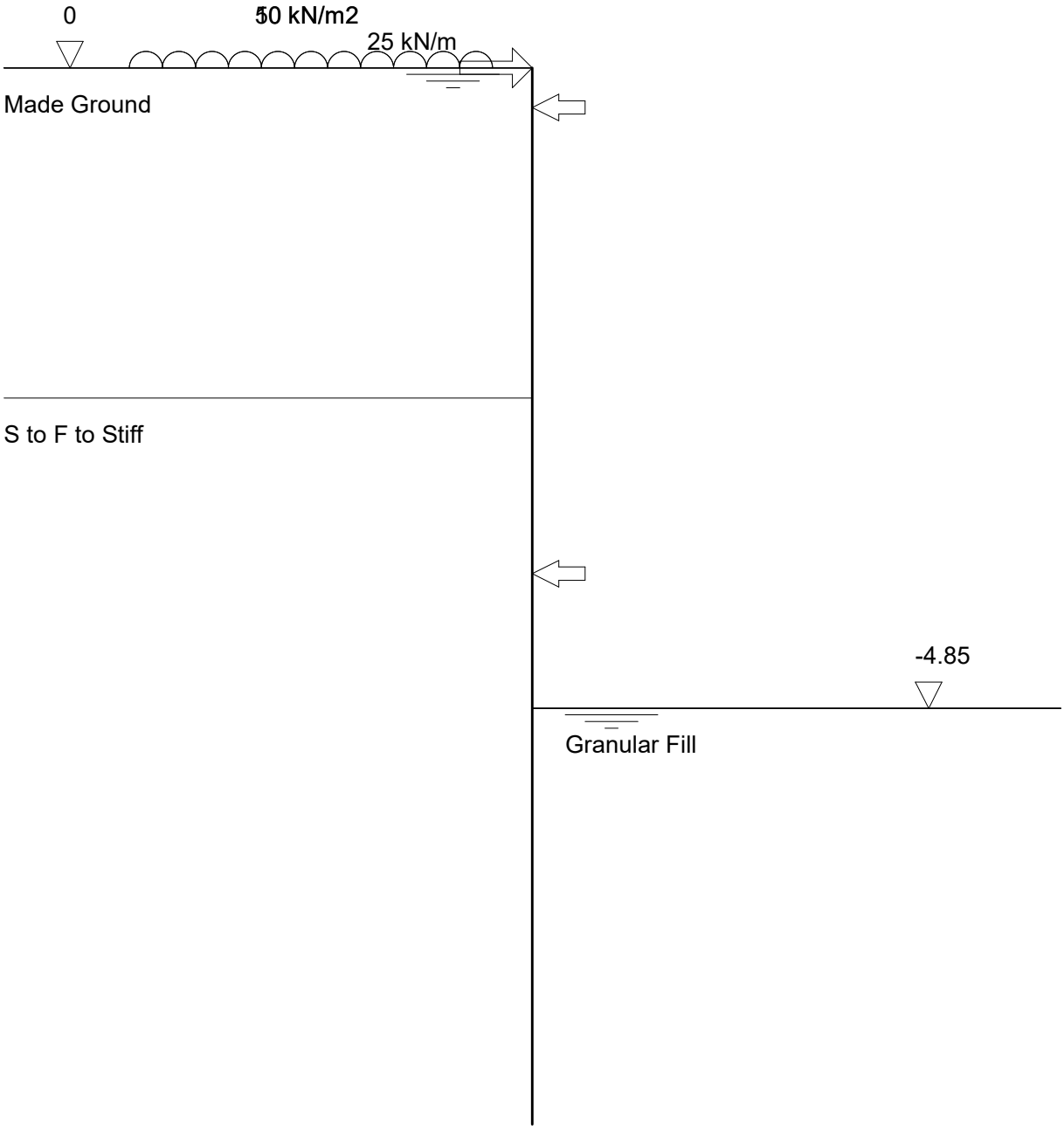


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 13
Stage type Horizontal load

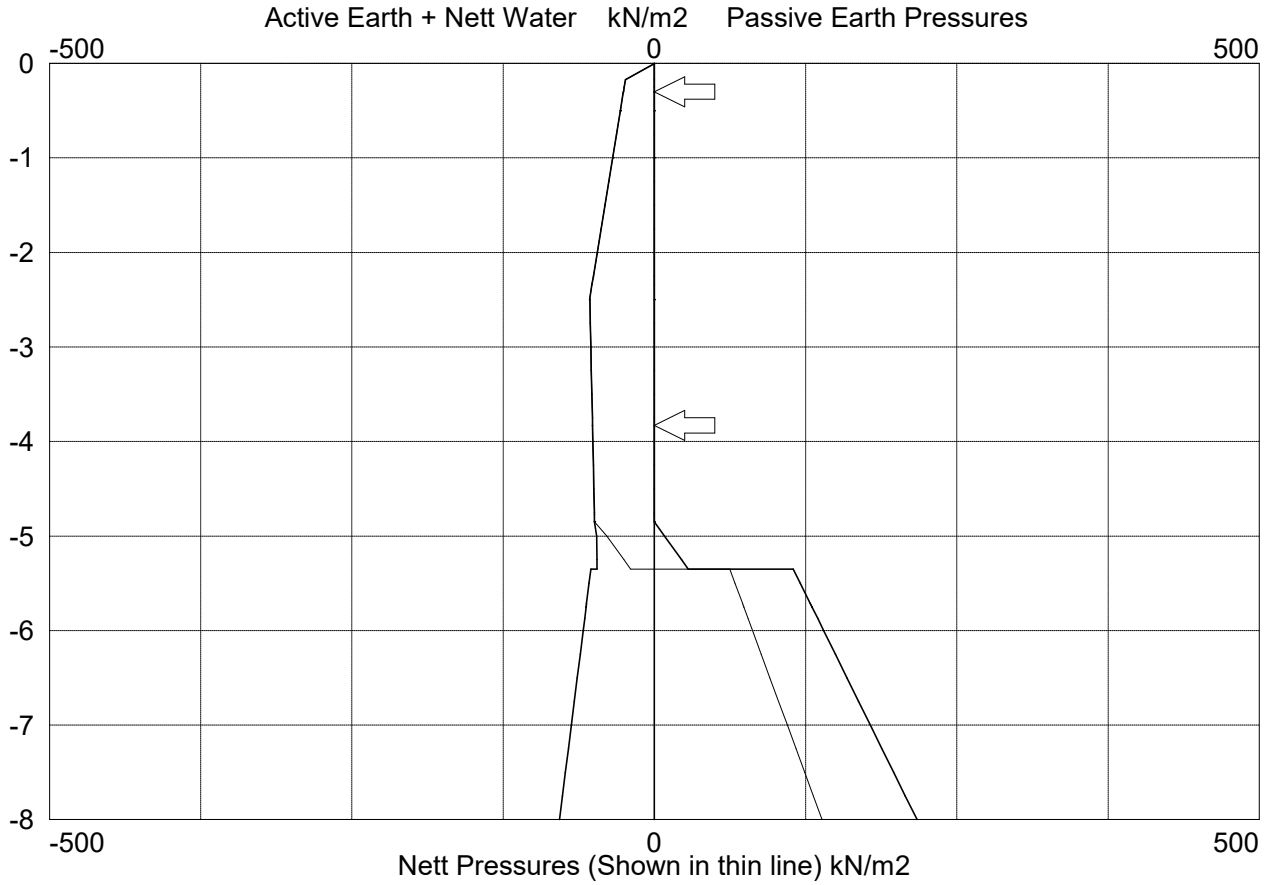


Tabular results from analysis of stage ref 13

strength.
analysis.

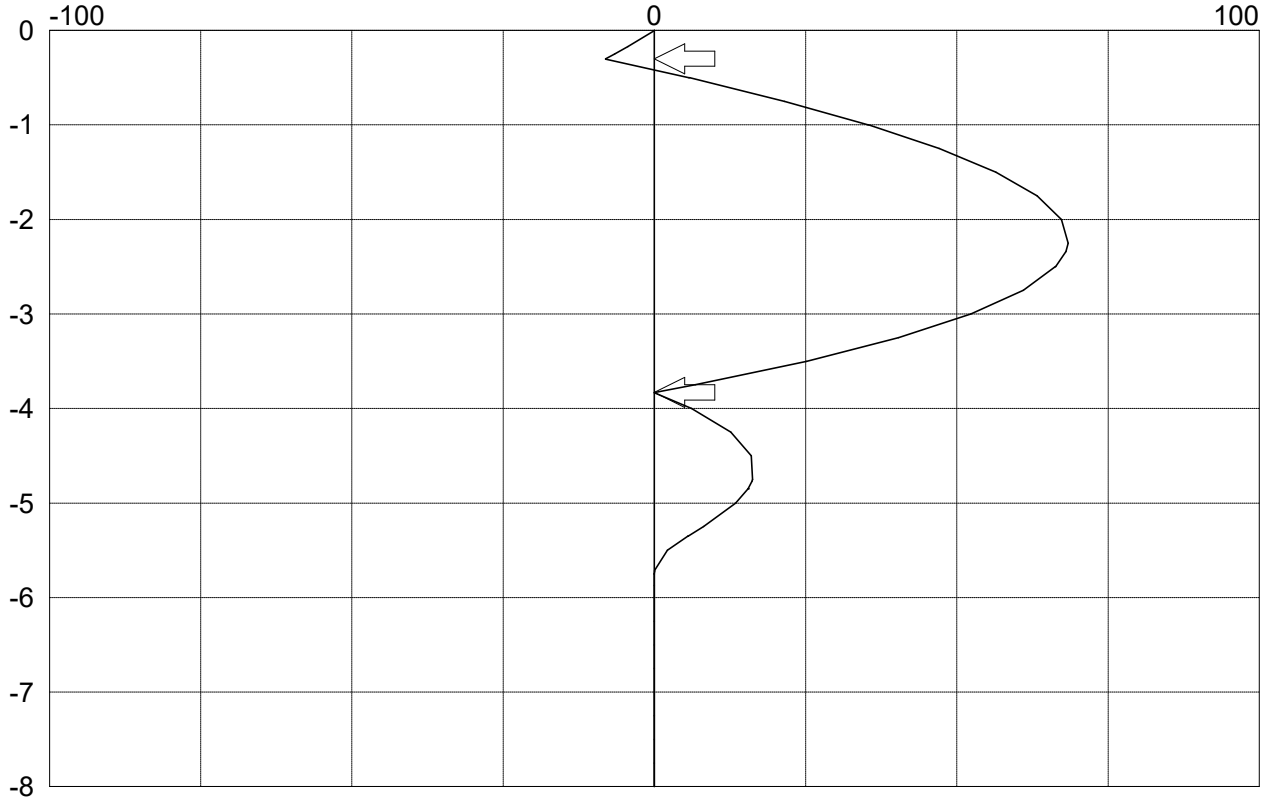
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	-25.0			.00
-.17	61.4	22.2	1.7	.0	.0	.0	23.9	4.4	-27.0			.00
-.30	62.5	22.6	2.9	.0	.0	.0	25.5	8.0	-30.2		102.5	.00
-.30	62.5	22.6	3.0	.0	.0	.0	25.6	8.1	72.2			.00
-.50	64.1	23.2	4.9	.0	.0	.0	28.1	-5.7	66.9		.0	.00
-.50	64.1	23.2	4.9	.0	.0	.0	28.1	-5.8	66.9			.00
-1.00	68.2	24.7	9.8	.0	.0	.0	34.4	-35.3	51.3			.00
-1.00	68.2	24.7	9.8	.0	.0	.0	34.5	-35.4	51.3			.00
-2.00	76.4	27.6	19.6	.0	.0	.0	47.2	-67.3	10.4			.00
-2.34	79.2	28.6	22.9	.0	.0	.0	51.6	-68.0	-6.3			.00
-2.50	80.5	29.1	24.5	.0	.0	.0	53.6	-66.3	-14.8			.00
-2.50	105.0	53.3	.0	.0	.0	.0	53.3	-66.3	-14.8			.00
-3.00	114.5	52.5	.0	.0	.0	.0	52.5	-52.3	-41.2			.00
-3.83	130.3	51.1	.0	.0	.0	.0	51.1	-.2	-84.2		125.2	.00
-3.83	130.3	51.1	.0	.0	.0	.0	51.1	0	40.9			.00
-4.00	133.5	50.8	.0	.0	.0	.0	50.8	-6.2	32.4			.00
-4.77	148.1	49.5	.0	.0	.0	.0	49.5	-16.1	-6.3			.00
-4.85	149.6	49.4	.0	.0	.0	.0	49.4	-15.5	-10.1			.00
-4.85	149.7	49.4	.0	.0	.0	.0	49.4	-15.5	-10.2			.00
-5.00	152.5	49.1	.0	1.5	8.4	1.5	39.2	-13.4	-16.9			.02
w -5.35	159.1	.0	52.4	5.1	27.9	4.9	19.6	-5.6	-27.1			.17
w -5.35	159.2	.0	52.4	10.0	114.8	.0	-62.4	-5.5	-27.1			.17
w -5.71	166.0	.0	56.0	16.9	128.8	.0	-72.8	0	-2.6			.94
w -5.73	166.3	.0	56.1	17.1	129.4	.0	-73.2	0	-1.6			.97
w -5.75	166.7	.0	56.3	17.6	130.2	.0	-73.9	0	0			1.00
w -5.75	166.8	.0	56.4	17.7	130.4	.0	-74.0	0	0			1.01
w -5.87	169.1	.0	57.5	19.9	135.0	.0	-77.4	0	0			1.17
w -6.00	171.5	.0	58.8	22.4	139.9	.0	-81.1	0	0			1.32
w -7.00	190.5	.0	68.6	41.4	178.5	.0	-109.9	0	0			2.01
w -8.00	209.5	.0	78.4	60.4	217.1	.0	-138.7	0	0			2.34

Graphical results from analysis of stage ref 13

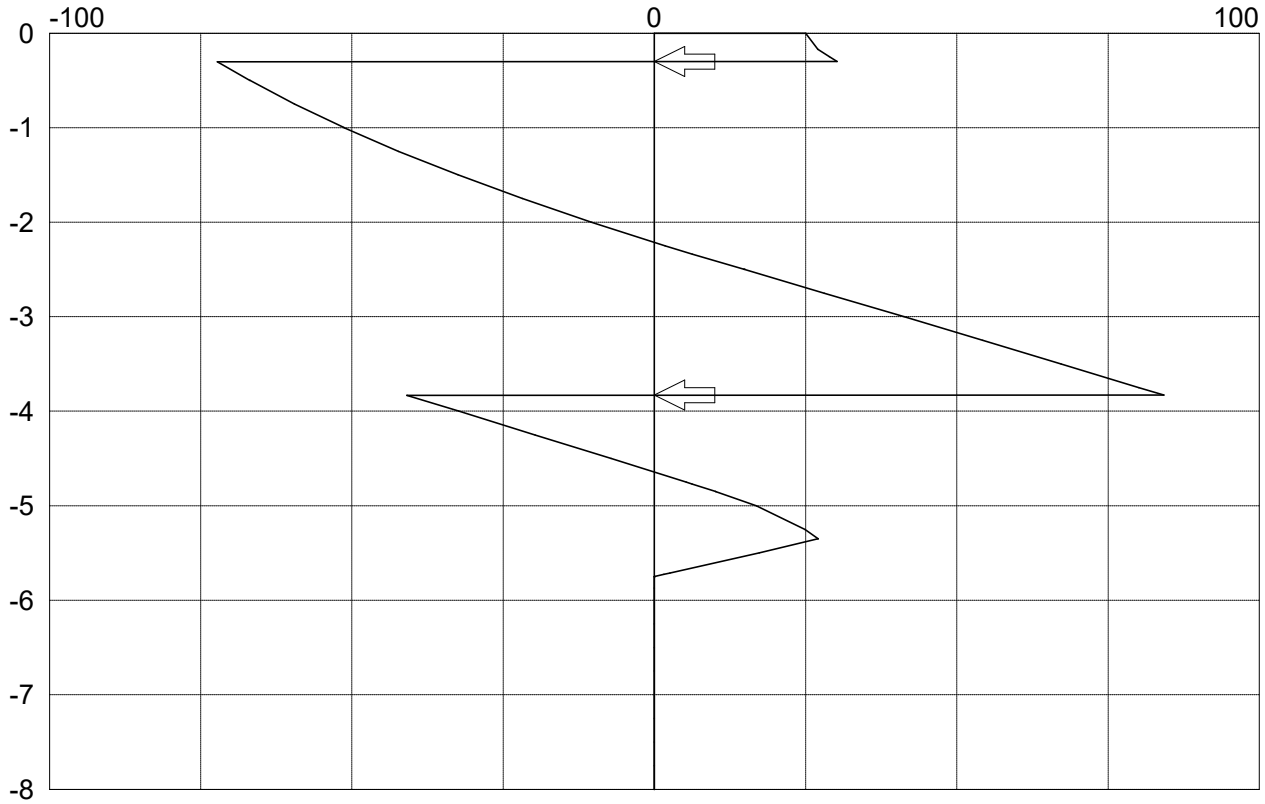


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 13 continued

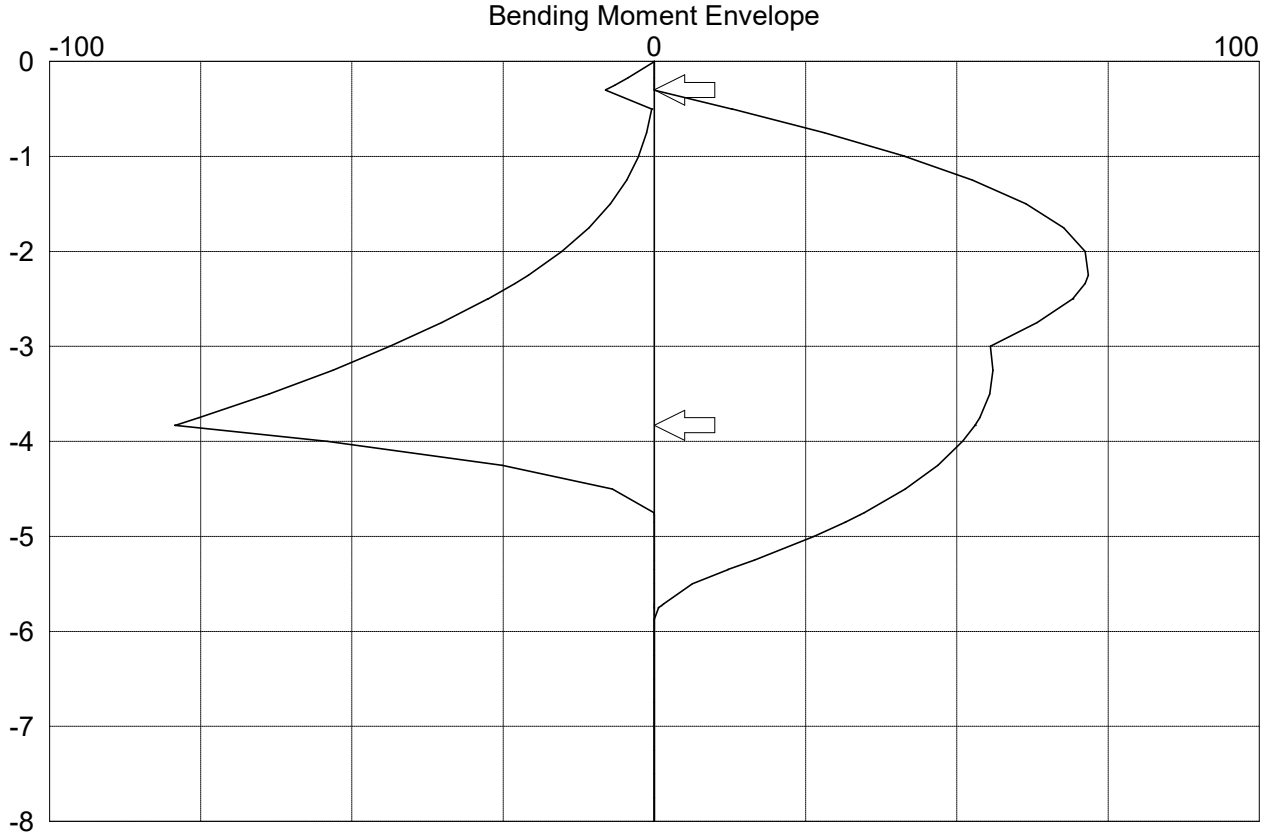


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Graphical plot of envelope from selected construction stages



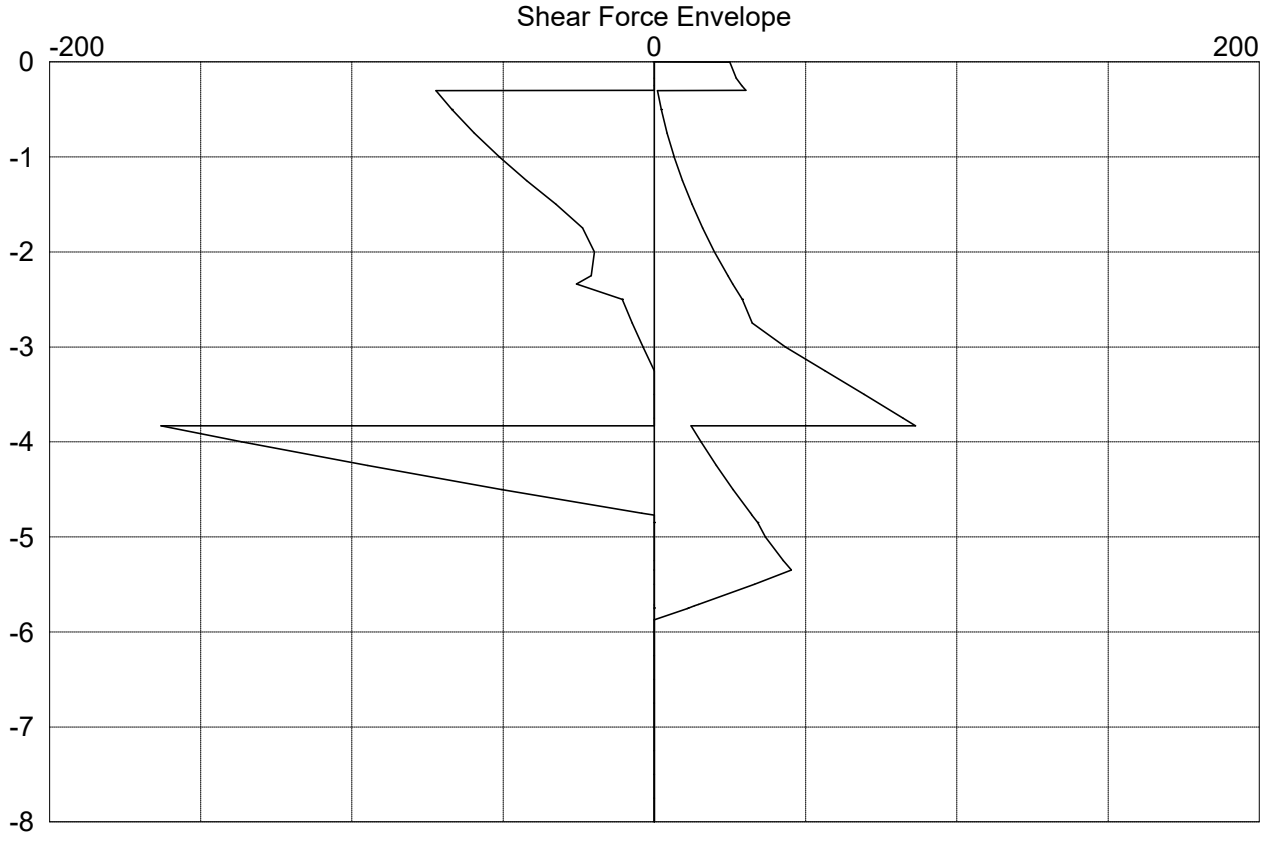


Table of envelope for wall forces

Calc Level m	Bending Minimum kNm/m	Bending Maximum kNm/m	Shear Minimum kN/m	Shear Maximum kN/m	Prop Force kN/m
.00	.0	.0	.0	.0	
.00	.0	.0	-25.0	.0	
-.17	.0	4.4	-27.0	.0	
-.30	.0	8.0	-30.2	.0	102.5
-.30	.0	8.1	-1.1	72.2	
-.50	-12.8	.4	-2.3	66.9	39.7
-.50	-12.9	.5	-2.3	66.9	
-1.00	-41.3	2.6	-6.5	51.3	
-1.00	-41.4	2.6	-6.6	51.3	
-2.00	-71.2	15.3	-19.9	19.8	
-2.34	-71.2	23.0	-25.9	25.8	
-2.50	-69.2	27.5	-29.1	10.6	
-2.50	-69.1	27.5	-29.1	10.6	
-3.00	-55.5	43.7	-43.4	3.8	
-3.83	-53.0	79.2	-86.3	.0	213.4
-3.83	-53.0	79.3	-12.1	163.1	
-4.00	-51.0	54.1	-15.4	136.4	
-4.77	-34.1	.0	-32.3	.0	
-4.85	-31.6	.0	-34.2	.0	
-4.85	-31.6	.0	-34.2	.0	
-5.00	-26.4	.0	-36.7	.0	
-5.35	-12.2	.0	-45.2	.0	
-5.35	-12.2	.0	-45.2	.0	
-5.71	-1.5	.0	-14.6	.0	
-5.73	-1.2	.0	-13.4	.0	
-5.75	-.7	.0	-11.4	.0	
-5.75	-.7	.0	-10.9	.0	
-5.87	.0	.0	.0	.0	
-6.00	.0	.0	.0	.0	
-7.00	.0	.0	.0	.0	
-8.00	.0	.0	.0	.0	

Structural design of wall

Wall section properties

Primary pile diameter	450	mm
Primary pile spacing	600	mm
Infill pile diameter		mm
Main rebar bar diameter	20	mm
Main rebar number of bars	5	
Links/Helix bar diameter	8	mm
Links/Helix spacing/pitch	200	mm

Wall material properties

Concrete cube strength	35	N/mm2
Concrete cover	50	mm
Main rebar steel grade	500	N/mm2
Link rebar steel grade	500	N/mm2
Ultimate load factor	1.00	

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Bending resistance. BS8110 plane strain analysis	48	103	kNm
Max longitudinal steel. BS8110 max 6% by area	9543	1571	mm2
Min longitudinal steel. BS8110 min 0.4% by area	636	1571	mm2
Shear resistance. BS8110	98	131	kN
Min link dia. BS8110 6mm or 0.25x bar dia	6	8	mm
Max link spacing. BS8110 12x main bar dia or 0.75d	232	200	mm
Min shear link area. BS8110 Clause 3.4.5	255	503	mm2/m

Pile Wall Section B-B Permanent Condition	Page No 1 Analysis Perm Condition
CADS Piled Wall Suite Version 6.10 Design of embedded retaining walls and cofferdams	Project ULS Analysis File Name B-B - perm condn.pws"
Broxwood View, 29 St. Edmund's Terrace London NW8 450mm Dia. Secant Pile Retaining Wall	Engineer AA Date 14/02/2023

Pile geometry

Pile top Level	0	m
Pile Length	8.05	m
Pile toe level	-8.05	m

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level -4.85

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
.00	Made Ground	18.00	18.00	15000	0			28	.67	.30	
								28	.50	4.15	
-2.50	S to F to Stiff	19.00	19.00	19200	7680	10		25	.67	.35	1.52
						10		25	.50	3.38	4.51

Construction sequence

Stage Ref		Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	A	Active surcharge	0.00	50.0	.3		
2	A	Insert prop	-3.83				
3		Insert prop	-0.30				
4	A	Passive side excavation	-4.85				
5	A	Active water level	0.00				
6	A	Horizontal load					

Code of practice

Code of practice or reference document	
Application of pressures for stability	Not applicable for FOS=1 on moments
FOS on moments (stability check)	1.00
ULS factor on Tan(Phi) values	1.20
ULS fFactor on drained cohesion values	1.20
ULS factor on undrained cohesion values	1.50
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.00

Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	9.8	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	.0	m
Continuity model for wall analysis	Pins at second and lower props	

Deflection parameters

Wall moment of inertia	335482	cm4/m
Wall Youngs modulus	27000000	kN/m2

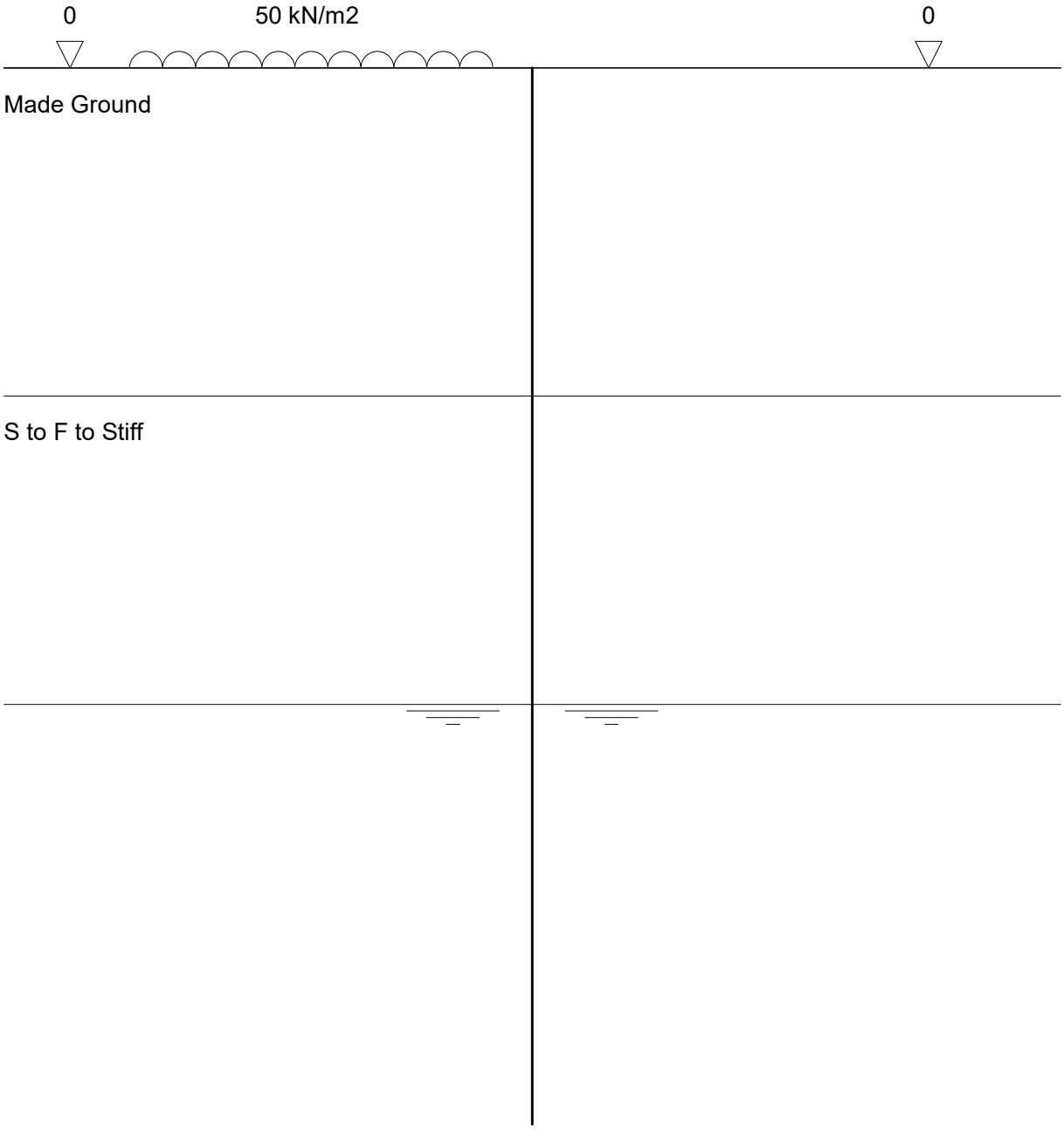
Properties for prop at -3.83

Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Properties for prop at -0.3

Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Stage ref. 1
Stage type Active surcharge

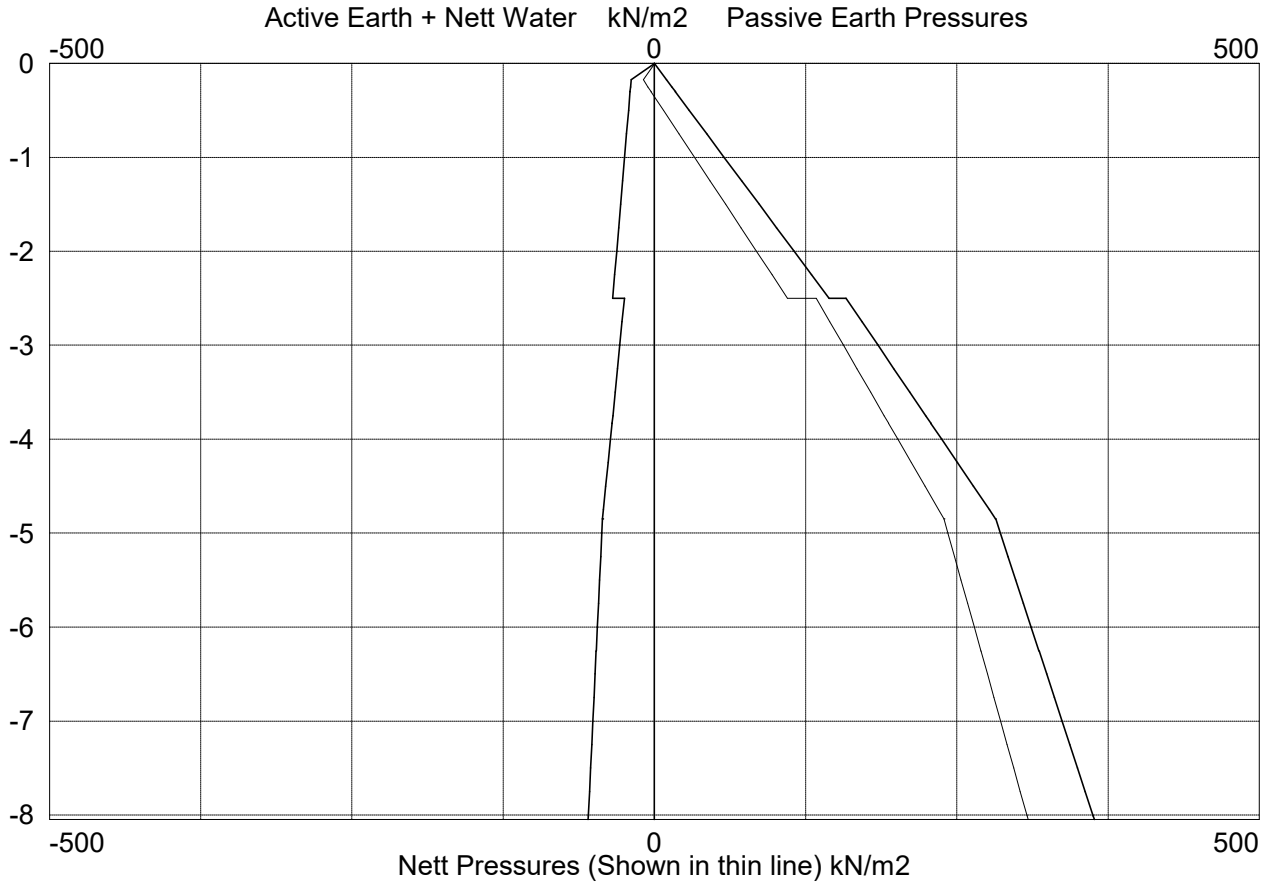


Tabular results from analysis of stage ref 1

strength.
analysis.

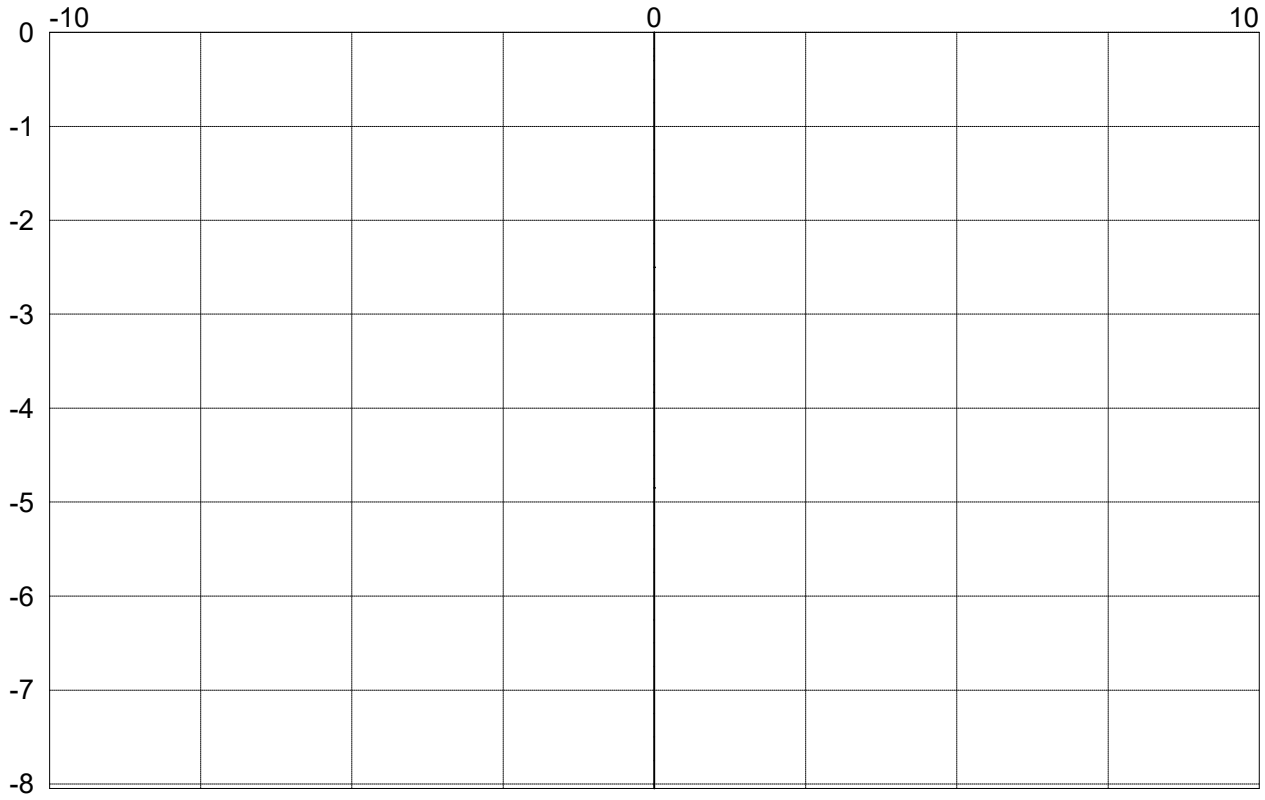
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.1	.0	-.1	0	0			8.87
-.17	53.1	19.2	.0	3.1	10.0	.0	9.2	0	0			.53
-.30	55.4	20.0	.0	5.4	17.3	.0	2.7	0	0		.0	.57
-.30	55.4	20.1	.0	5.4	17.4	.0	2.6	0	0			.57
-1.00	68.0	24.6	.0	18.0	57.8	.0	-33.2	0	0			1.11
-2.00	86.0	31.1	.0	36.0	115.5	.0	-84.4	0	0			1.84
-2.50	95.0	34.4	.0	45.0	144.4	.0	-110.1	0	0			2.16
-2.50	95.0	24.7	.0	45.0	158.6	.0	-133.8	0	0			2.16
-3.00	104.5	28.6	.0	54.5	184.9	.0	-156.3	0	0			2.49
-3.83	120.3	34.9	.0	70.3	228.5	.0	-193.6	0	0		.0	3.07
-3.83	120.3	35.0	.0	70.3	228.6	.0	-193.7	0	0			3.07
-4.00	123.5	36.3	.0	73.5	237.5	.0	-201.2	0	0			3.18
-4.85	139.6	42.8	.0	89.6	282.1	.0	-239.3	0	0			3.69
-4.85	139.7	42.8	.0	89.6	282.2	.0	-239.4	0	0			3.69
-5.00	141.0	43.3	1.5	91.0	286.0	1.5	-242.7	0	0			3.78
-6.00	150.2	47.1	11.3	100.2	311.5	11.3	-264.4	0	0			4.25
-6.26	152.6	48.0	13.8	102.6	318.1	13.8	-270.1	0	0			4.36
-7.00	159.4	50.8	21.1	109.4	336.9	21.1	-286.2	0	0			4.63
-8.00	168.6	54.5	30.9	118.6	362.4	30.9	-307.9	0	0			4.92
-8.01	168.7	54.6	31.0	118.7	362.7	31.0	-308.2	0	0			4.92
-8.05	169.1	54.7	31.4	119.1	363.7	31.4	-309.0	0	0			4.93

Graphical results from analysis of stage ref 1

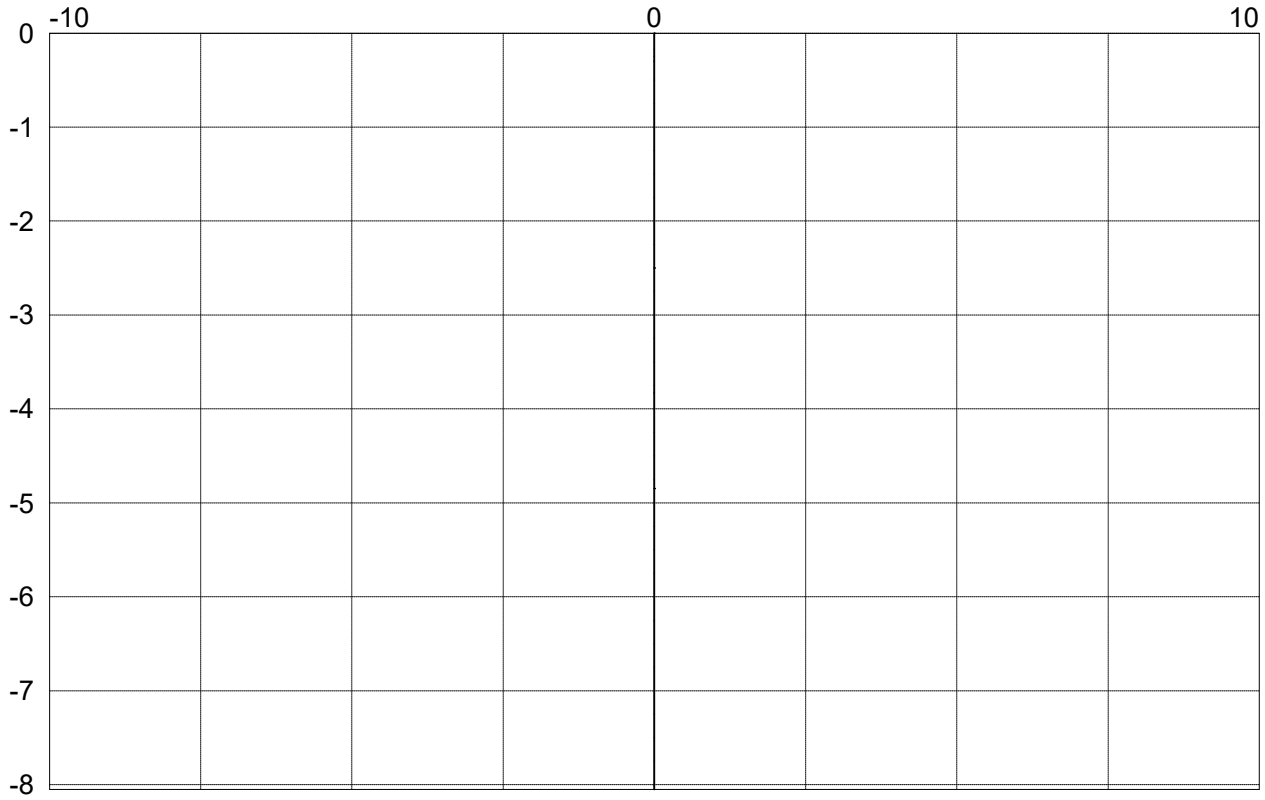


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 1 continued

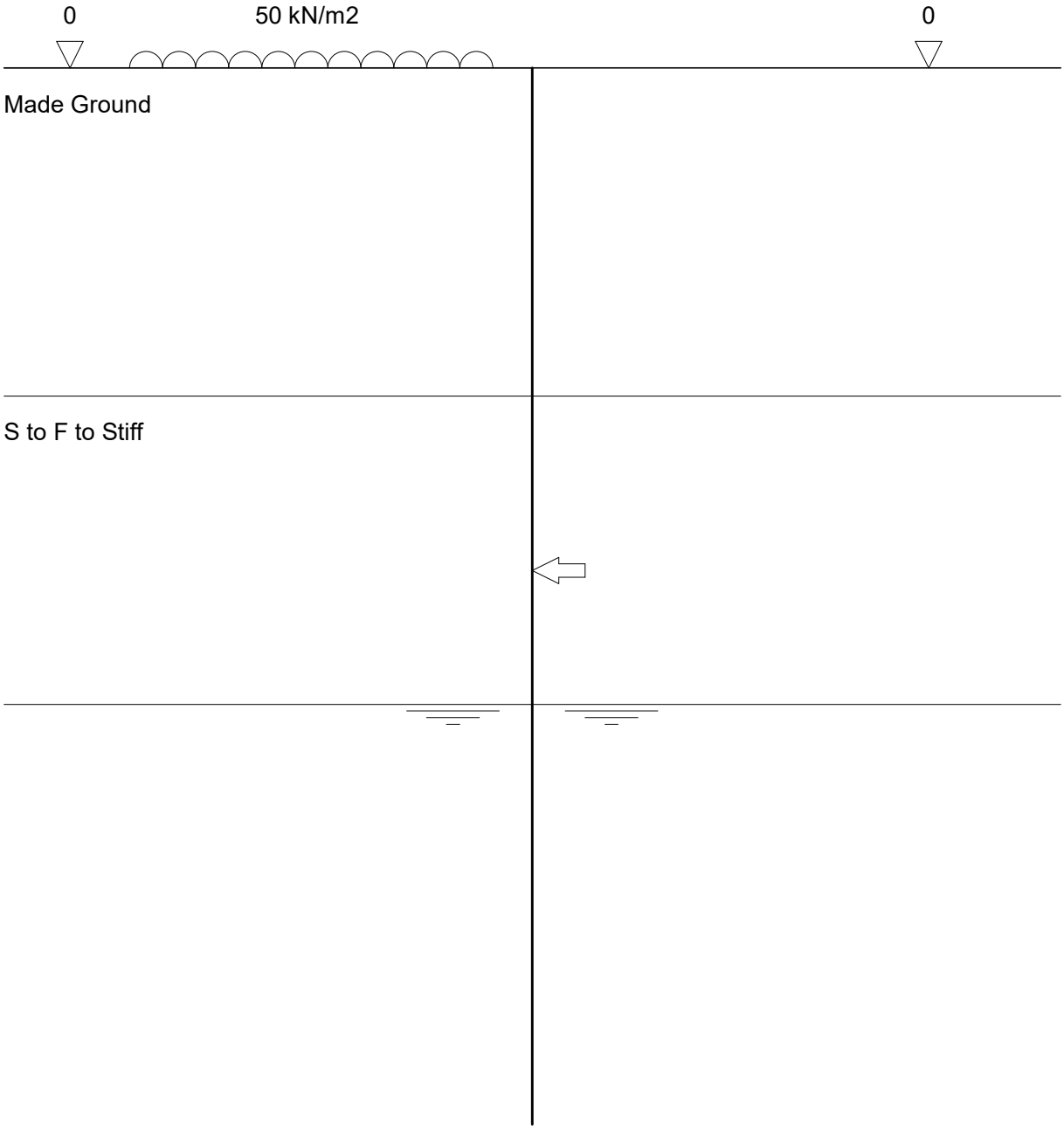


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 2
Stage type Insert prop

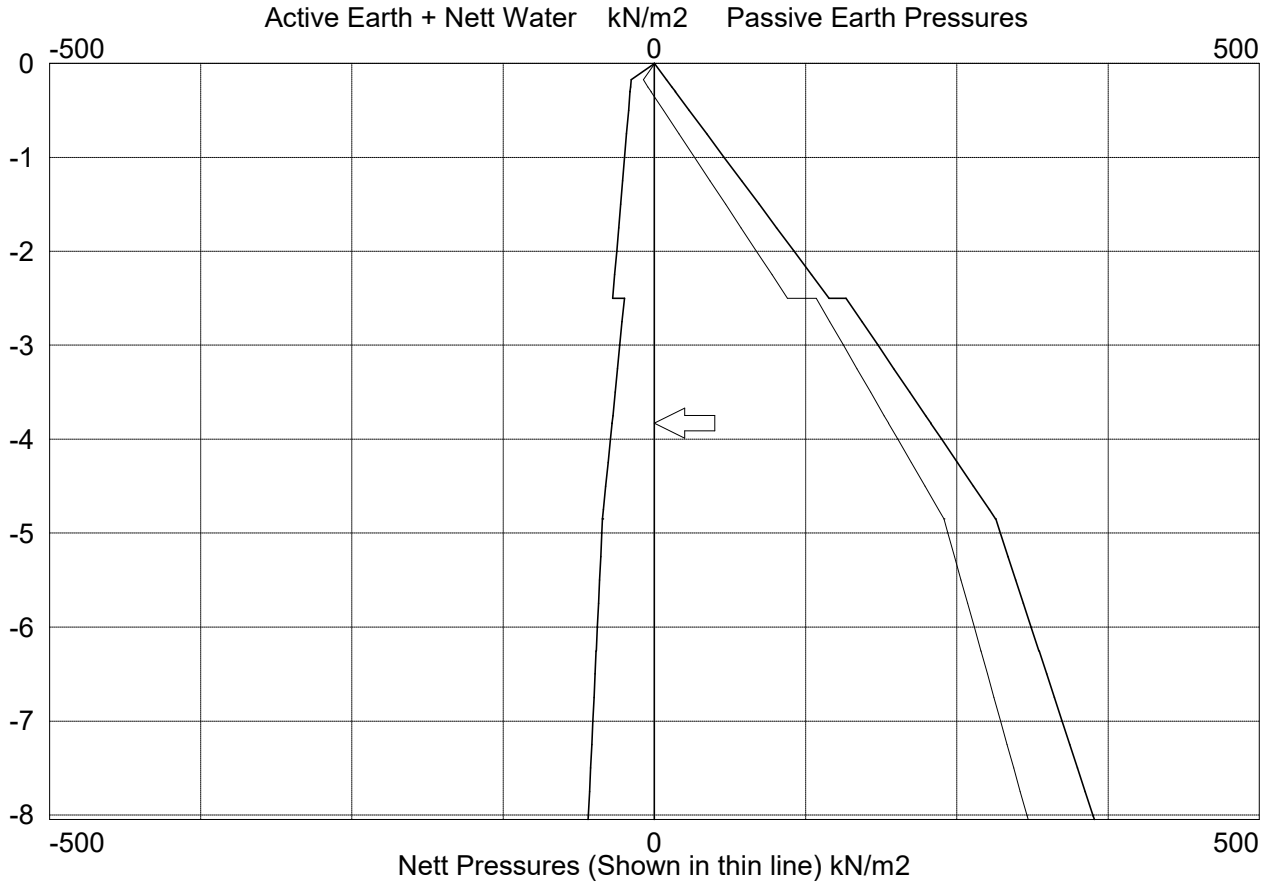


Tabular results from analysis of stage ref 2

strength.
analysis.

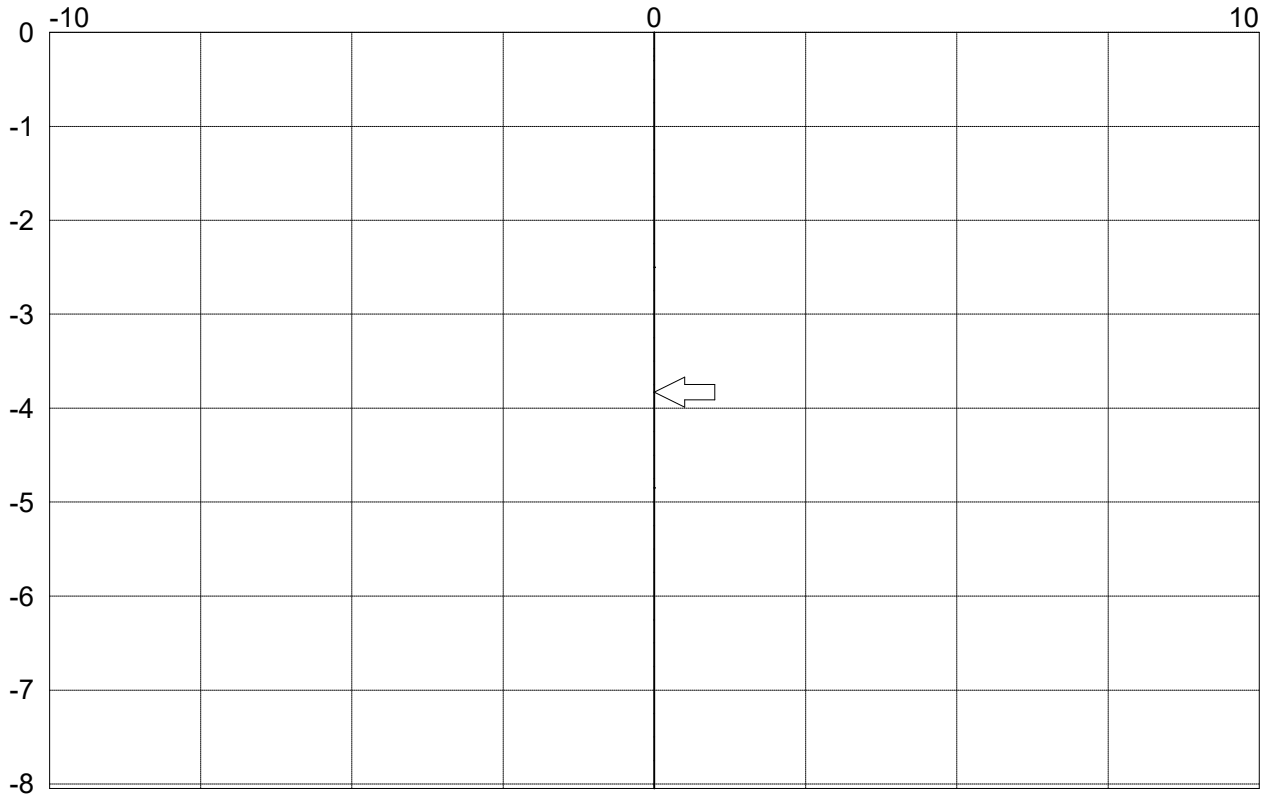
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.1	.0	-.1	0	0			8.87
-.17	53.1	19.2	.0	3.1	10.0	.0	9.2	0	0			.53
-.30	55.4	20.0	.0	5.4	17.3	.0	2.7	0	0		.0	.57
-.30	55.4	20.1	.0	5.4	17.4	.0	2.6	0	0			.57
-1.00	68.0	24.6	.0	18.0	57.8	.0	-33.2	0	0			1.11
-2.00	86.0	31.1	.0	36.0	115.5	.0	-84.4	0	0			1.84
-2.50	95.0	34.4	.0	45.0	144.4	.0	-110.1	0	0			2.16
-2.50	95.0	24.7	.0	45.0	158.6	.0	-133.8	0	0			2.16
-3.00	104.5	28.6	.0	54.5	184.9	.0	-156.3	0	0			2.49
-3.83	120.3	34.9	.0	70.3	228.5	.0	-193.6	0	0		.0	3.07
-3.83	120.3	35.0	.0	70.3	228.6	.0	-193.7	0	0			3.07
-4.00	123.5	36.3	.0	73.5	237.5	.0	-201.2	0	0			3.18
-4.85	139.6	42.8	.0	89.6	282.1	.0	-239.3	0	0			3.69
-4.85	139.7	42.8	.0	89.6	282.2	.0	-239.4	0	0			3.69
-5.00	141.0	43.3	1.5	91.0	286.0	1.5	-242.7	0	0			3.78
-6.00	150.2	47.1	11.3	100.2	311.5	11.3	-264.4	0	0			4.25
-6.26	152.6	48.0	13.8	102.6	318.1	13.8	-270.1	0	0			4.36
-7.00	159.4	50.8	21.1	109.4	336.9	21.1	-286.2	0	0			4.63
-8.00	168.6	54.5	30.9	118.6	362.4	30.9	-307.9	0	0			4.92
-8.01	168.7	54.6	31.0	118.7	362.7	31.0	-308.2	0	0			4.92
-8.05	169.1	54.7	31.4	119.1	363.7	31.4	-309.0	0	0			4.93

Graphical results from analysis of stage ref 2

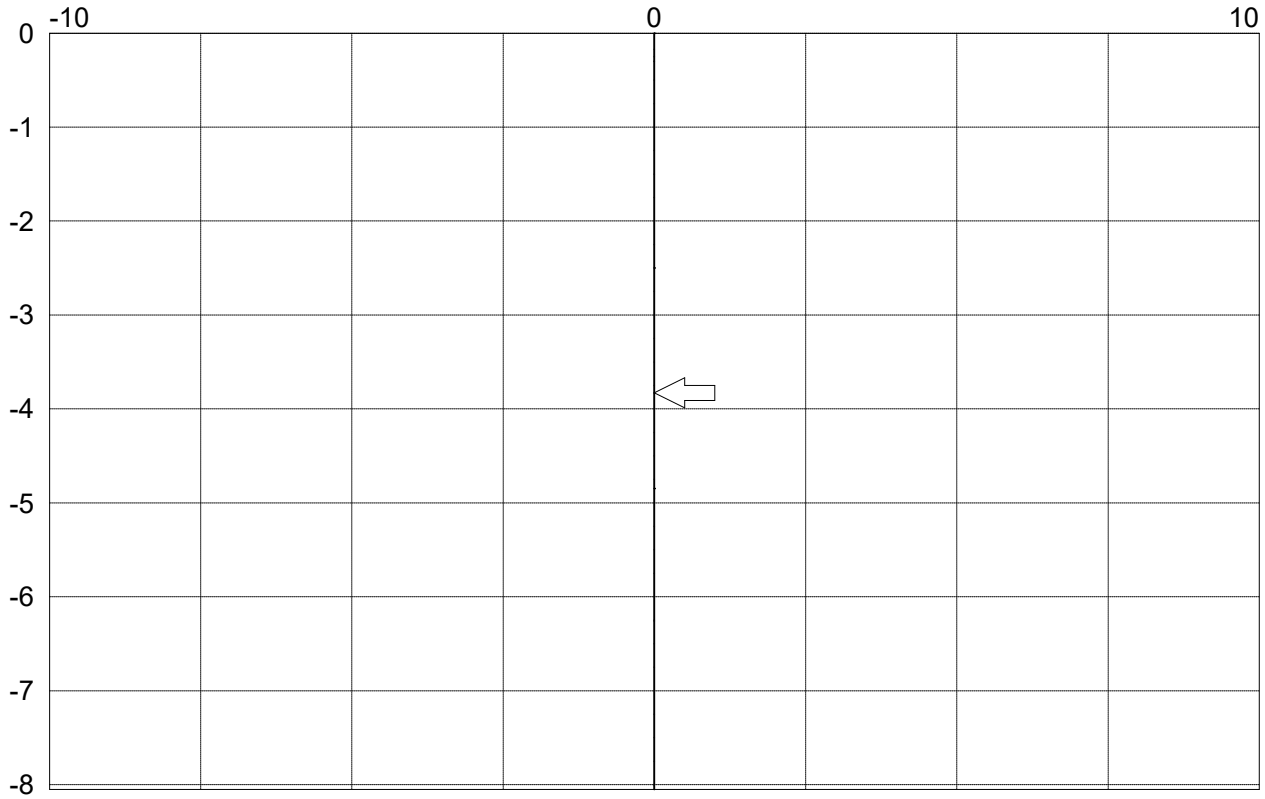


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 2 continued

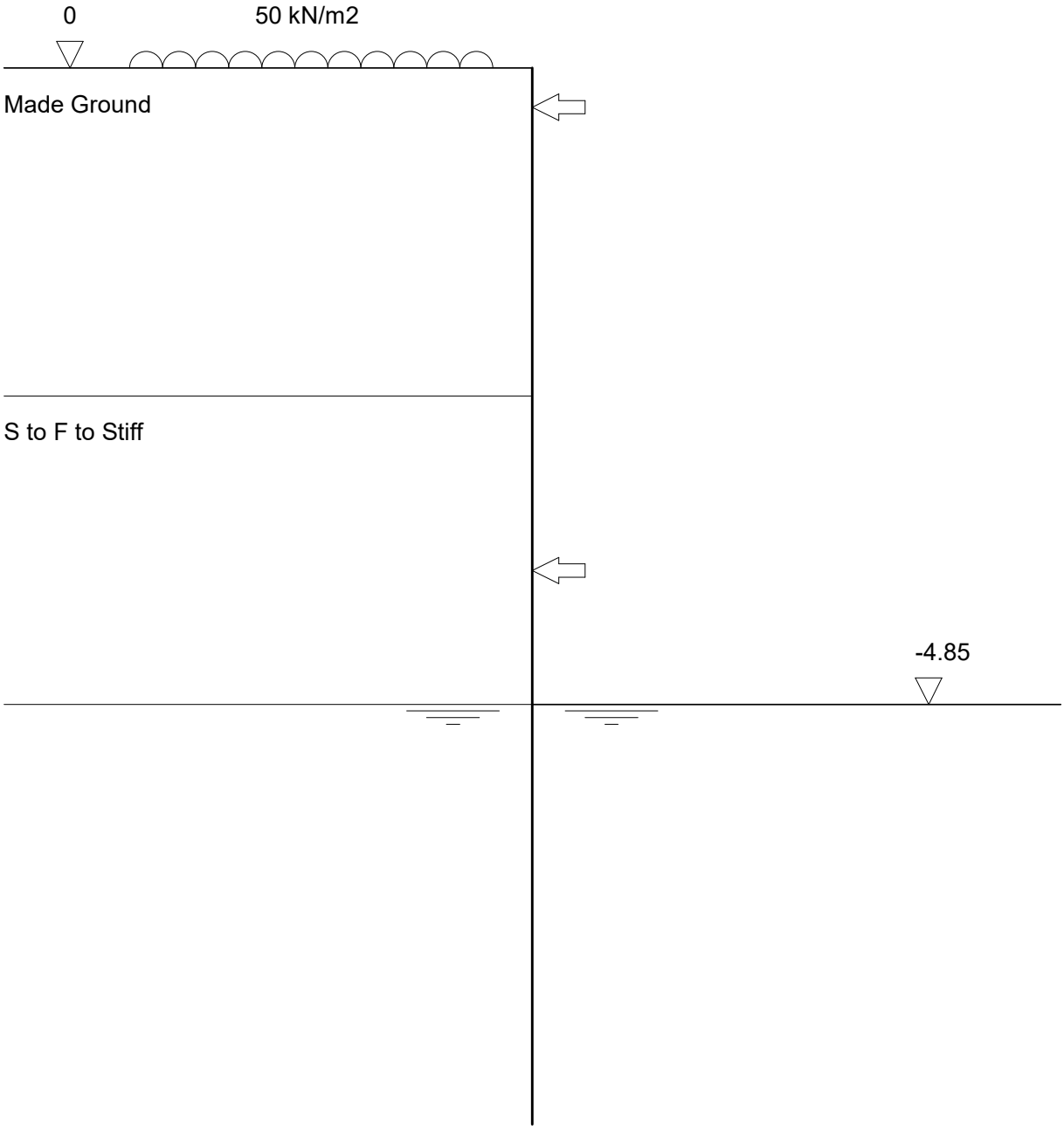


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 4
Stage type Passive side excavation

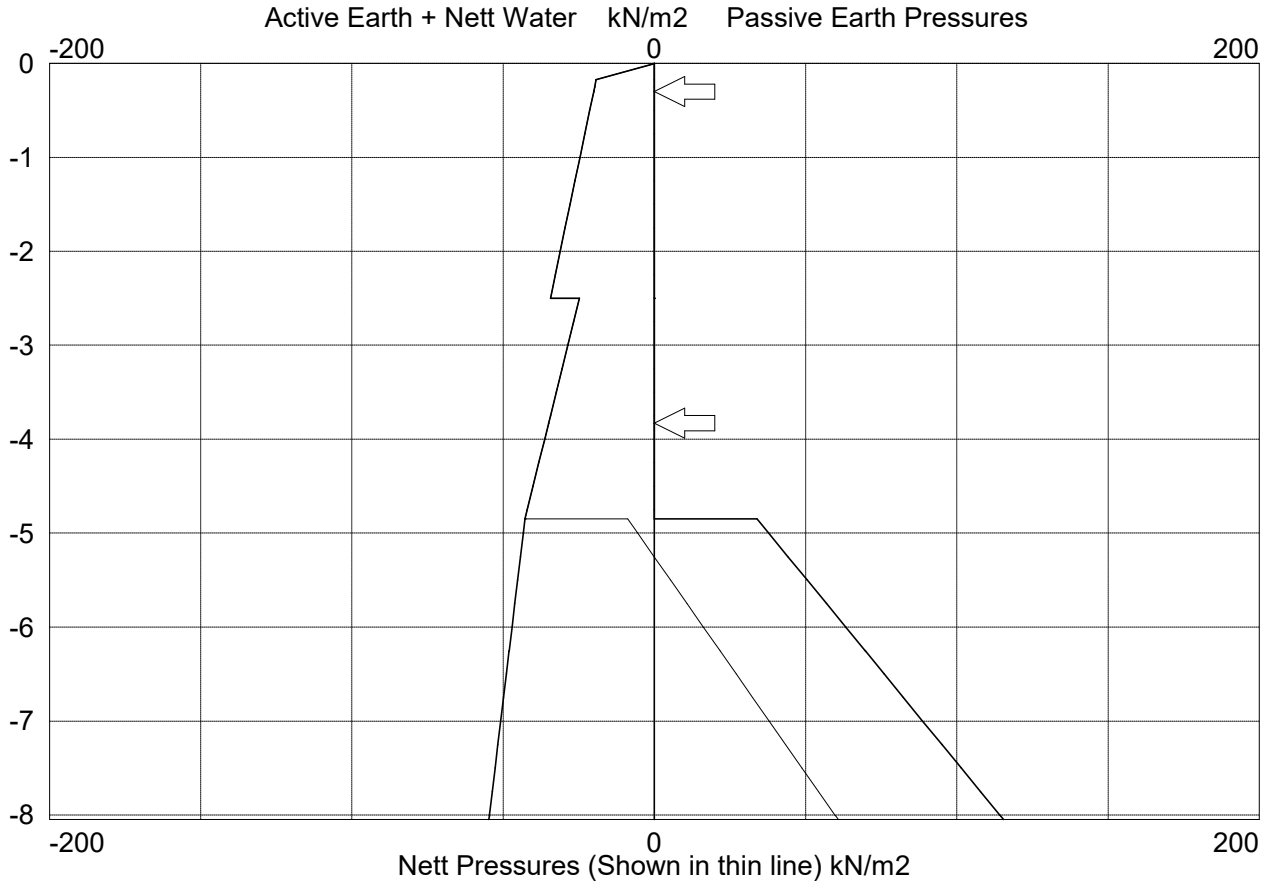


Tabular results from analysis of stage ref 4

strength.
analysis.

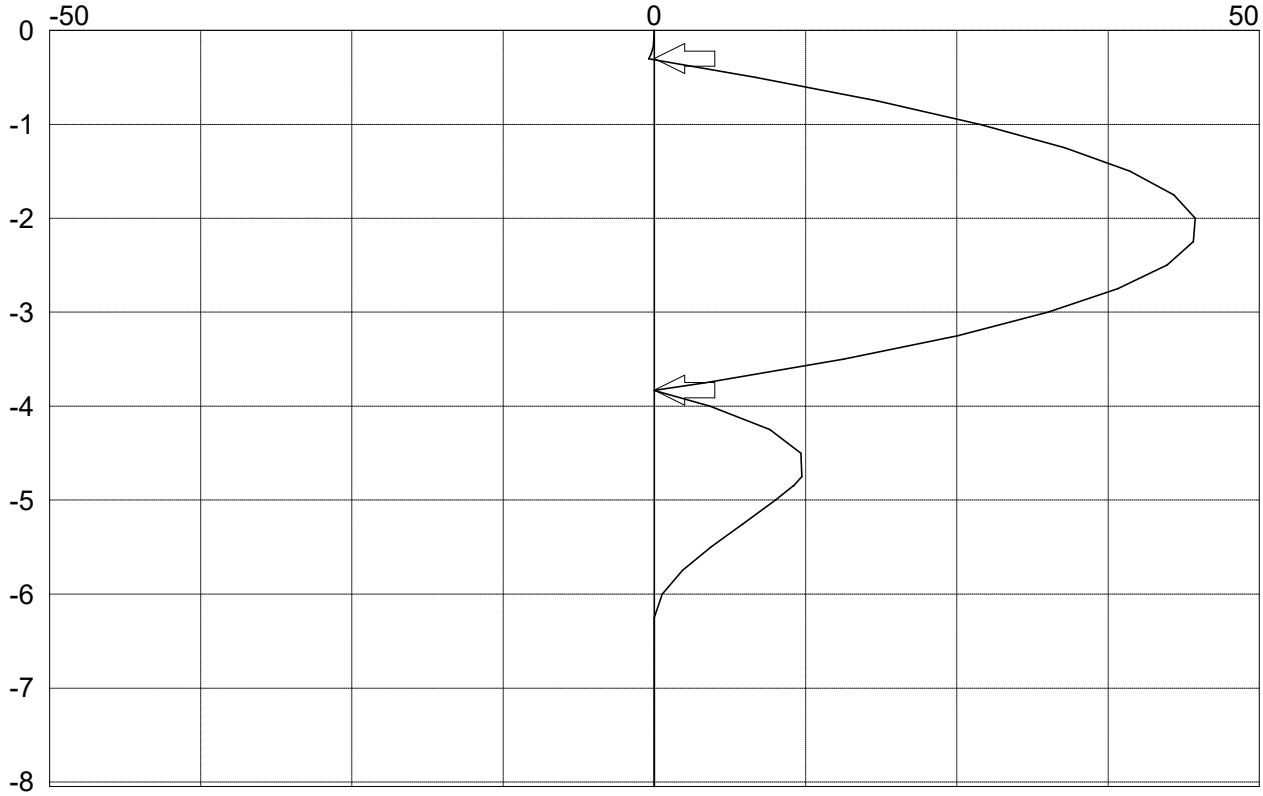
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	53.1	19.2	.0	.0	.0	.0	19.2	.1	-1.6			.00
-.30	55.4	20.0	.0	.0	.0	.0	20.0	.5	-4.1		50.9	.00
-.30	55.4	20.1	.0	.0	.0	.0	20.1	.5	46.8			.00
-1.00	68.0	24.6	.0	.0	.0	.0	24.6	-26.9	31.2			.00
-2.00	86.0	31.1	.0	.0	.0	.0	31.1	-44.7	3.3			.00
-2.50	95.0	34.4	.0	.0	.0	.0	34.4	-42.3	-13.1			.00
-2.50	95.0	24.7	.0	.0	.0	.0	24.7	-42.3	-13.1			.00
-3.00	104.5	28.6	.0	.0	.0	.0	28.6	-32.6	-26.4			.00
-3.83	120.3	34.9	.0	.0	.0	.0	34.9	-.1	-52.7		83.2	.00
-3.83	120.3	35.0	.0	.0	.0	.0	35.0	0	30.4			.00
-4.00	123.5	36.3	.0	.0	.0	.0	36.3	-4.6	24.4			.00
-4.85	139.6	42.8	.0	.0	.0	.0	42.8	-11.5	-9.1			.00
-4.85	139.7	42.8	.0	.0	34.0	.0	8.8	-11.5	-9.1			.00
-5.00	141.0	43.3	1.5	1.4	37.8	1.5	5.6	-10.0	-10.2			.21
-6.00	150.2	47.1	11.3	10.6	63.3	11.3	-16.2	-.7	-4.9			.89
-6.26	152.6	48.0	13.8	13.0	69.9	13.8	-21.8	0	0			1.00
-7.00	159.4	50.8	21.1	19.8	88.7	21.1	-37.9	0	0			1.27
-8.00	168.6	54.5	30.9	29.0	114.2	30.9	-59.7	0	0			1.57
-8.01	168.7	54.6	31.0	29.1	114.5	31.0	-60.0	0	0			1.57
-8.05	169.1	54.7	31.4	29.4	115.5	31.4	-60.8	0	0			1.58

Graphical results from analysis of stage ref 4

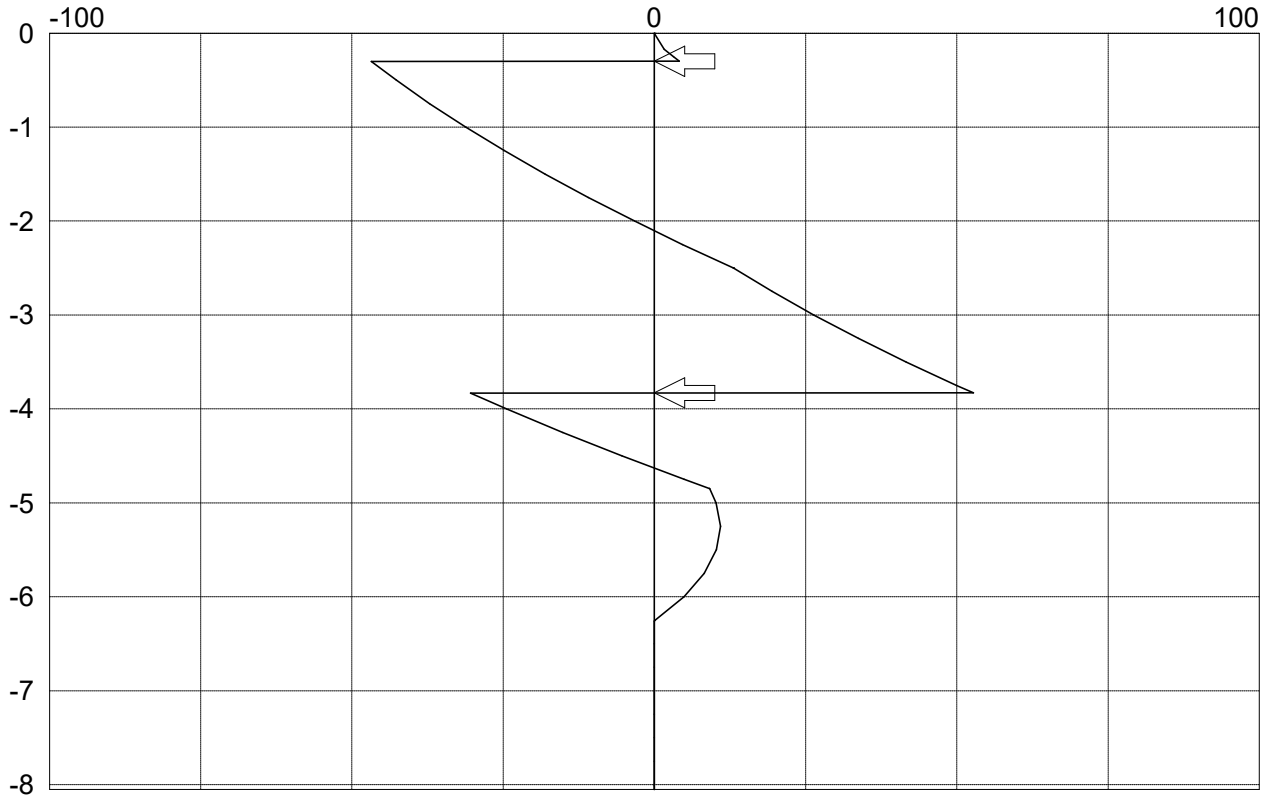


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 4 continued

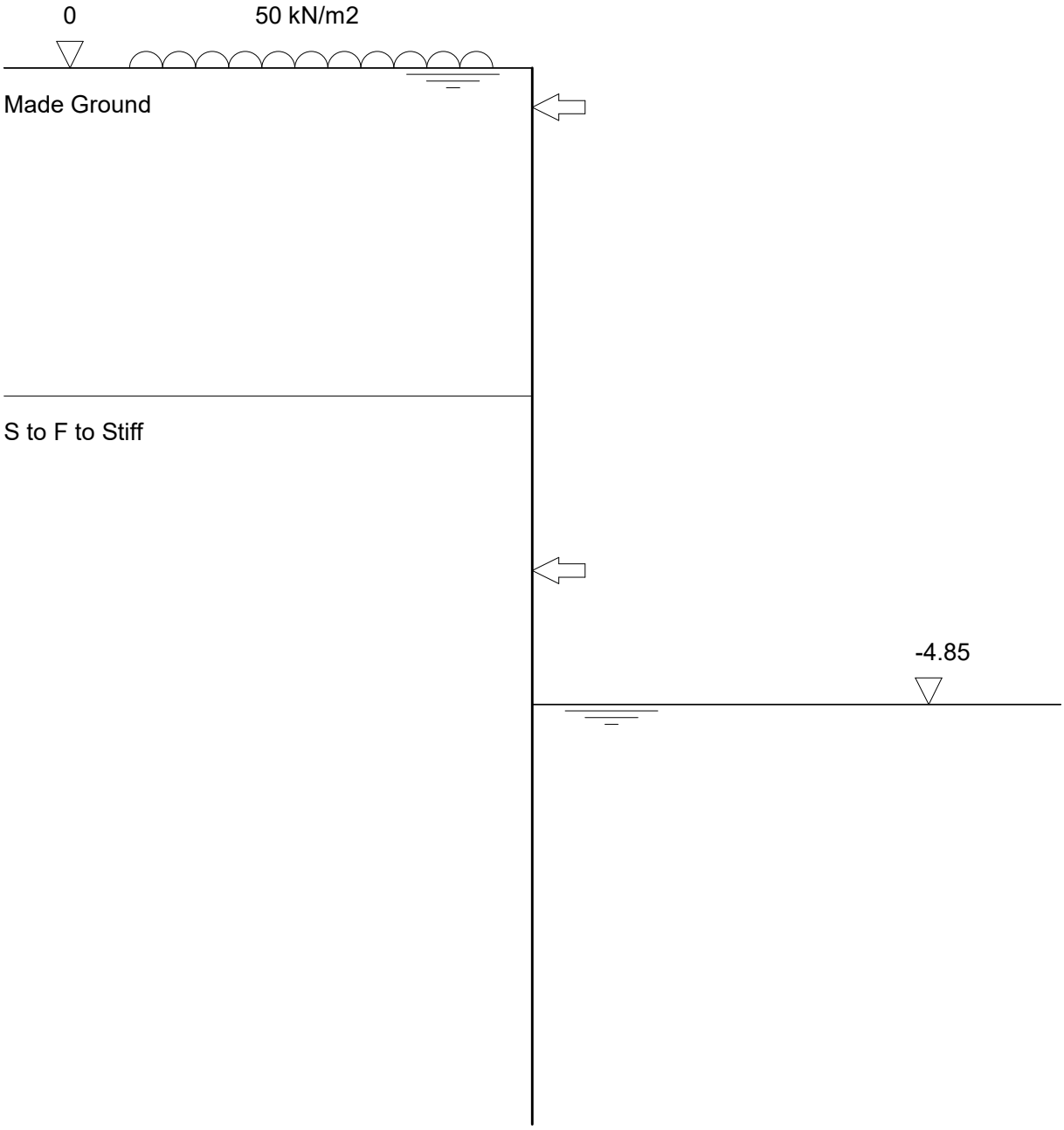


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 5
Stage type Active water level

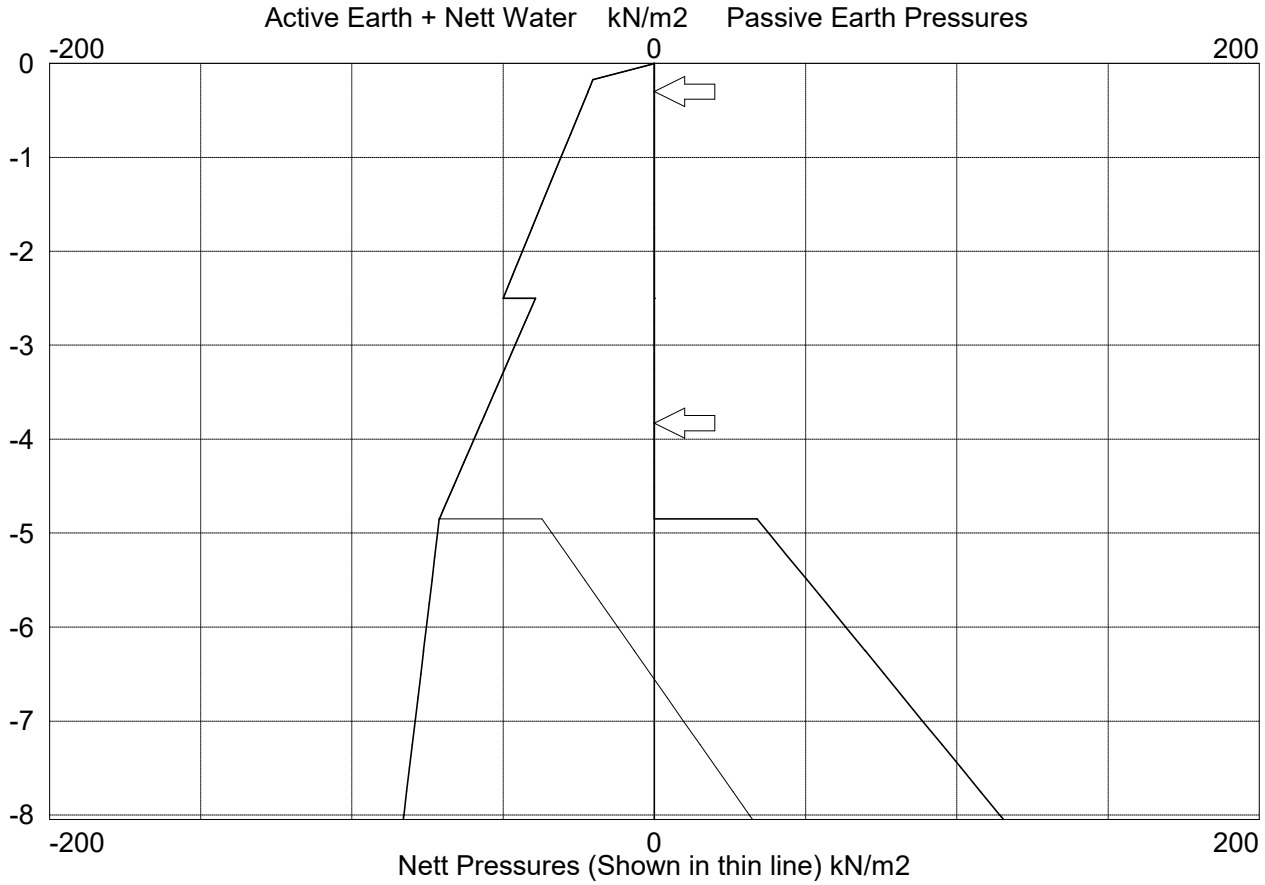


Tabular results from analysis of stage ref 5

strength.
analysis.

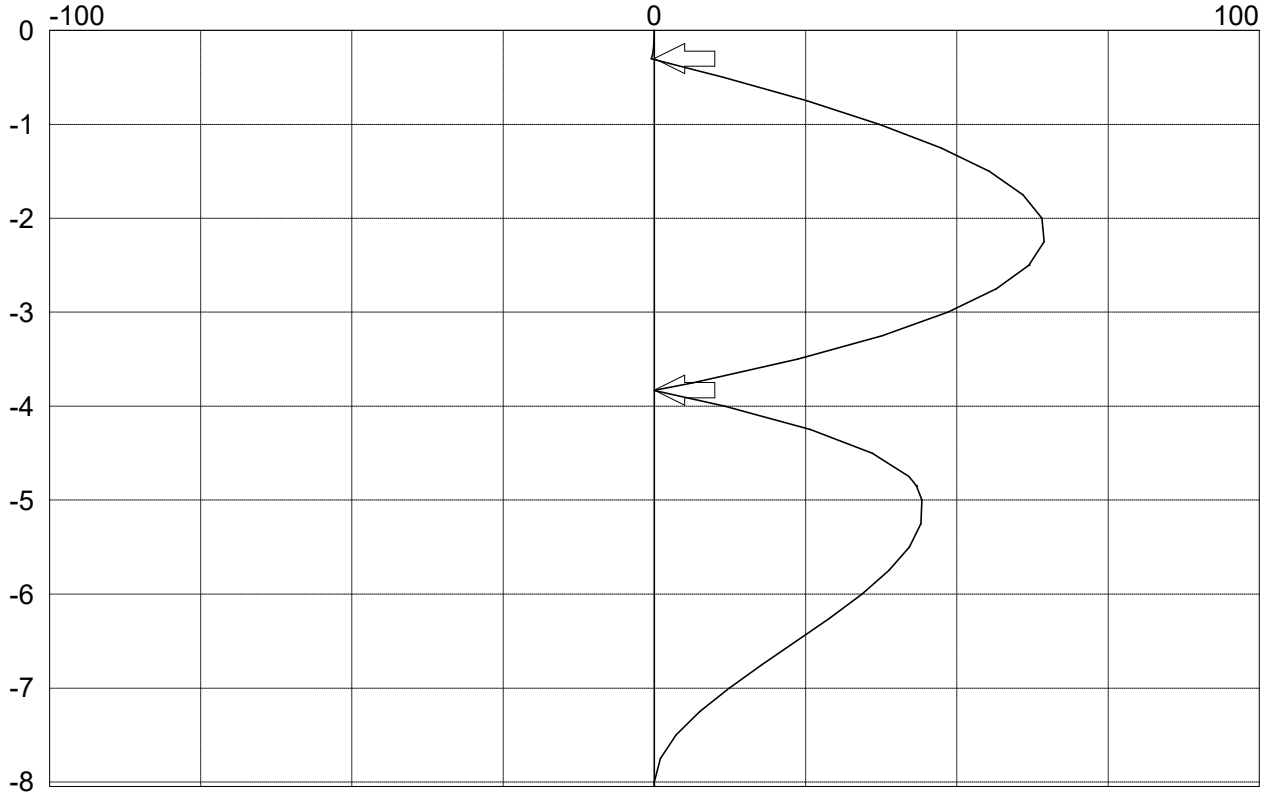
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
-.17	51.4	18.6	1.7	.0	.0	.0	20.3	.1	-1.7			.00
-.30	52.5	19.0	2.9	.0	.0	.0	21.9	.5	-4.4		67.2	.00
-.30	52.5	19.0	3.0	.0	.0	.0	21.9	.5	62.8			.00
-1.00	58.2	21.1	9.8	.0	.0	.0	30.9	-37.3	44.4			.00
-2.00	66.4	24.0	19.6	.0	.0	.0	43.6	-64.1	7.1			.00
-2.50	70.5	25.5	24.5	.0	.0	.0	50.0	-61.9	-16.3			.00
-2.50	70.5	14.8	24.5	.0	.0	.0	39.3	-61.9	-16.3			.00
-3.00	75.1	16.7	29.4	.0	.0	.0	46.1	-48.6	-37.6			.00
-3.83	82.7	19.8	37.5	.0	.0	.0	57.3	-.2	-80.5		154.7	.00
-3.83	82.8	19.8	37.6	.0	.0	.0	57.3	0	74.1			.00
-4.00	84.3	20.4	39.2	.0	.0	.0	59.6	-11.6	64.3			.00
-4.85	92.1	23.6	47.5	.0	.0	.0	71.1	-43.3	8.9			.00
-4.85	92.1	23.6	47.5	.0	34.0	.0	37.1	-43.3	8.7			.00
-5.00	93.5	24.1	49.0	1.4	37.8	1.5	33.9	-44.2	3.4			.13
-6.00	102.7	27.8	58.8	10.6	63.3	11.3	12.1	-34.4	-19.6			.55
-6.26	105.1	28.8	61.3	13.0	69.9	13.8	6.5	-28.9	-22.0			.62
-7.00	111.9	31.6	68.6	19.8	88.7	21.1	-9.6	-12.4	-20.8			.79
-8.00	121.1	35.3	78.4	29.0	114.2	30.9	-31.4	0	-.3			1.00
-8.01	121.2	35.3	78.5	29.1	114.5	31.0	-31.7	0	0			1.00
-8.05	121.6	35.5	78.9	29.4	115.5	31.4	-32.5	0	0			1.01

Graphical results from analysis of stage ref 5

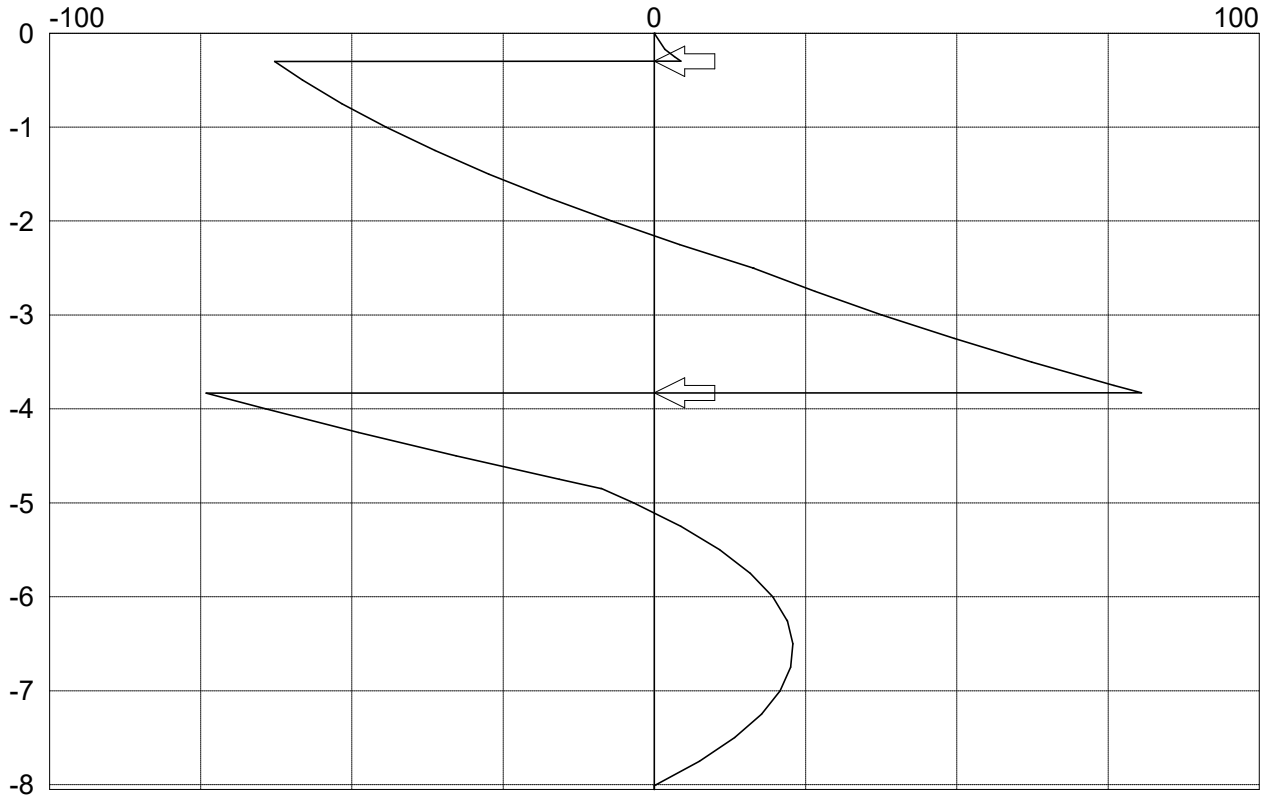


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 5 continued

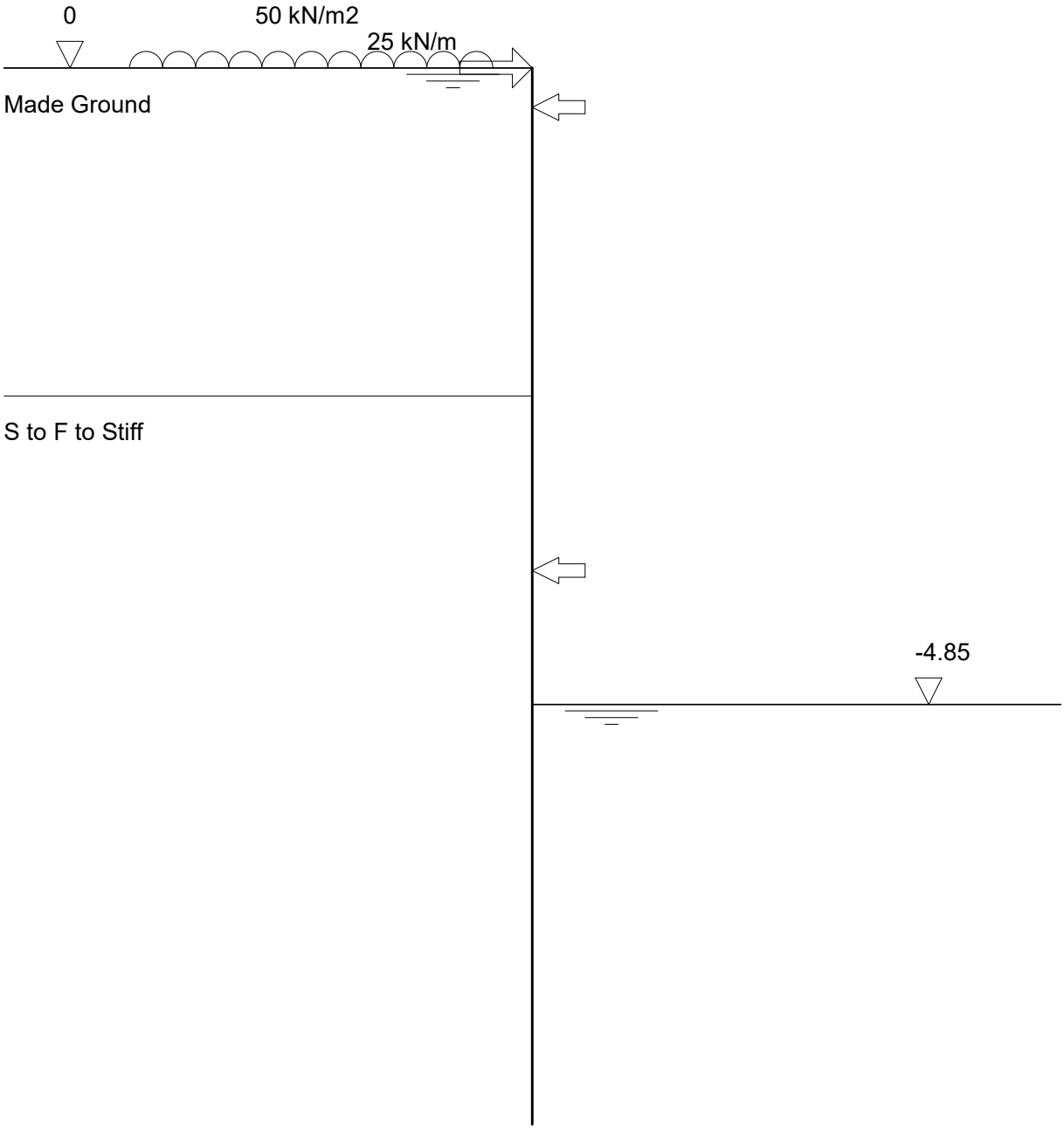


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Stage ref. 6
Stage type Horizontal load

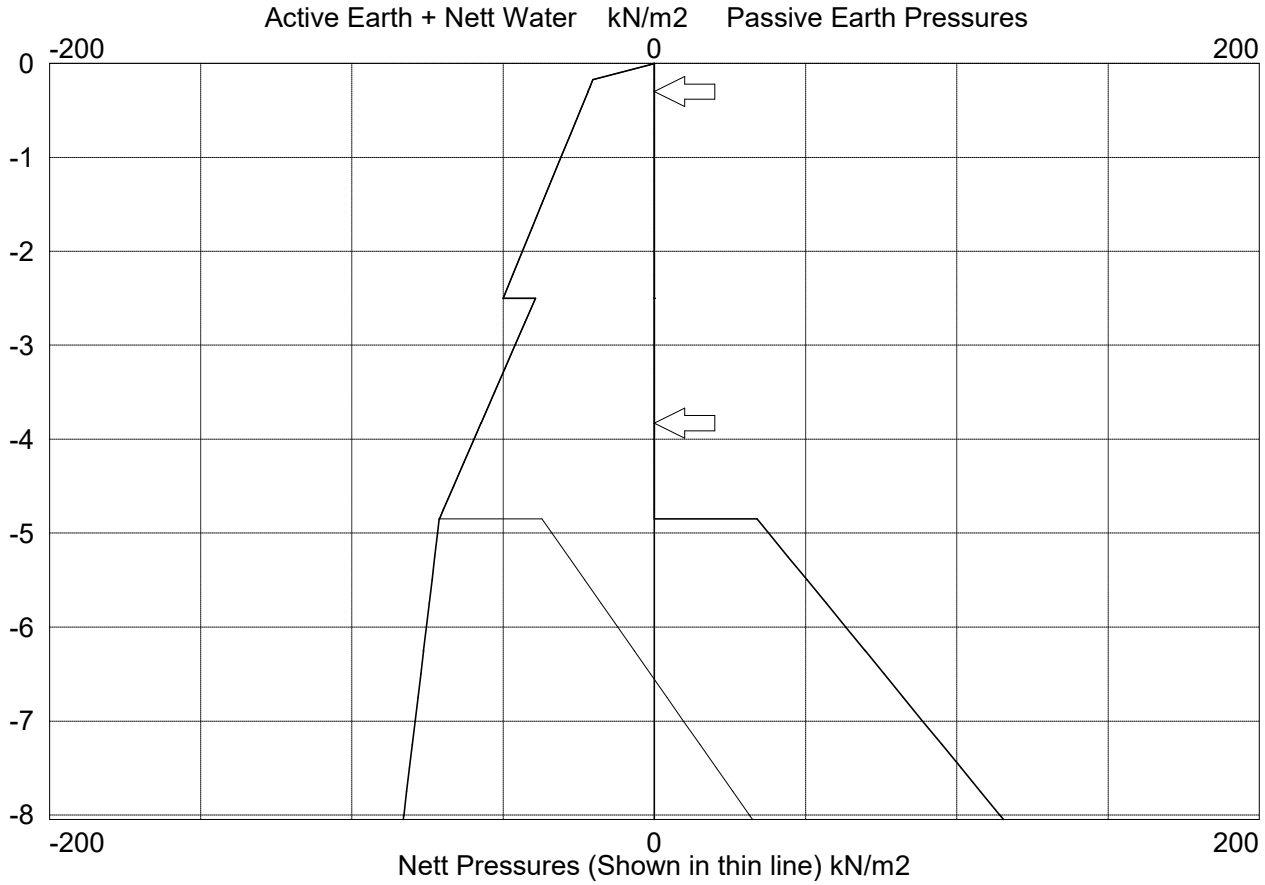


Tabular results from analysis of stage ref 6

strength.
analysis.

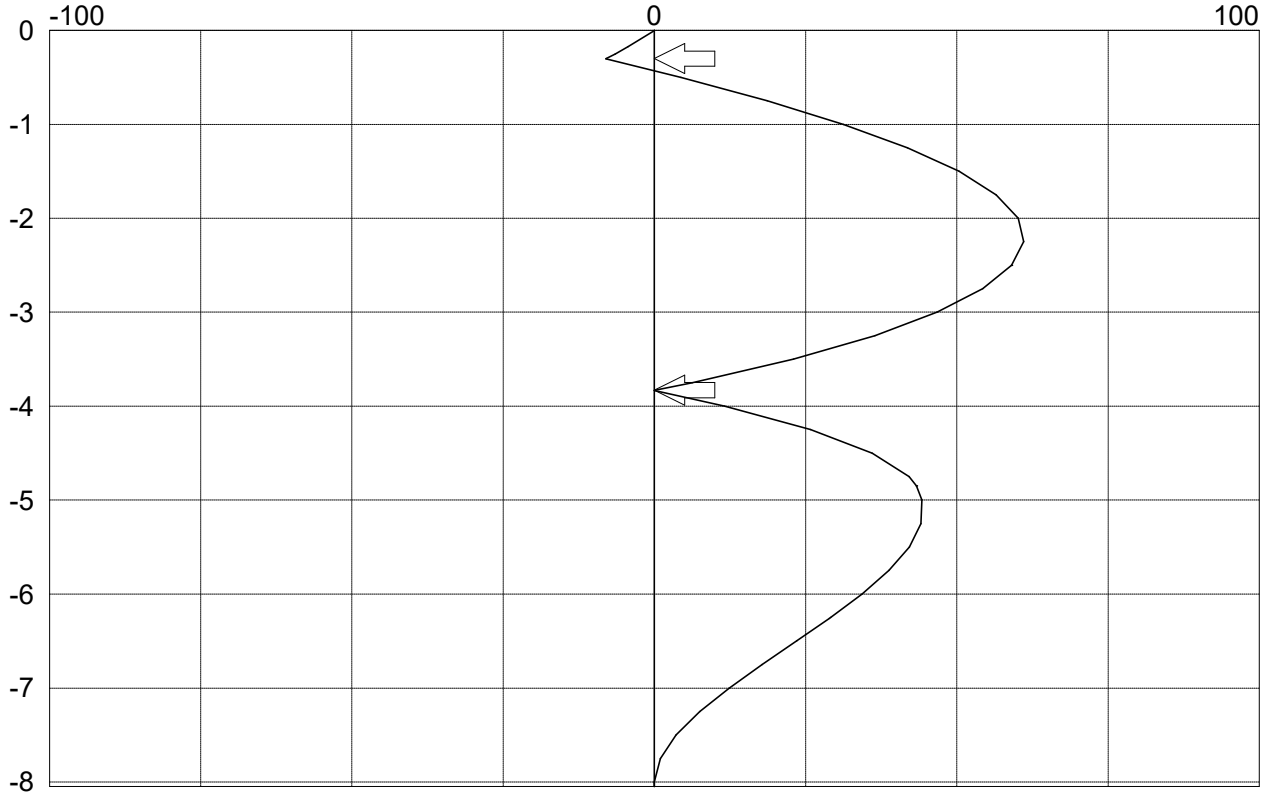
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0			.00
.00	.0	.0	.0	.0	.0	.0	0	0	-25.0			.00
-.17	51.4	18.6	1.7	.0	.0	.0	20.3	4.4	-26.7			.00
-.30	52.5	19.0	2.9	.0	.0	.0	21.9	7.9	-29.4		94.4	.00
-.30	52.5	19.0	3.0	.0	.0	.0	21.9	8.0	64.9			.00
-1.00	58.2	21.1	9.8	.0	.0	.0	30.9	-31.2	46.5			.00
-2.00	66.4	24.0	19.6	.0	.0	.0	43.6	-60.2	9.2			.00
-2.50	70.5	25.5	24.5	.0	.0	.0	50.0	-59.1	-14.2			.00
-2.50	70.5	14.8	24.5	.0	.0	.0	39.3	-59.1	-14.2			.00
-3.00	75.1	16.7	29.4	.0	.0	.0	46.1	-46.8	-35.5			.00
-3.83	82.7	19.8	37.5	.0	.0	.0	57.3	-.2	-78.4		152.6	.00
-3.83	82.8	19.8	37.6	.0	.0	.0	57.3	0	74.1			.00
-4.00	84.3	20.4	39.2	.0	.0	.0	59.6	-11.6	64.3			.00
-4.85	92.1	23.6	47.5	.0	.0	.0	71.1	-43.3	8.9			.00
-4.85	92.1	23.6	47.5	.0	34.0	.0	37.1	-43.3	8.7			.00
-5.00	93.5	24.1	49.0	1.4	37.8	1.5	33.9	-44.2	3.4			.13
-6.00	102.7	27.8	58.8	10.6	63.3	11.3	12.1	-34.4	-19.6			.55
-6.26	105.1	28.8	61.3	13.0	69.9	13.8	6.5	-28.9	-22.0			.62
-7.00	111.9	31.6	68.6	19.8	88.7	21.1	-9.6	-12.4	-20.8			.79
-8.00	121.1	35.3	78.4	29.0	114.2	30.9	-31.4	0	-.3			1.00
-8.01	121.2	35.3	78.5	29.1	114.5	31.0	-31.7	0	0			1.00
-8.05	121.6	35.5	78.9	29.4	115.5	31.4	-32.5	0	0			1.01

Graphical results from analysis of stage ref 6

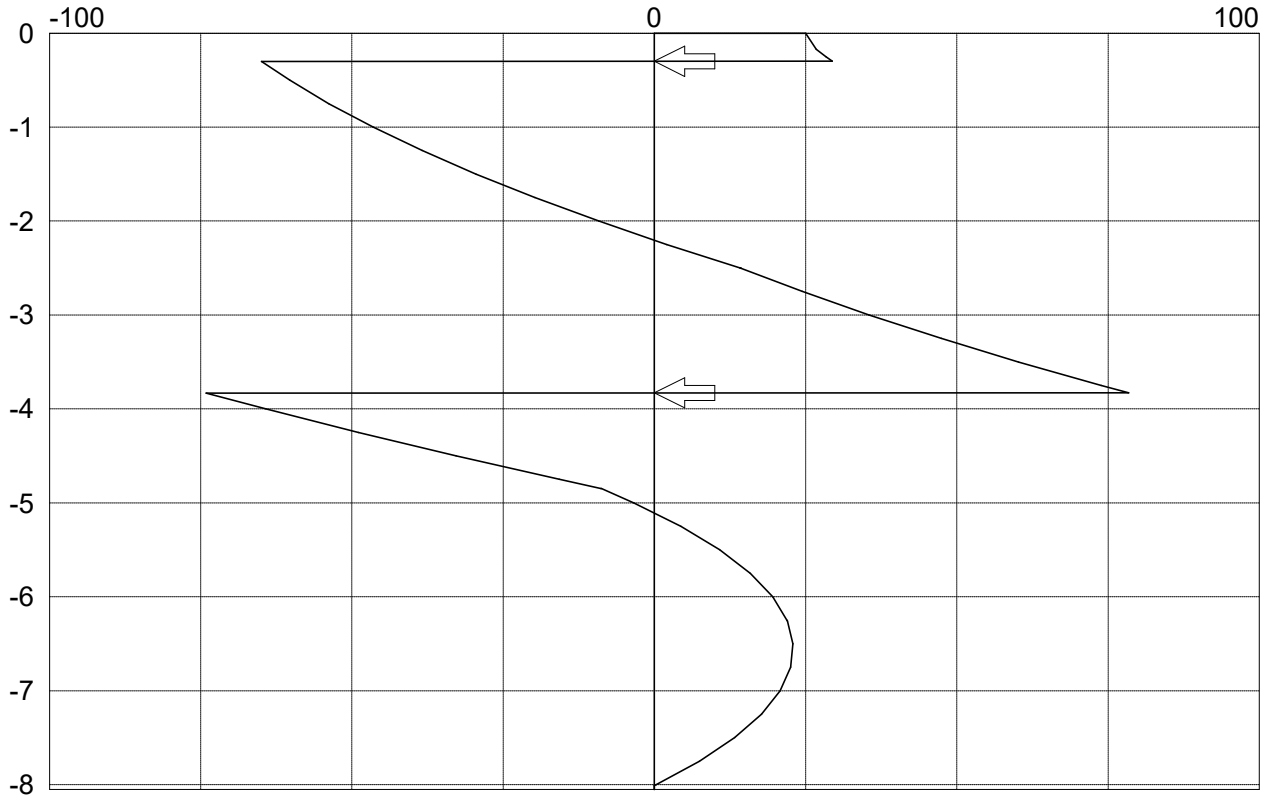


Deflection diagram not shown for analysis with partial factors applied

Graphical results from analysis of stage ref 6 continued

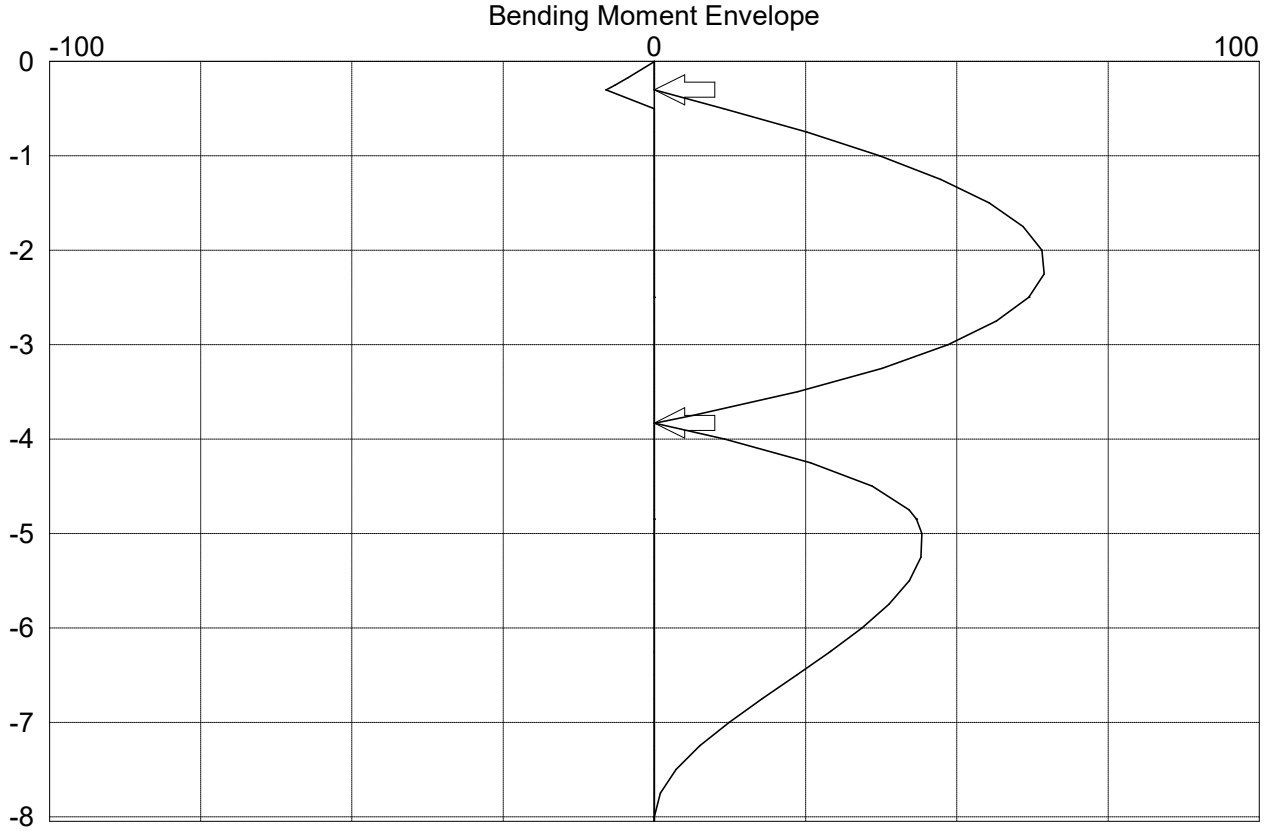


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Graphical plot of envelope from selected construction stages



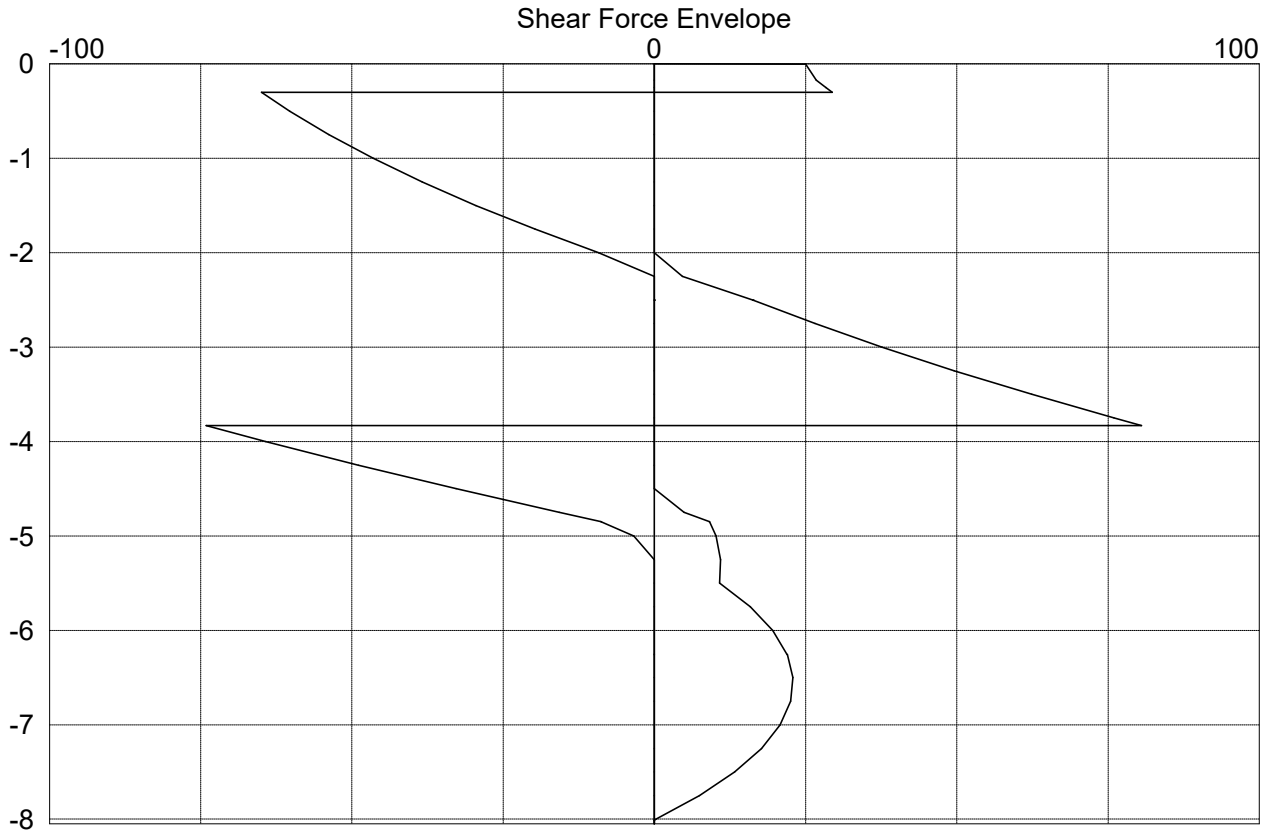


Table of envelope for wall forces

Calc Level m	Bending Minimum kNm/m	Bending Maximum kNm/m	Shear Minimum kN/m	Shear Maximum kN/m	Prop Force kN/m
.00	.0	.0	.0	.0	
.00	.0	.0	-25.0	.0	
-.17	.0	4.4	-26.7	.0	
-.30	.0	7.9	-29.4	.0	94.4
-.30	.0	8.0	.0	64.9	
-1.00	-37.3	.0	.0	46.5	
-2.00	-64.1	.0	.0	9.2	
-2.50	-61.9	.0	-16.3	.0	
-2.50	-61.9	.0	-16.3	.0	
-3.00	-48.6	.0	-37.6	.0	
-3.83	-.2	.0	-80.5	.0	154.7
-3.83	.0	.0	.0	74.1	
-4.00	-11.6	.0	.0	64.3	
-4.85	-43.3	.0	-9.1	8.9	
-4.85	-43.3	.0	-9.1	8.7	
-5.00	-44.2	.0	-10.2	3.4	
-6.00	-34.4	.0	-19.6	.0	
-6.26	-28.9	.0	-22.0	.0	
-7.00	-12.4	.0	-20.8	.0	
-8.00	.0	.0	-.3	.0	
-8.01	.0	.0	.0	.0	
-8.05	.0	.0	.0	.0	

Structural design of wall

Wall section properties

Primary pile diameter	450	mm
Primary pile spacing	600	mm
Infill pile diameter		mm
Main rebar bar diameter	20	mm
Main rebar number of bars	5	
Links/Helix bar diameter	8	mm
Links/Helix spacing/pitch	200	mm

Wall material properties

Concrete cube strength	35	N/mm2
Concrete cover	50	mm
Main rebar steel grade	500	N/mm2
Link rebar steel grade	500	N/mm2
Ultimate load factor	1.00	

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Bending resistance. BS8110 plane strain analysis	39	103	kNm
Max longitudinal steel. BS8110 max 6% by area	9543	1571	mm2
Min longitudinal steel. BS8110 min 0.4% by area	636	1571	mm2
Shear resistance. BS8110	48	131	kN
Min link dia. BS8110 6mm or 0.25x bar dia	6	8	mm
Max link spacing. BS8110 12x main bar dia or 0.75d	232	200	mm
Min shear link area. BS8110 Clause 3.4.5	236	503	mm2/m

CADS PWS 6.09 Computer Output Files for Pile Retaining Wall – SLS Analysis

Section A - A SLS Analysis	Page No 1 Analysis Temp Condition
CADS Piled Wall Suite Version 6.10 Design of embedded retaining walls and cofferdams	Project SLS Analysis File Name a-a -temp condn.pws"
Broxwood View, 29 St. Edmund's Terrace London NW8 600mm Dia. Contiguous Pile Retaining Wall	Engineer AA Date 30/11/2022

Pile geometry

Pile top Level	0	m
Pile Length	16	m
Pile toe level	-16	m

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level -4.85

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
.00	Made Ground	18.00	18.00	15000	0	1		28	.67	.30	1.43
						1		28	.50	4.15	4.99
-2.50	S to F to Stiff	19.00	19.00	24000	9600	30	12.0		.67	1.00	2.58
						30	12.0		.50	1.00	2.45

Construction sequence

Stage Ref		Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	A	Active surcharge	-0.90	270.0	.3		
2	A	Active surcharge	0.00	10.0	.3		
3		Insert prop	-0.50				
4	A	Passive side excavation	-3.00				
5		Insert prop	-2.50				
6	A	Passive side excavation	-4.85				
7		Insert prop	-3.83				
8	A	Remove prop	-2.50				
9		Insert prop	-0.30				
10	A	Remove prop	-0.50				
11	A	Active water level	0.00				

Code of practice

Code of practice or reference document	
Application of pressures for stability	Not applicable for FOS=1 on moments
FOS on moments (stability check)	1.00
ULS factor on Tan(Phi) values	1.00
ULS fFactor on drained cohesion values	1.00
ULS factor on undrained cohesion values	1.00
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.00

Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	9.8	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	.0	m
Continuity model for wall analysis	Pins at second and lower props	

Deflection parameters

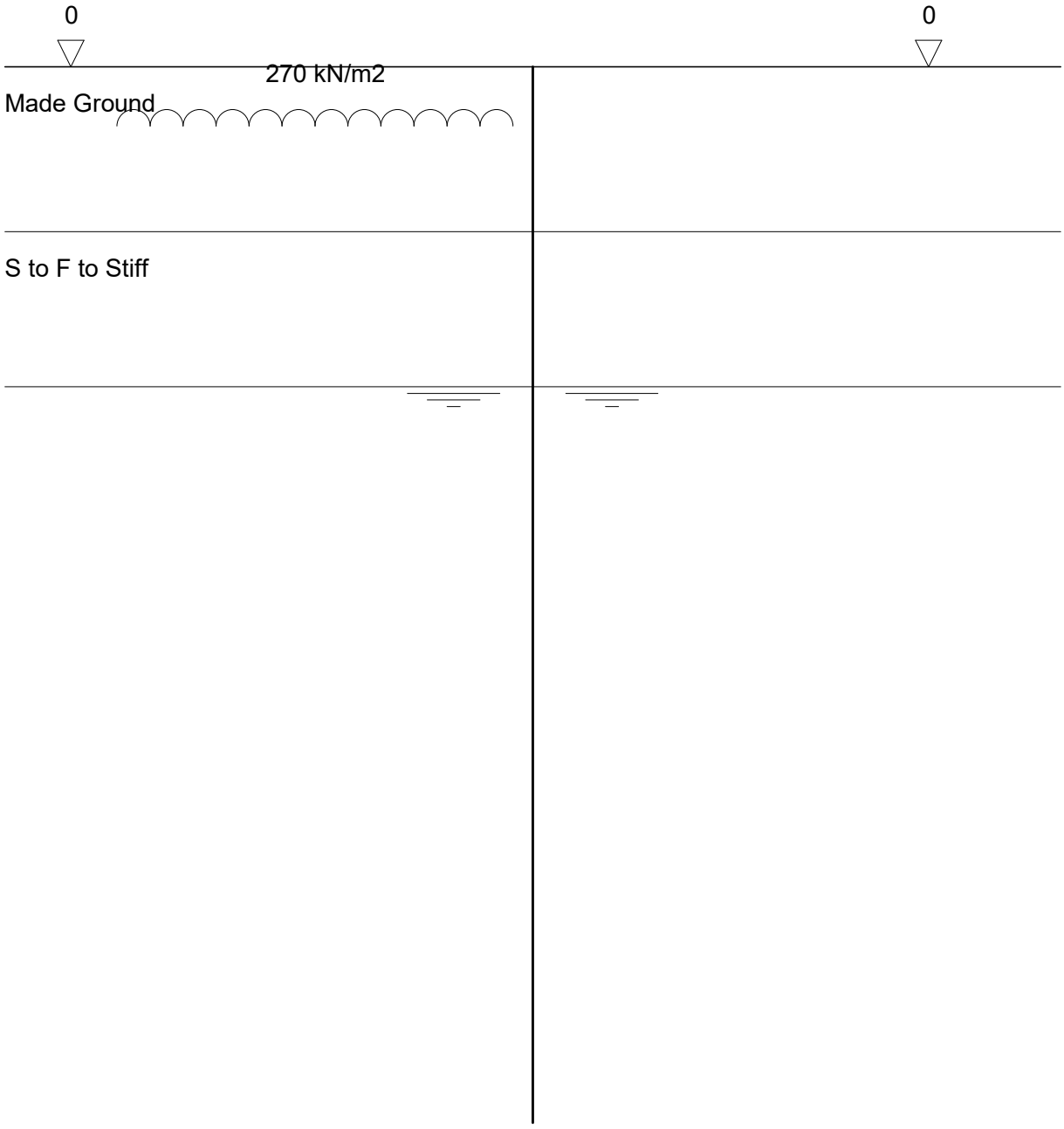
Wall moment of inertia	1908818	cm4/m
Wall Youngs modulus	28000000	kN/m2
Properties for prop at -0.5		
Prop/Tie cross sectional area	3	cm2 each
Prop/Tie Youngs modulus	200000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm
Properties for prop at -2.5		
Prop/Tie cross sectional area	3	cm2 each
Prop/Tie Youngs modulus	200000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Deflection parameters - continued

Properties for prop at -3.83		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Properties for prop at -0.3		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

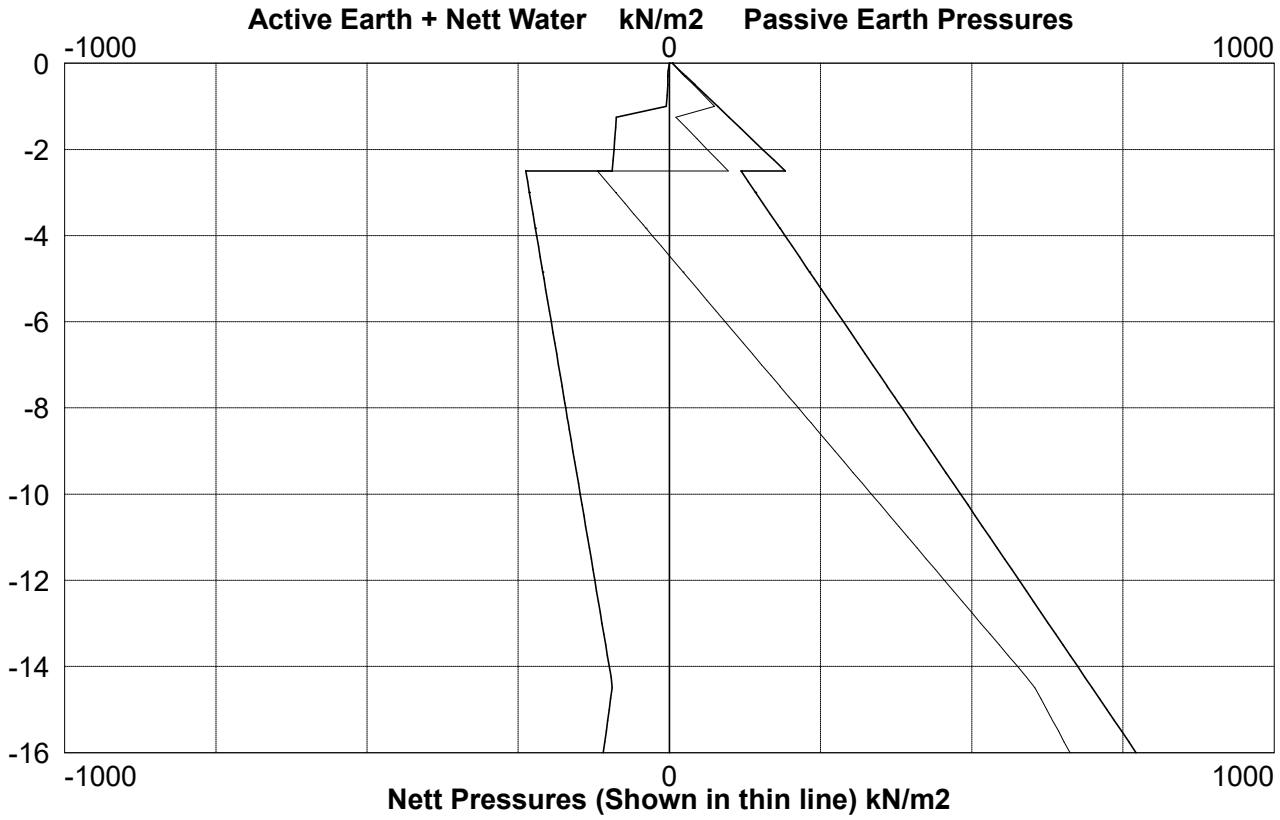
Stage ref. **1**
Stage type **Active surcharge**

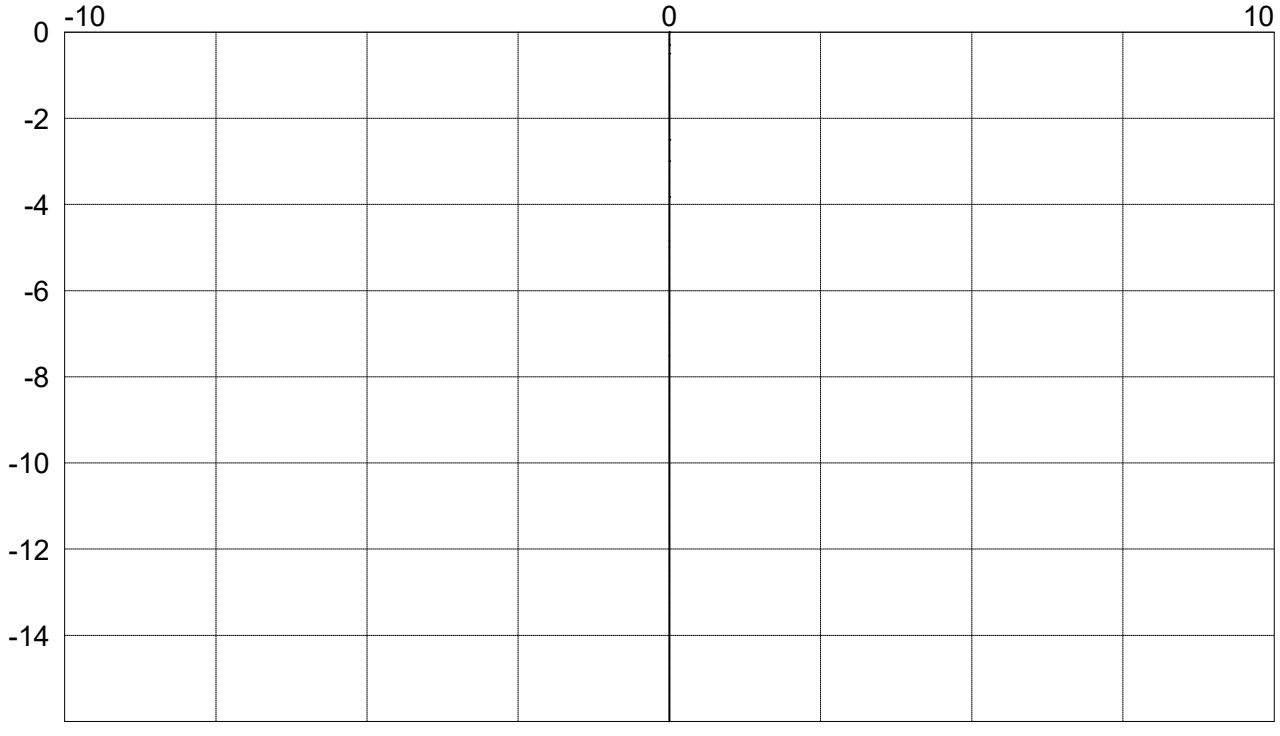


Tabular results from analysis of stage ref 1

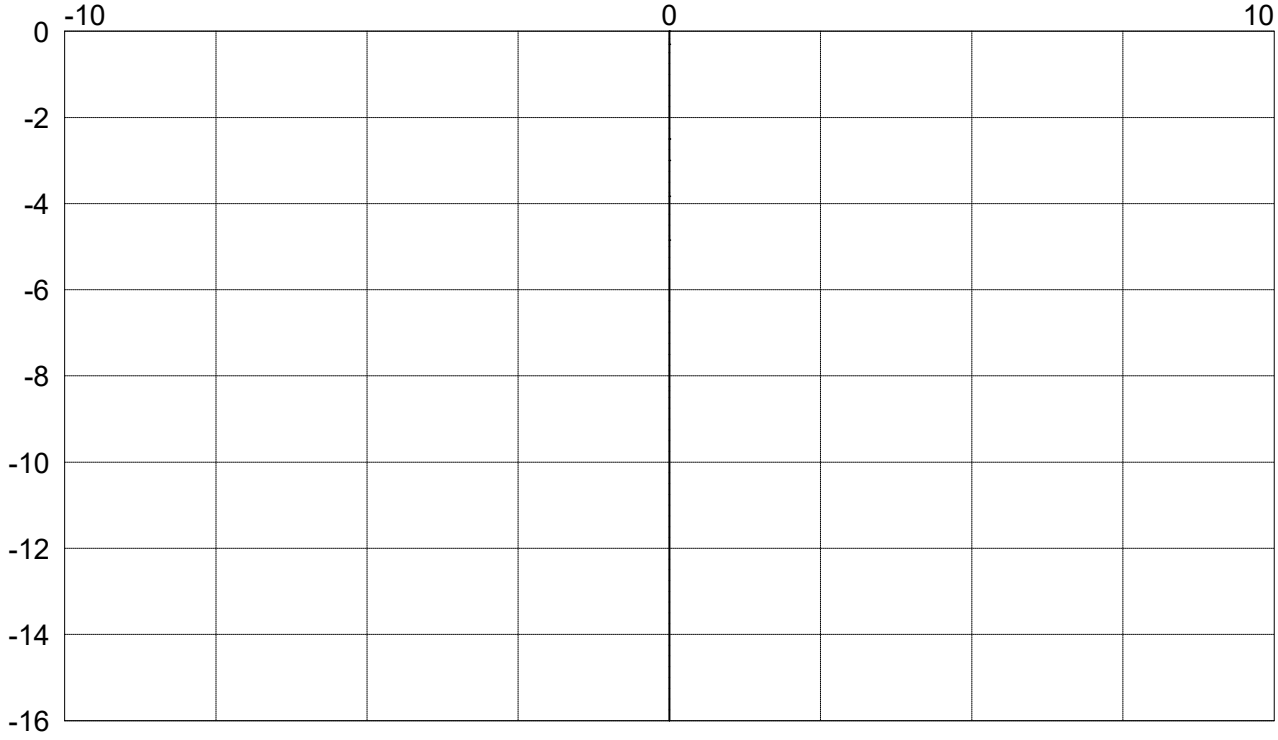
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	5.0	.0	-5.0	0	0	0		.00
.00	.0	.0	.0	.0	5.1	.0	-5.1	0	0	0		.19
t -.17	3.1	.0	1.7	3.1	17.9	.0	-16.2	0	0	0		16.44
t -.30	5.4	.0	2.5	5.4	27.4	.0	-25.0	0	0	0	.0	12.77
t -.30	5.4	.0	2.5	5.4	27.6	.0	-25.1	0	0	0		12.75
m -.50	9.0	2.5	.0	9.0	42.3	.0	-39.8	0	0	0	.0	12.18
m -.50	9.0	2.5	.0	9.0	42.5	.0	-40.0	0	0	0		12.19
m -1.00	18.0	5.0	.0	18.0	79.7	.0	-74.7	0	0	0		14.13
-2.00	306.0	91.6	.0	36.0	154.4	.0	-62.8	0	0	0		2.84
-2.50	315.0	94.4	.0	45.0	191.8	.0	-97.4	0	0	0	.0	2.31
-2.50	315.0	237.5	.0	45.0	118.5	.0	119.0	0	0	0		2.31
-2.50	315.0	237.4	.0	45.0	118.6	.0	118.9	0	0	0		2.31
-3.00	324.5	231.5	.0	54.5	142.6	.0	88.9	0	0	0		1.89
-3.00	324.5	231.5	.0	54.5	142.7	.0	88.8	0	0	0		1.89
-3.83	340.3	221.5	.0	70.3	182.8	.0	38.6	0	0	0	.0	1.42
-3.83	340.3	221.5	.0	70.3	182.9	.0	38.5	0	0	0		1.42
-4.00	343.5	219.4	.0	73.5	191.1	.0	28.4	0	0	0		1.36
-4.85	359.6	209.3	.0	89.6	232.1	.0	-22.9	0	0	0		1.19
-4.85	359.7	209.2	.0	89.6	232.2	.0	-23.0	0	0	0		1.19
-5.00	362.5	207.4	.0	92.5	239.5	.0	-32.0	0	0	0		1.18
-6.00	381.5	195.4	.0	111.5	287.9	.0	-92.5	0	0	0		1.12
-7.00	400.5	183.4	.0	130.5	336.3	.0	-152.9	0	0	0		1.13
-7.51	410.1	177.3	.0	140.1	360.7	.0	-183.4	0	0	0		1.14
-7.88	417.3	172.8	.0	147.3	379.0	.0	-206.3	0	0	0		1.15
-8.00	419.5	171.4	.0	149.5	384.7	.0	-213.3	0	0	0		1.16
-8.35	426.1	167.2	.0	156.1	401.5	.0	-234.3	0	0	0		1.18
-9.00	438.5	159.4	.0	168.5	433.0	.0	-273.7	0	0	0		1.21
-10.00	457.5	147.4	.0	187.5	481.4	.0	-334.1	0	0	0		1.28
-11.00	476.5	135.3	.0	206.5	529.8	.0	-394.5	0	0	0		1.35
-12.00	495.5	123.3	.0	225.5	578.2	.0	-454.9	0	0	0		1.44
-13.00	514.5	111.3	.0	244.5	626.6	.0	-515.3	0	0	0		1.53
-14.00	533.5	99.3	.0	263.5	675.0	.0	-575.7	0	0	0		1.63
w -15.00	552.5	.0	99.5	282.5	723.4	.0	-623.9	0	0	0		1.73
w -16.00	571.5	.0	109.3	301.5	771.8	.0	-662.5	0	0	0		1.84

Graphical results from analysis of stage ref 1

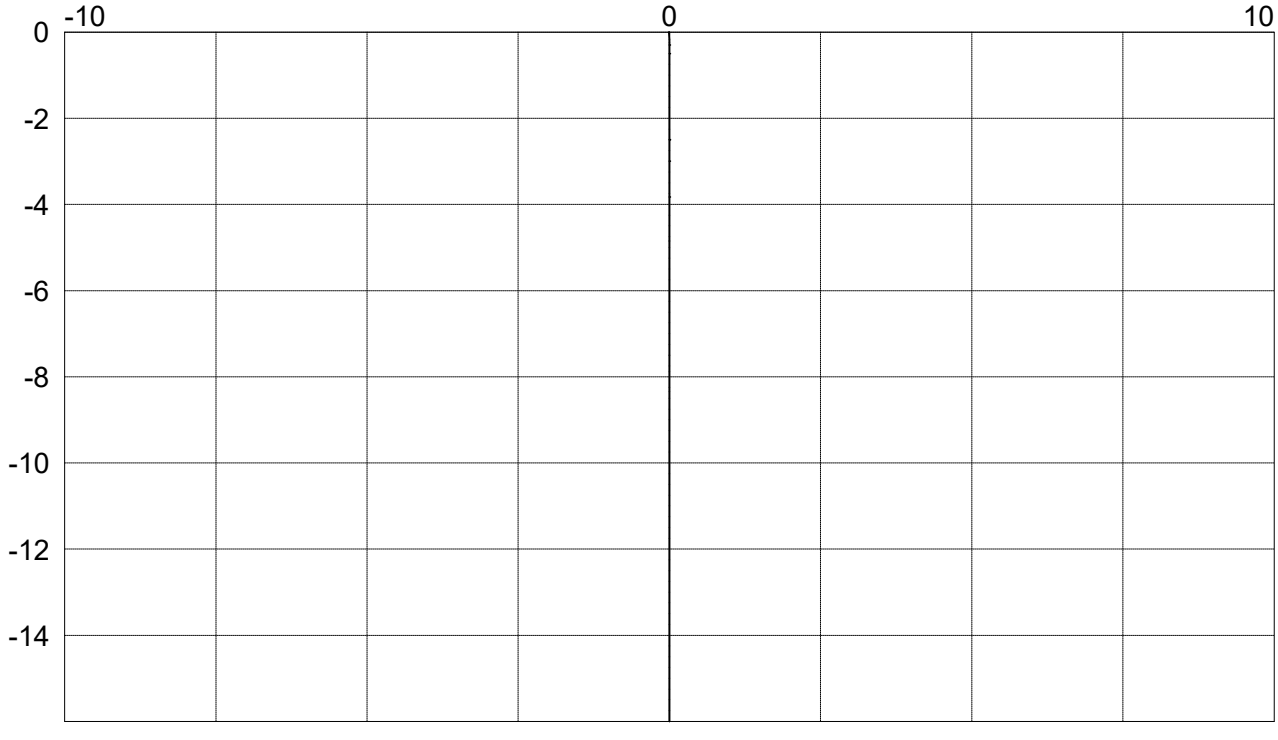




Graphical results from analysis of stage ref 1 continued

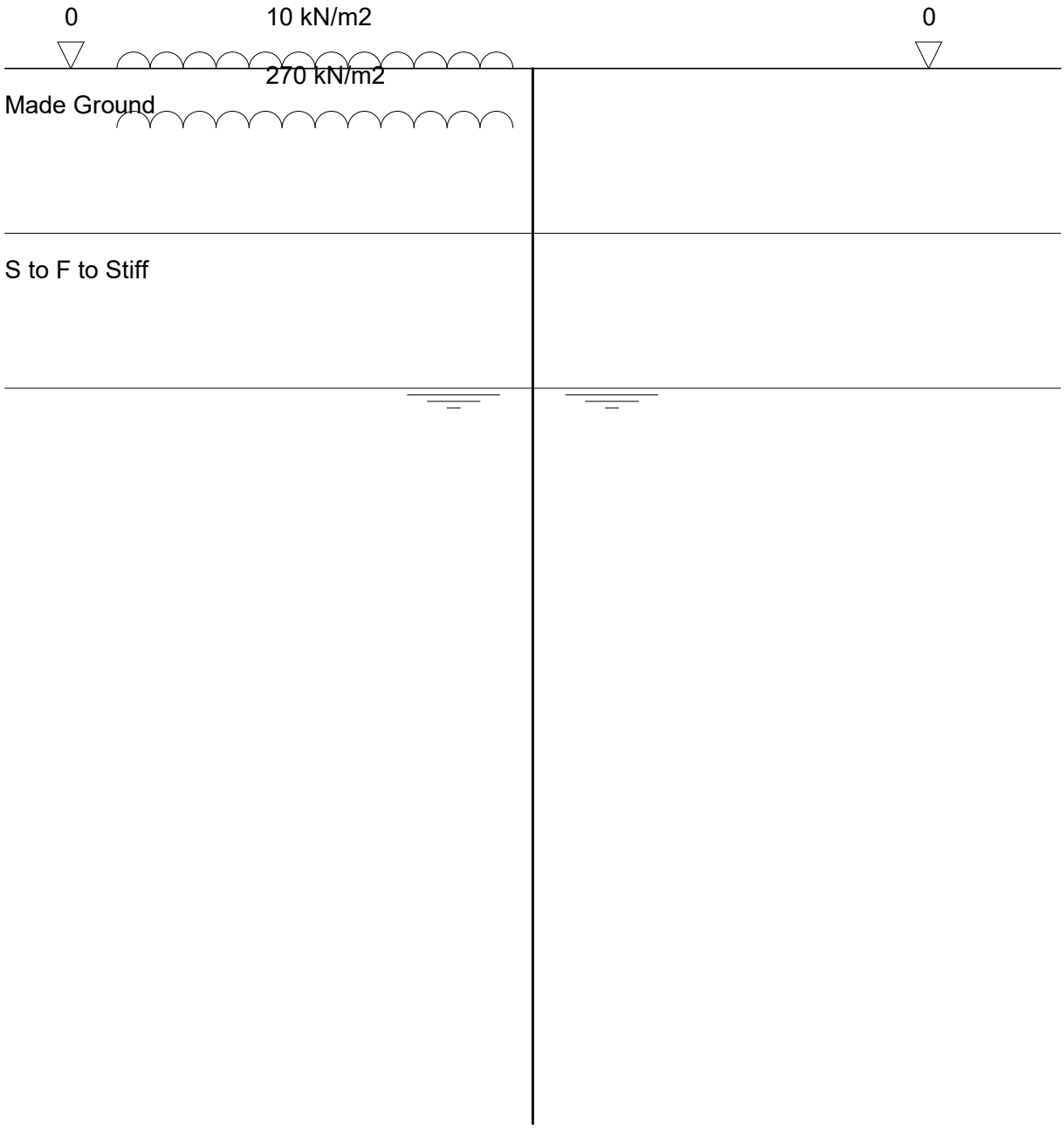


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

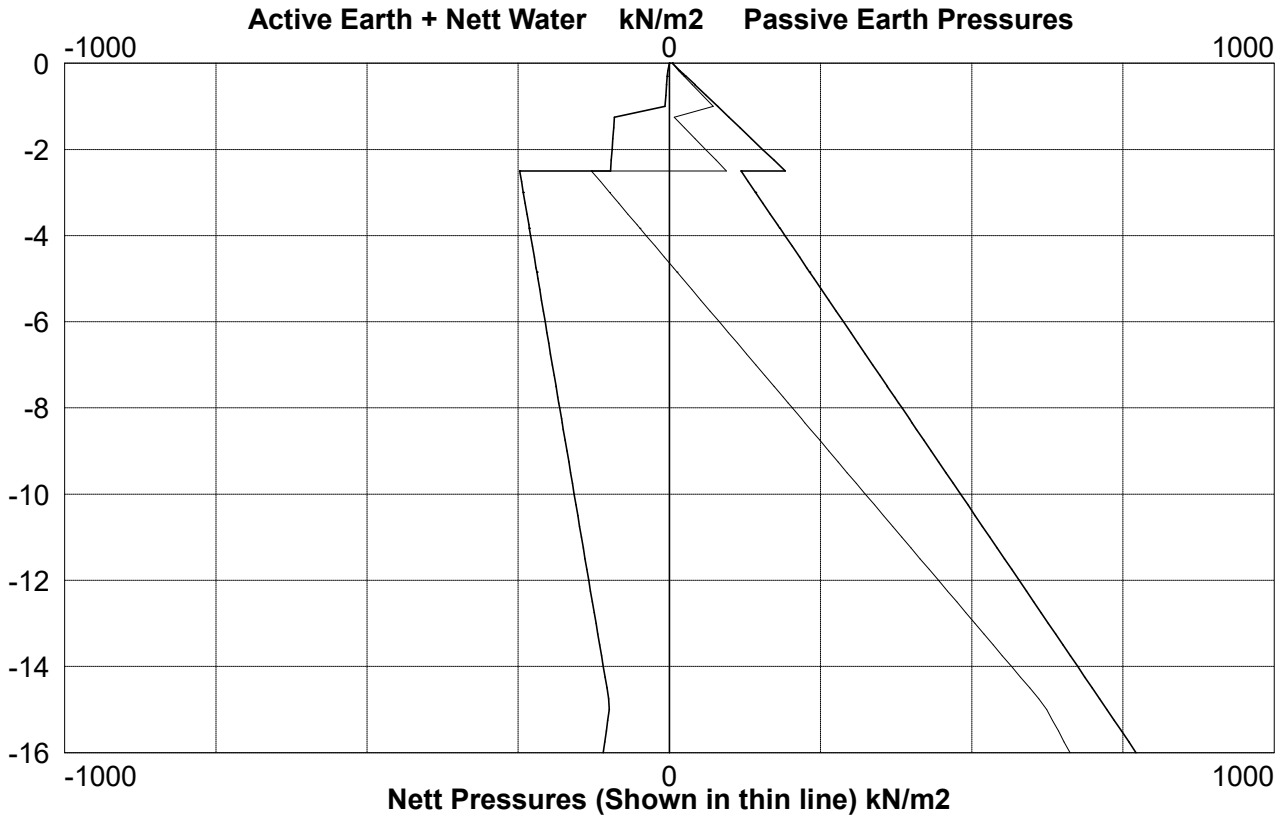
Stage ref. **2**
Stage type **Active surcharge**

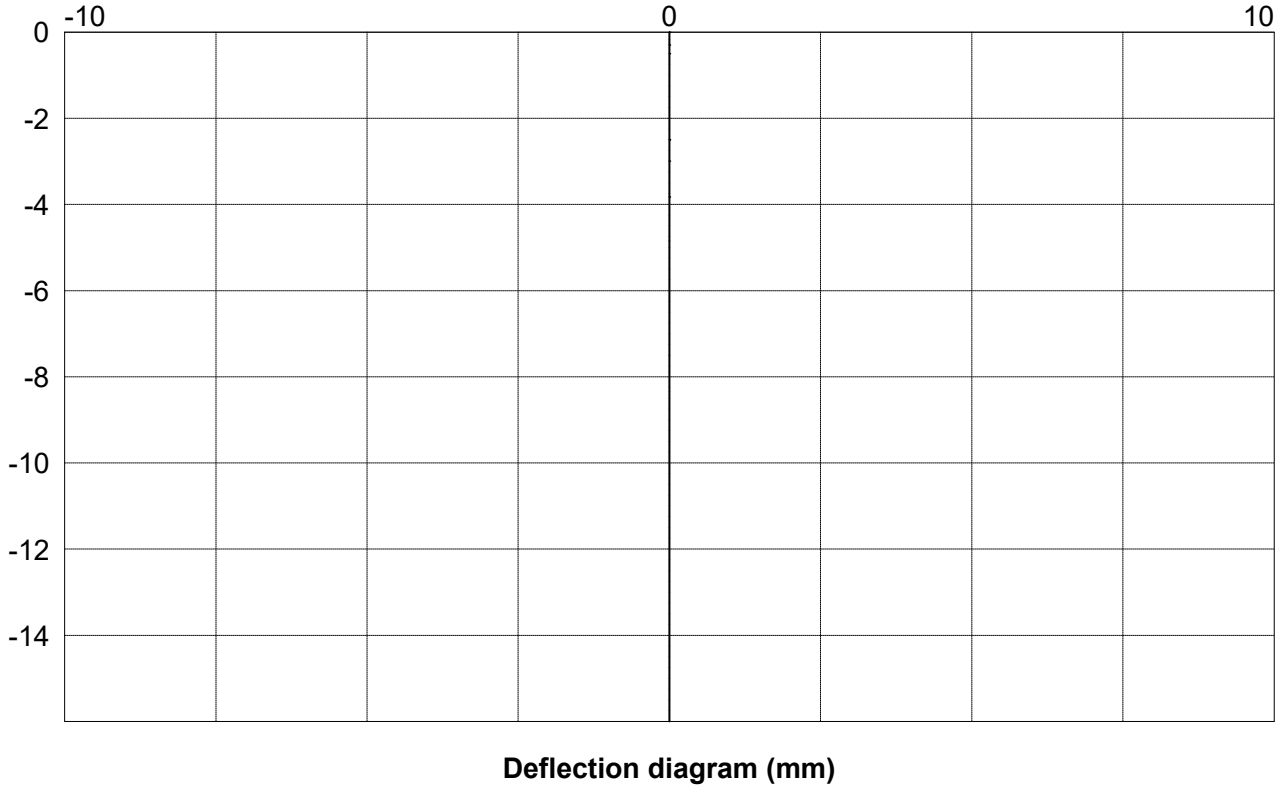


Tabular results from analysis of stage ref 2

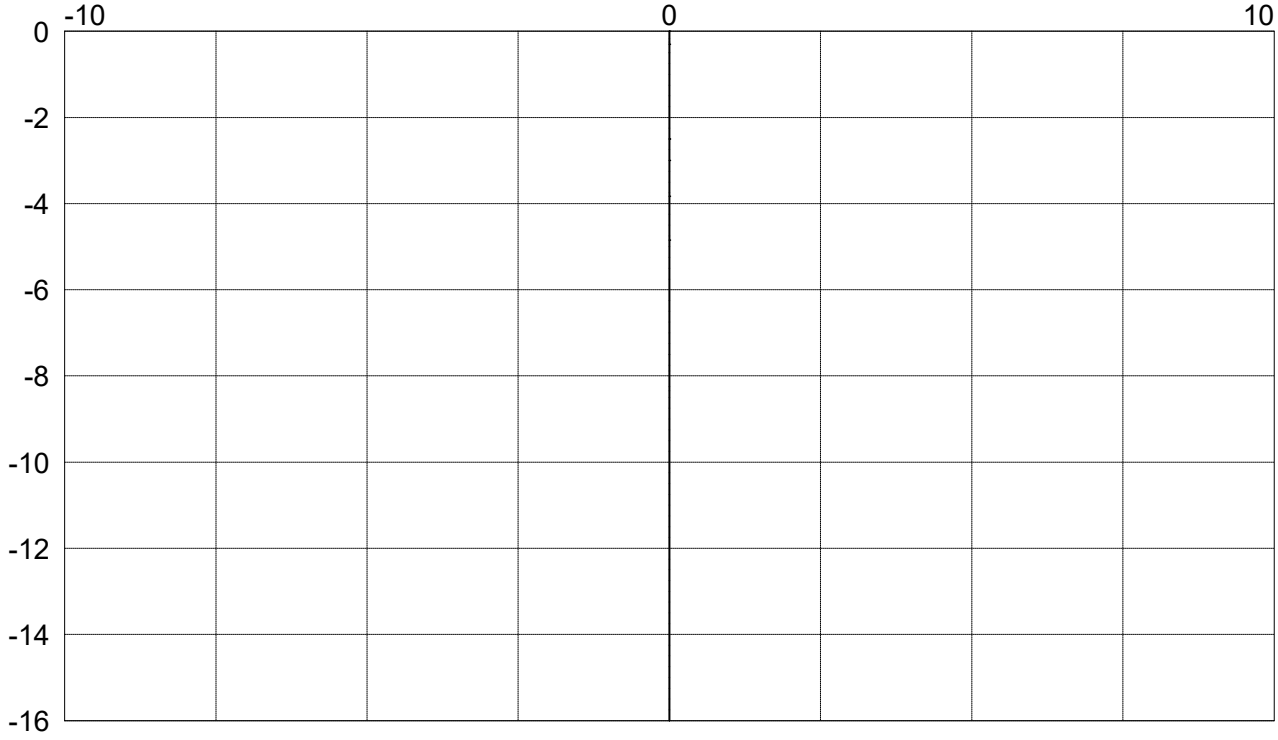
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	5.0	.0	-5.0	0	0	0		.00
t .00	.0	.0	.0	.0	5.1	.0	-5.1	0	0	0		>100.00
-.17	13.1	2.6	.0	3.1	17.9	.0	-15.4	0	0	0		10.97
-.30	15.4	3.3	.0	5.4	27.4	.0	-24.1	0	0	0	.0	8.87
-.30	15.4	3.3	.0	5.4	27.6	.0	-24.3	0	0	0		8.85
-.50	19.0	4.4	.0	9.0	42.3	.0	-38.0	0	0	0	.0	8.59
-.50	19.0	4.4	.0	9.0	42.5	.0	-38.1	0	0	0		8.59
-1.00	28.0	7.1	.0	18.0	79.7	.0	-72.6	0	0	0		9.41
-2.00	316.0	94.7	.0	36.0	154.4	.0	-59.7	0	0	0		2.61
-2.50	325.0	97.4	.0	45.0	191.8	.0	-94.3	0	0	0	.0	2.17
-2.50	325.0	247.5	.0	45.0	118.5	.0	129.0	0	0	0		2.17
-2.50	325.0	247.4	.0	45.0	118.6	.0	128.9	0	0	0		2.17
-3.00	334.5	241.5	.0	54.5	142.6	.0	98.9	0	0	0		1.80
-3.00	334.5	241.5	.0	54.5	142.7	.0	98.8	0	0	0		1.79
-3.83	350.3	231.5	.0	70.3	182.8	.0	48.6	0	0	0	.0	1.35
-3.83	350.3	231.5	.0	70.3	182.9	.0	48.5	0	0	0		1.35
-4.00	353.5	229.4	.0	73.5	191.1	.0	38.4	0	0	0		1.30
-4.85	369.6	219.3	.0	89.6	232.1	.0	-12.9	0	0	0		1.14
-4.85	369.7	219.2	.0	89.6	232.2	.0	-13.0	0	0	0		1.14
-5.00	372.5	217.4	.0	92.5	239.5	.0	-22.0	0	0	0		1.13
-6.00	391.5	205.4	.0	111.5	287.9	.0	-82.5	0	0	0		1.07
-7.00	410.5	193.4	.0	130.5	336.3	.0	-142.9	0	0	0		1.08
-7.51	420.1	187.3	.0	140.1	360.7	.0	-173.4	0	0	0		1.09
-7.88	427.3	182.8	.0	147.3	379.0	.0	-196.3	0	0	0		1.10
-8.00	429.5	181.4	.0	149.5	384.7	.0	-203.3	0	0	0		1.11
-8.35	436.1	177.2	.0	156.1	401.5	.0	-224.3	0	0	0		1.12
-9.00	448.5	169.4	.0	168.5	433.0	.0	-263.7	0	0	0		1.16
-10.00	467.5	157.4	.0	187.5	481.4	.0	-324.1	0	0	0		1.22
-11.00	486.5	145.3	.0	206.5	529.8	.0	-384.5	0	0	0		1.29
-12.00	505.5	133.3	.0	225.5	578.2	.0	-444.9	0	0	0		1.37
-13.00	524.5	121.3	.0	244.5	626.6	.0	-505.3	0	0	0		1.45
-14.00	543.5	109.3	.0	263.5	675.0	.0	-565.7	0	0	0		1.55
w -15.00	562.5	.0	99.5	282.5	723.4	.0	-623.9	0	0	0		1.65
w -16.00	581.5	.0	109.3	301.5	771.8	.0	-662.5	0	0	0		1.75

Graphical results from analysis of stage ref 2

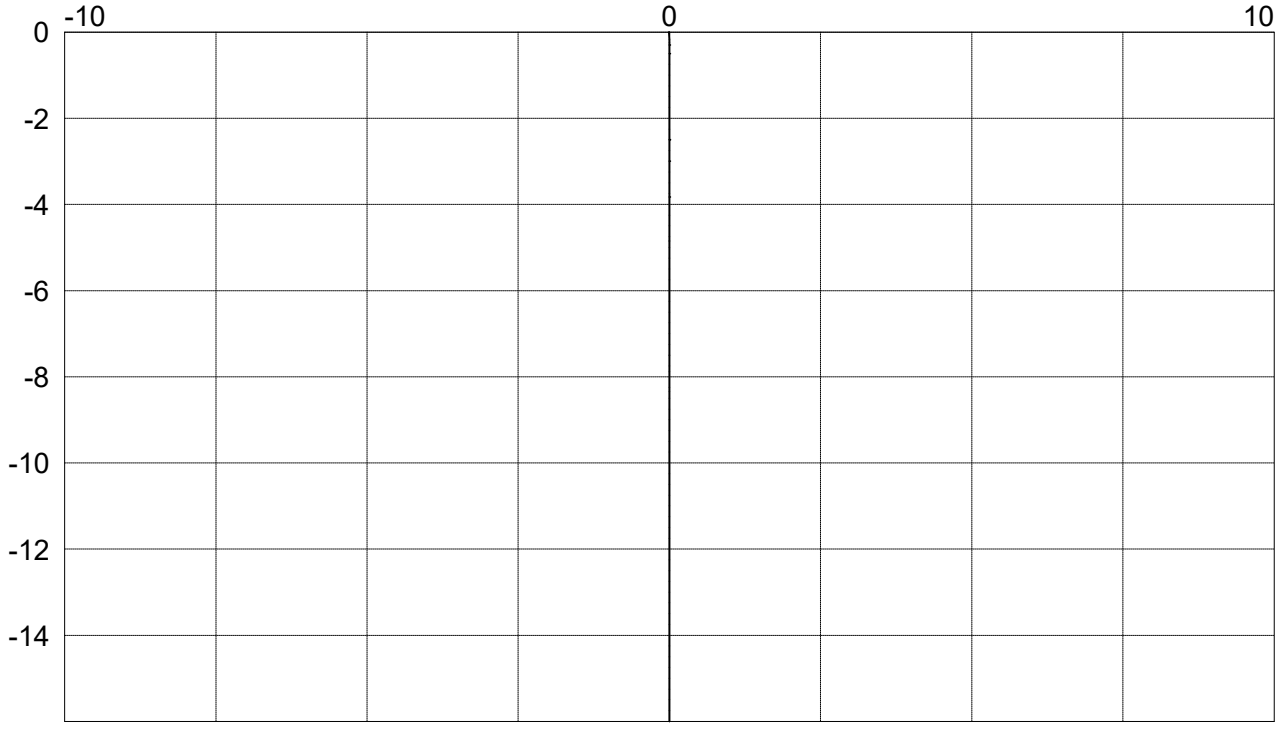




Graphical results from analysis of stage ref 2 continued

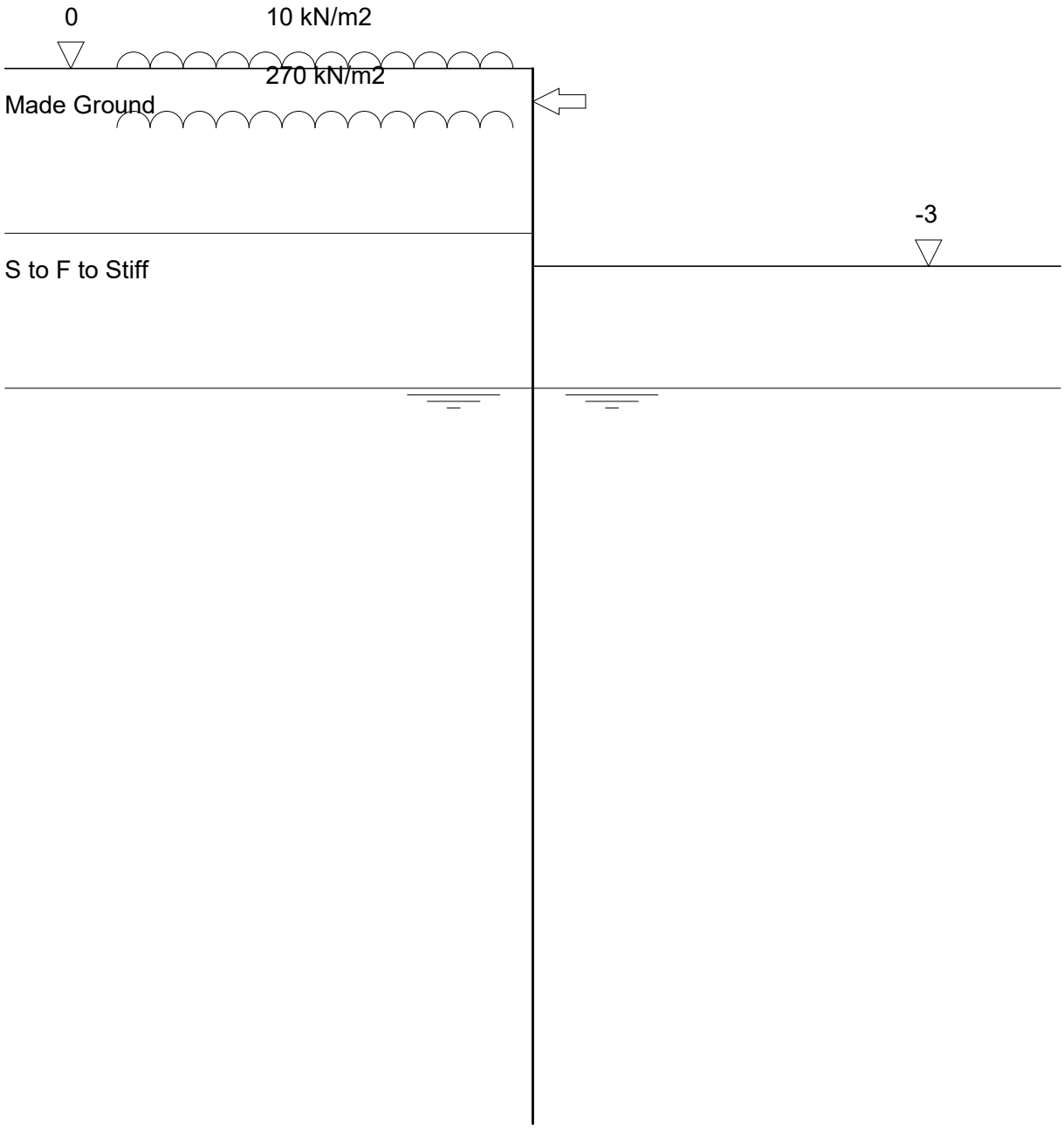


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

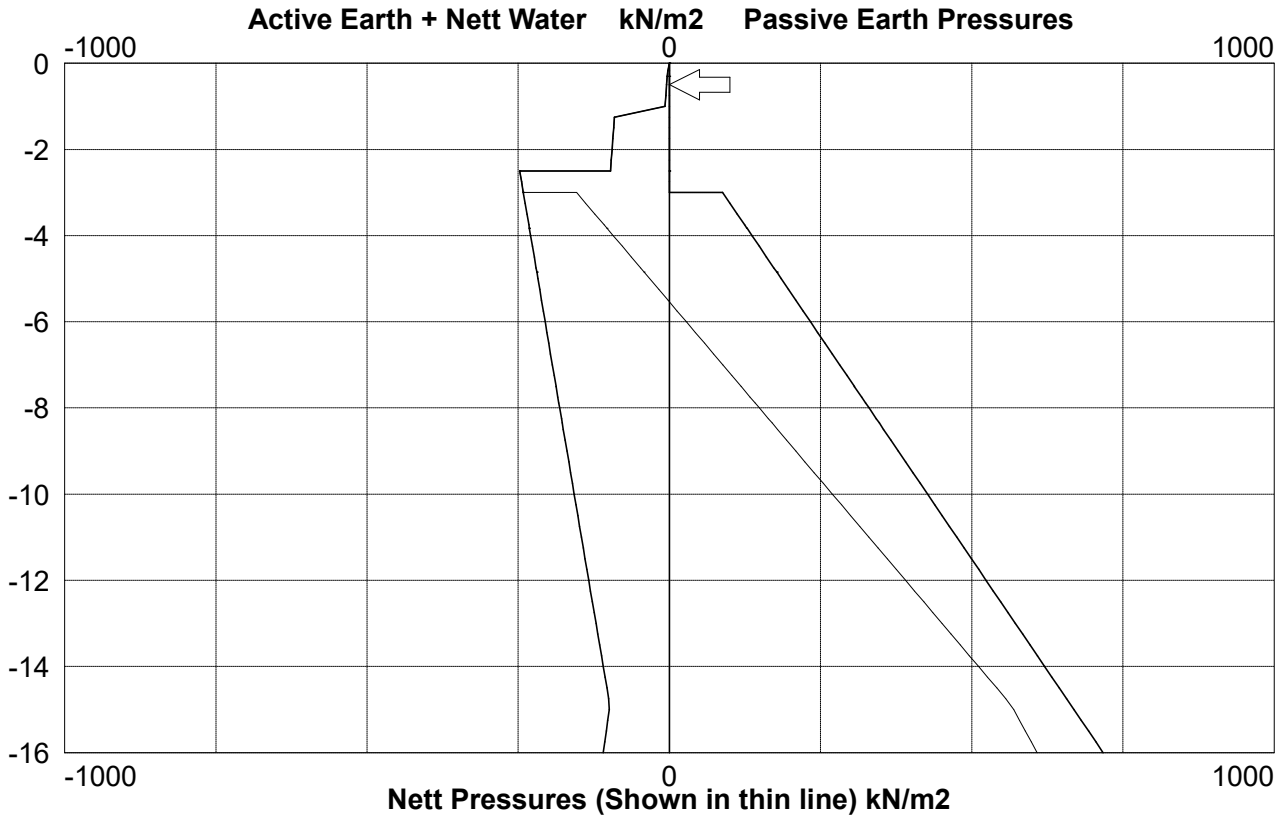
Stage ref. **4**
Stage type **Passive side excavation**

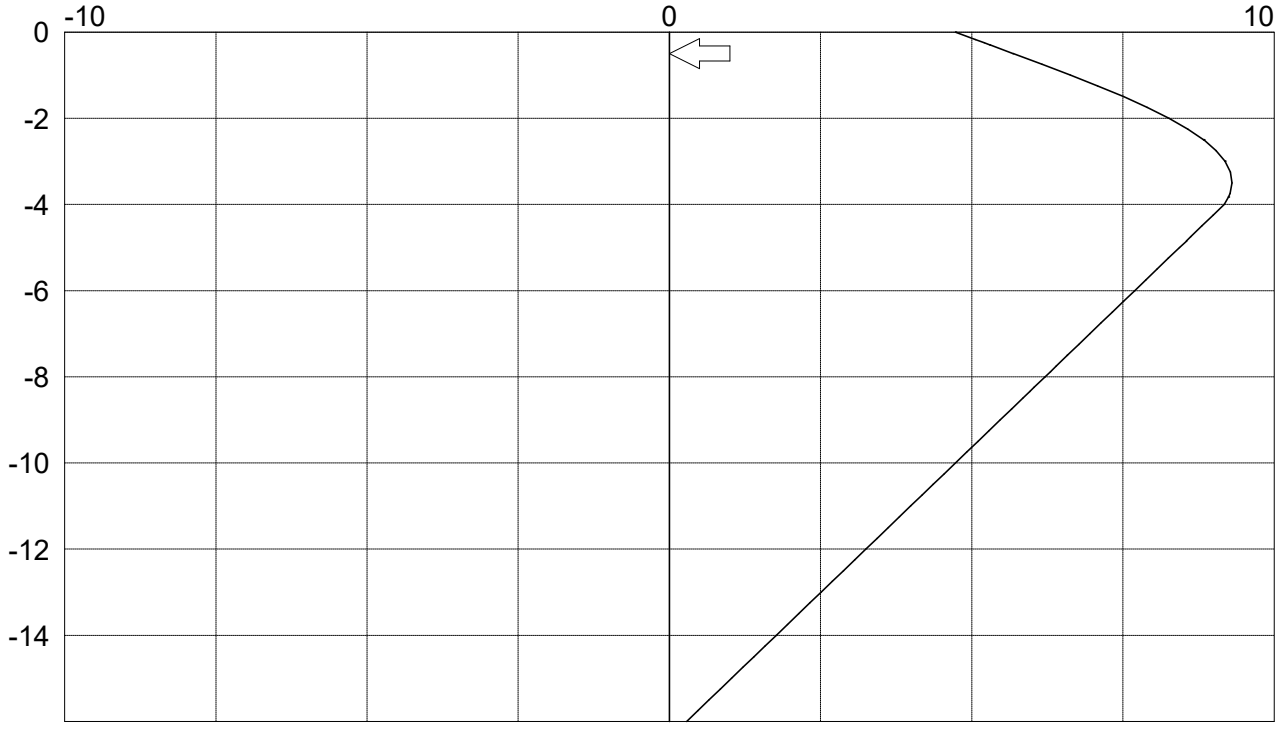


Tabular results from analysis of stage ref 4

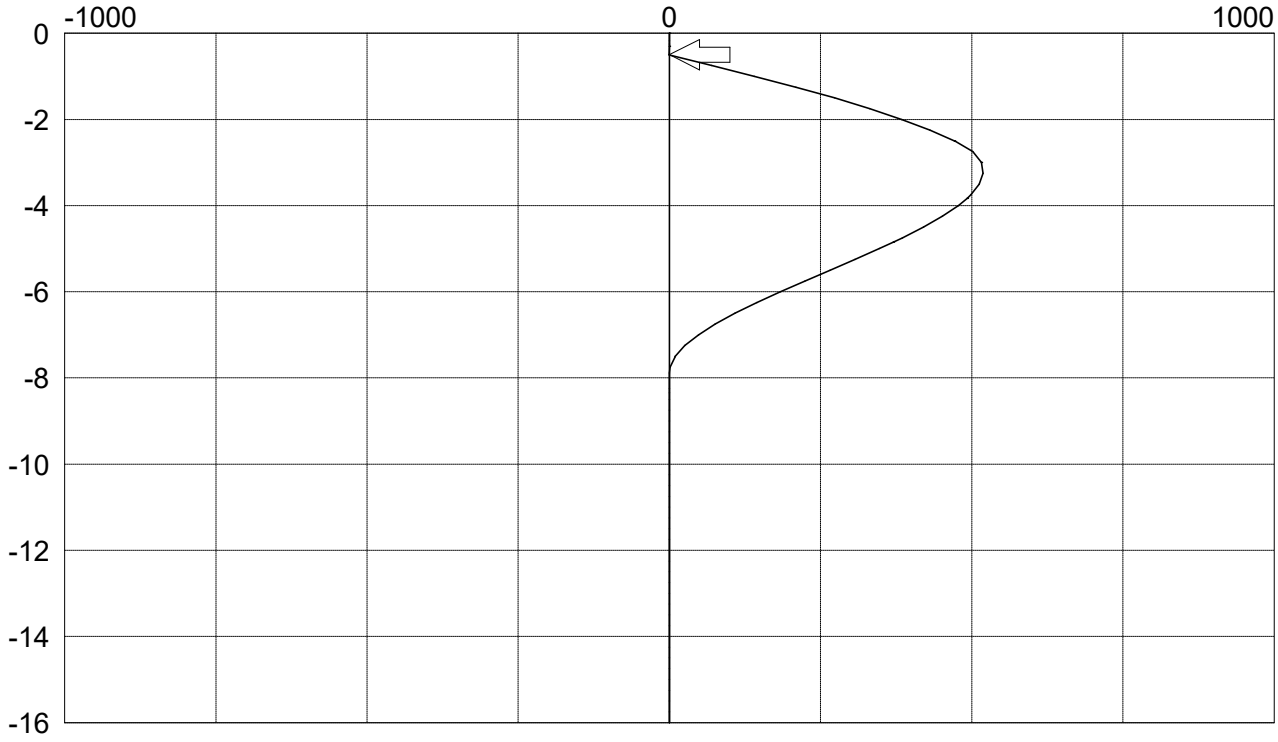
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	4.7		.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0	4.7		.00
-.17	13.1	2.6	.0	.0	.0	.0	2.6	0	-.2	5.1		.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	5.3	.0	.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	5.3		.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	.3	-1.4	5.7	284.5	.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	.3	283.1	5.7		.00
-1.00	28.0	7.1	.0	.0	.0	.0	7.1	-140.1	280.3	6.6		.00
-2.00	316.0	94.7	.0	.0	.0	.0	94.7	-384.3	198.6	8.3		.00
-2.50	325.0	97.4	.0	.0	.0	.0	97.4	-471.6	150.6	8.8	.0	.00
-2.50	325.0	247.5	.0	.0	.0	.0	247.5	-471.8	150.6	8.8		.00
-2.50	325.0	247.4	.0	.0	.0	.0	247.4	-471.9	150.1	8.8		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-516.2	28.8	9.2		.00
-3.00	334.5	241.5	.0	.0	88.2	.0	153.3	-516.2	28.4	9.2		.00
-3.83	350.3	231.5	.0	15.8	128.3	.0	103.1	-492.8	-78.0	9.2	.0	.26
-3.83	350.3	231.5	.0	15.8	128.4	.0	103.0	-492.6	-78.2	9.2		.26
-4.00	353.5	229.4	.0	19.0	136.6	.0	92.9	-478.1	-94.6	9.2		.30
-4.85	369.6	219.3	.0	35.1	177.6	.0	41.6	-370.6	-151.7	8.6		.46
-4.85	369.7	219.2	.0	35.2	177.7	.0	41.5	-370.3	-151.7	8.5		.46
-5.00	372.5	217.4	.0	38.0	185.0	.0	32.5	-347.1	-157.3	8.4		.48
-6.00	391.5	205.4	.0	57.0	233.4	.0	-28.0	-183.6	-159.5	7.7		.66
-7.00	410.5	193.4	.0	76.0	281.8	.0	-88.4	-48.1	-101.4	7.0		.84
-7.51	420.1	187.3	.0	85.6	306.2	.0	-118.9	-9.6	-48.9	6.6		.93
-7.88	427.3	182.8	.0	92.8	324.5	.0	-141.8	0	0	6.3		1.00
-8.00	429.5	181.4	.0	95.0	330.2	.0	-148.8	0	0	6.2		1.02
-8.35	436.1	177.2	.0	101.6	347.0	.0	-169.8	0	0	6.0		1.09
-9.00	448.5	169.4	.0	114.0	378.5	.0	-209.2	0	0	5.5		1.22
-10.00	467.5	157.4	.0	133.0	426.9	.0	-269.6	0	0	4.7		1.44
-11.00	486.5	145.3	.0	152.0	475.3	.0	-330.0	0	0	4.0		1.67
-12.00	505.5	133.3	.0	171.0	523.7	.0	-390.4	0	0	3.3		1.93
-13.00	524.5	121.3	.0	190.0	572.1	.0	-450.8	0	0	2.5		2.21
-14.00	543.5	109.3	.0	209.0	620.5	.0	-511.2	0	0	1.8		2.51
w -15.00	562.5	.0	99.5	228.0	668.9	.0	-569.4	0	0	1.0		2.85
w -16.00	581.5	.0	109.3	247.0	717.3	.0	-608.0	0	0	.3		3.19

Graphical results from analysis of stage ref 4

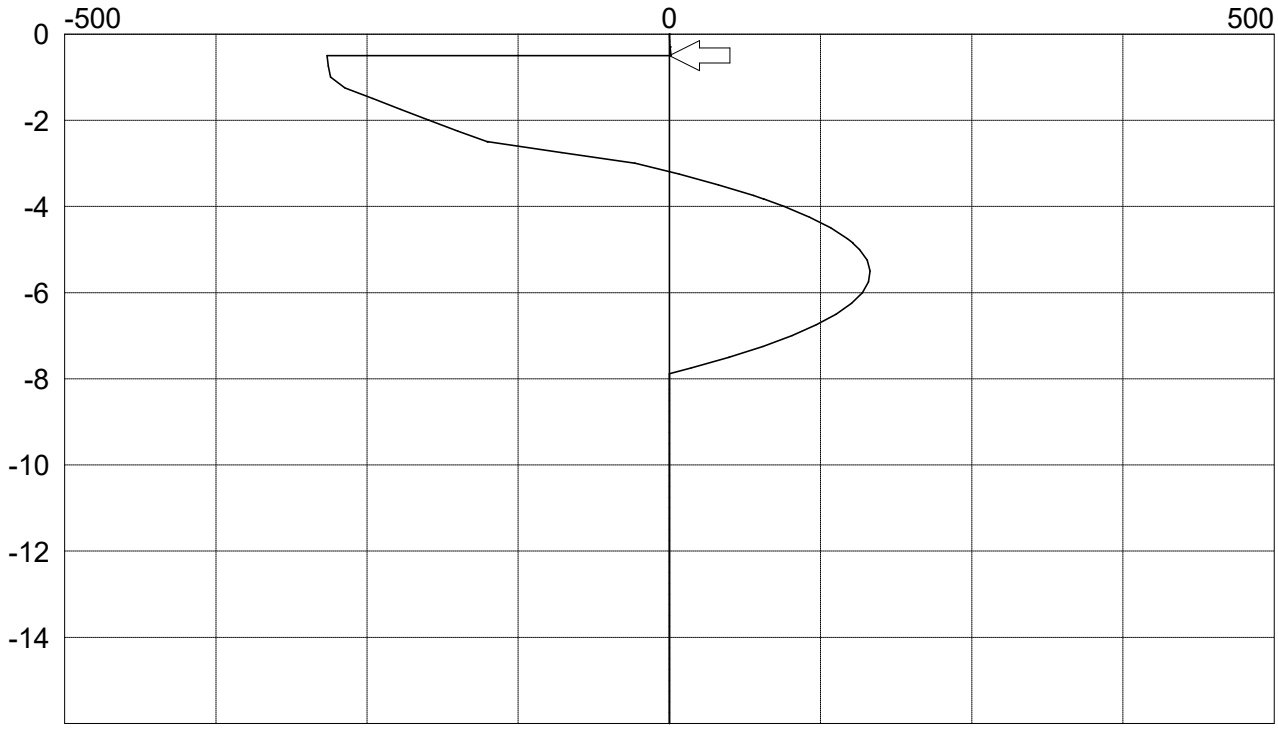




Graphical results from analysis of stage ref 4 continued

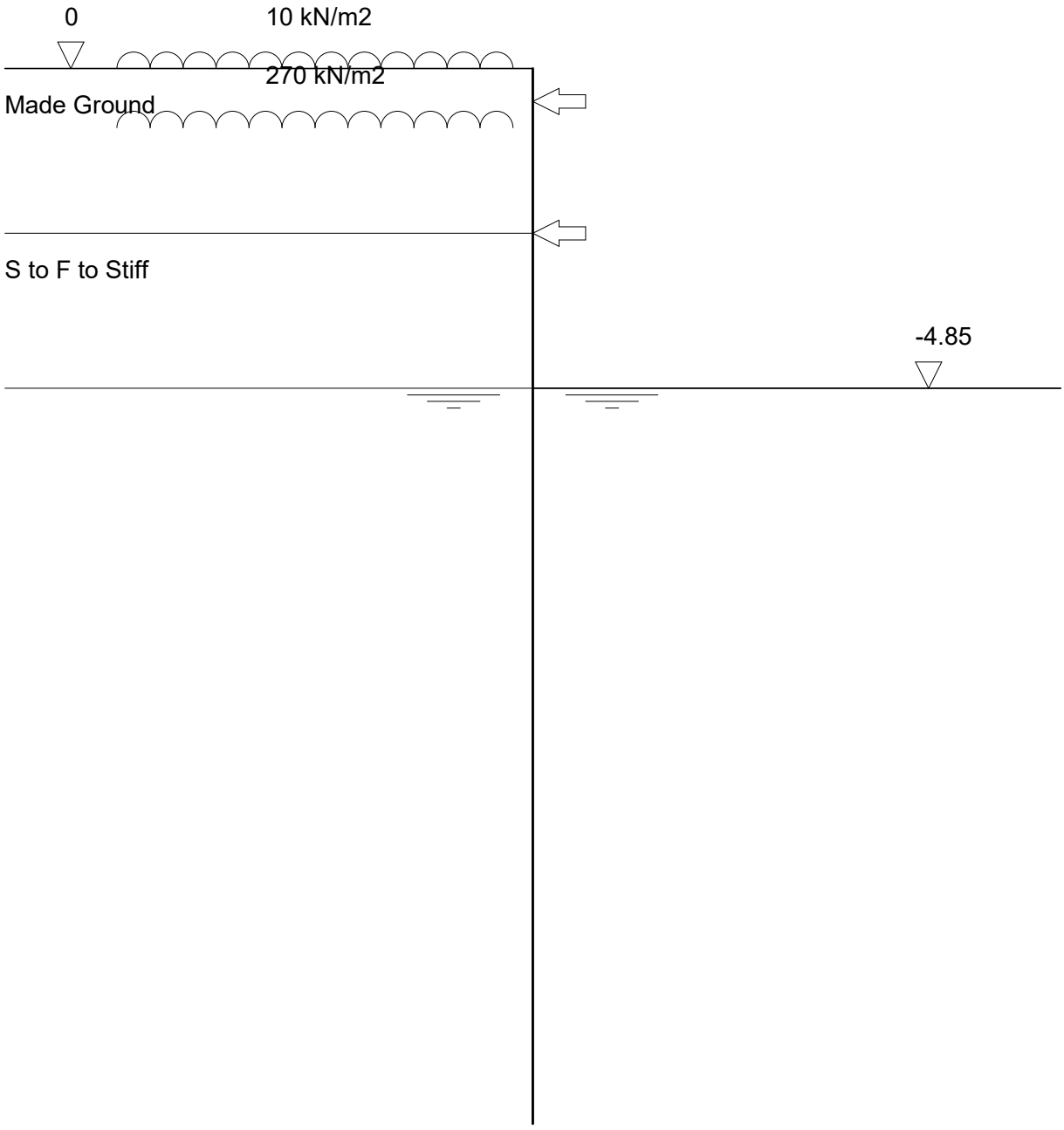


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

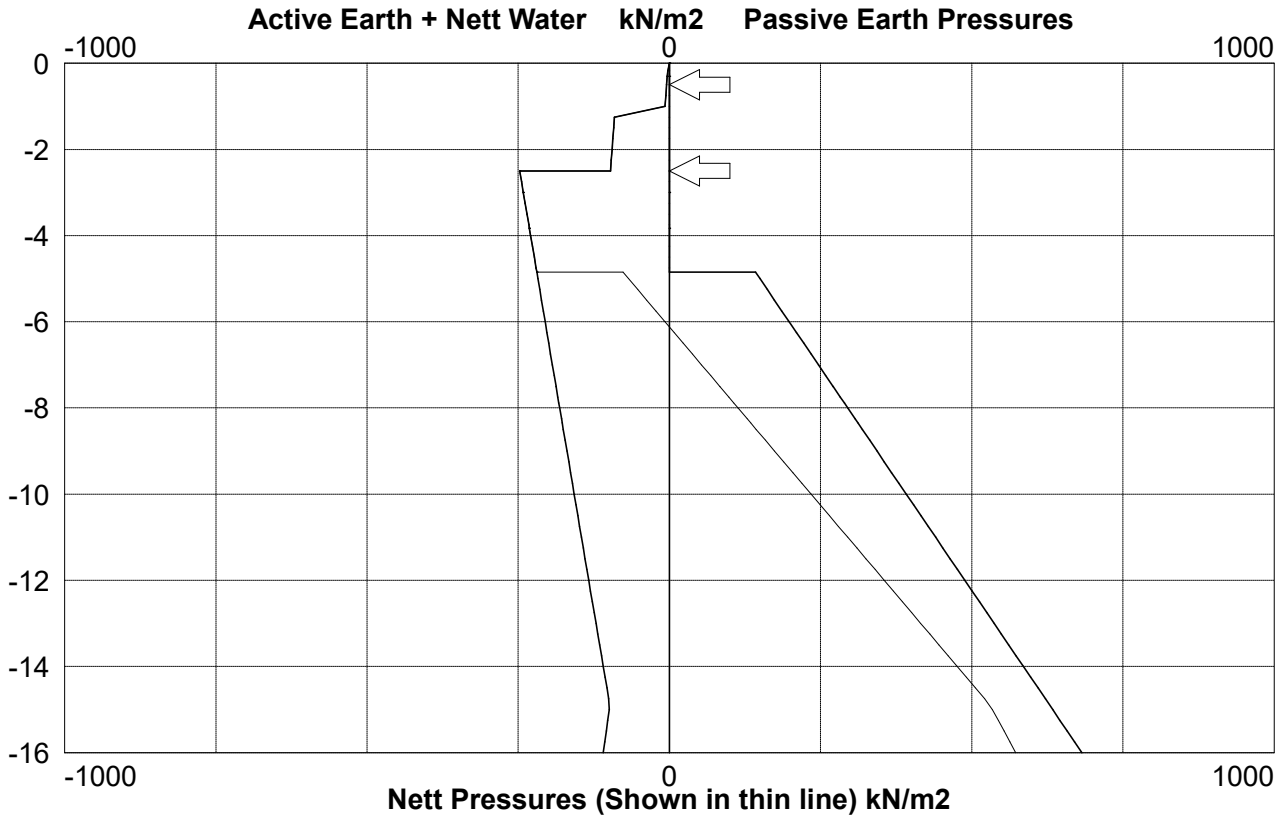
Stage ref. **6**
Stage type **Passive side excavation**

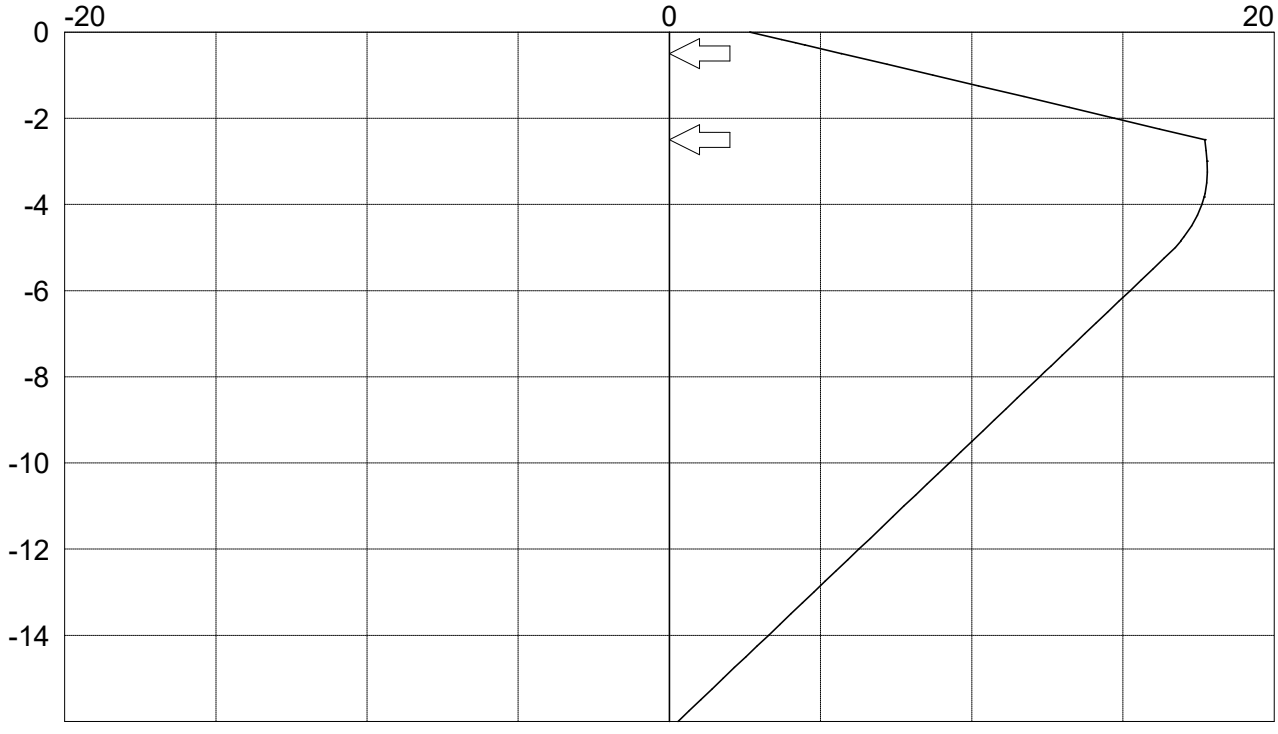


Tabular results from analysis of stage ref 6

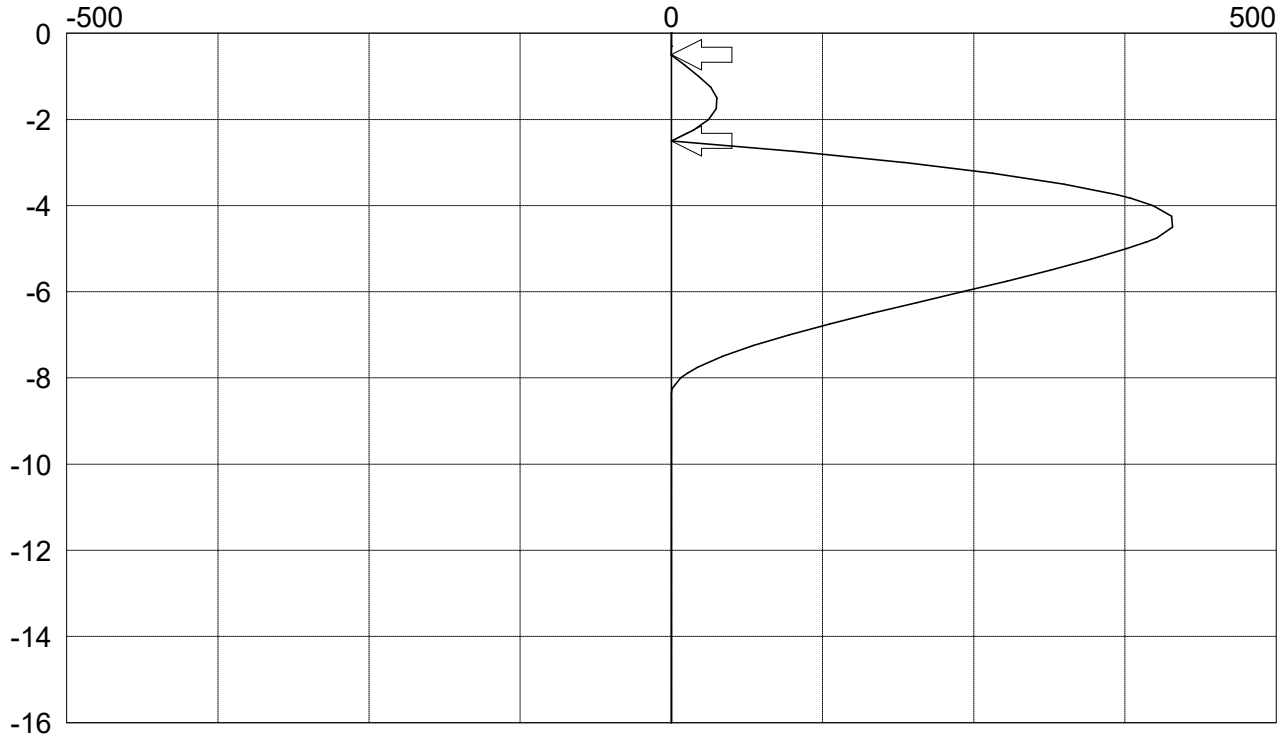
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	2.7		.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0	2.7		.00
-.17	13.1	2.6	.0	.0	.0	.0	2.6	0	-.2	3.7		.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	4.5	.0	.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	4.5		.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	.3	-1.4	5.7	48.5	.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	.3	47.1	5.7		.00
-1.00	28.0	7.1	.0	.0	.0	.0	7.1	-22.6	44.3	8.7		.00
-2.00	316.0	94.7	.0	.0	.0	.0	94.7	-30.7	-37.4	14.7		.00
-2.50	325.0	97.4	.0	.0	.0	.0	97.4	-.1	-85.4	17.7	532.3	.00
-2.50	325.0	247.5	.0	.0	.0	.0	247.5	0	446.9	17.7		.00
-2.50	325.0	247.4	.0	.0	.0	.0	247.4	-.4	446.4	17.7		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-191.7	325.2	17.8		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-192.3	324.7	17.8		.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	-379.8	128.4	17.7	.0	.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	-380.0	128.0	17.7		.00
-4.00	353.5	229.4	.0	.0	.0	.0	229.4	-398.3	89.2	17.6		.00
-4.85	369.6	219.3	.0	.0	.0	.0	219.3	-392.7	-101.0	16.9		.00
-4.85	369.7	219.2	.0	.0	142.6	.0	76.7	-392.5	-101.3	16.9		.00
-5.00	372.5	217.4	.0	2.9	149.8	.0	67.6	-376.5	-112.1	16.7		.08
-6.00	391.5	205.4	.0	21.9	198.2	.0	7.2	-240.6	-149.5	15.2		.43
-7.00	410.5	193.4	.0	40.9	246.6	.0	-53.2	-97.5	-126.5	13.7		.69
-7.51	420.1	187.3	.0	50.5	271.1	.0	-83.8	-41.7	-91.8	13.0		.81
-7.88	427.3	182.8	.0	57.6	289.4	.0	-106.6	-13.4	-55.9	12.4		.89
-8.00	429.5	181.4	.0	59.9	295.0	.0	-113.6	-7.7	-43.1	12.2		.92
-8.35	436.1	177.2	.0	66.5	311.8	.0	-134.6	0	0	11.7		1.00
-9.00	448.5	169.4	.0	78.9	343.4	.0	-174.0	0	0	10.8		1.15
-10.00	467.5	157.4	.0	97.9	391.8	.0	-234.4	0	0	9.3		1.39
-11.00	486.5	145.3	.0	116.9	440.2	.0	-294.8	0	0	7.8		1.64
-12.00	505.5	133.3	.0	135.9	488.6	.0	-355.3	0	0	6.3		1.92
-13.00	524.5	121.3	.0	154.9	537.0	.0	-415.7	0	0	4.8		2.22
-14.00	543.5	109.3	.0	173.9	585.4	.0	-476.1	0	0	3.3		2.55
w -15.00	562.5	.0	99.5	192.9	633.8	.0	-534.3	0	0	1.8		2.91
w -16.00	581.5	.0	109.3	211.9	682.2	.0	-572.9	0	0	.3		3.27

Graphical results from analysis of stage ref 6

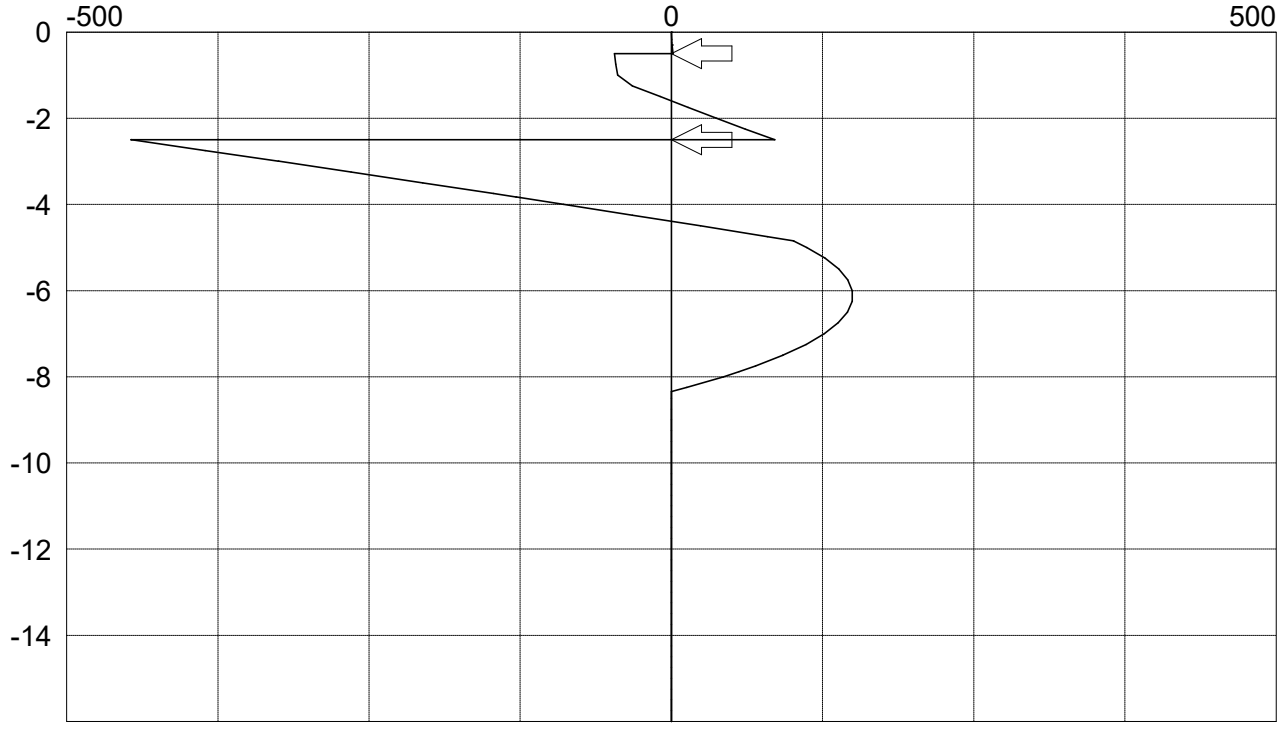




Graphical results from analysis of stage ref 6 continued

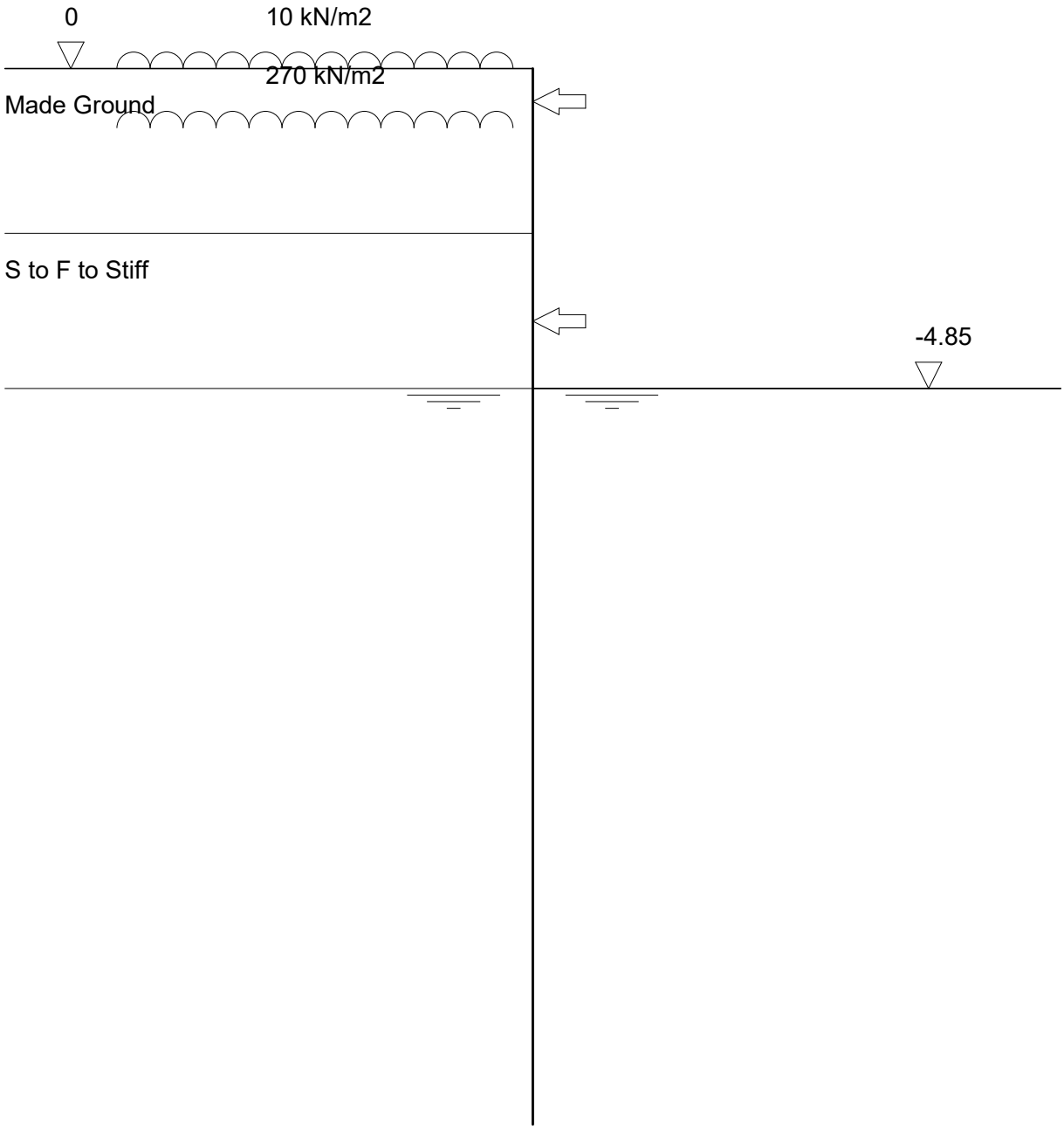


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

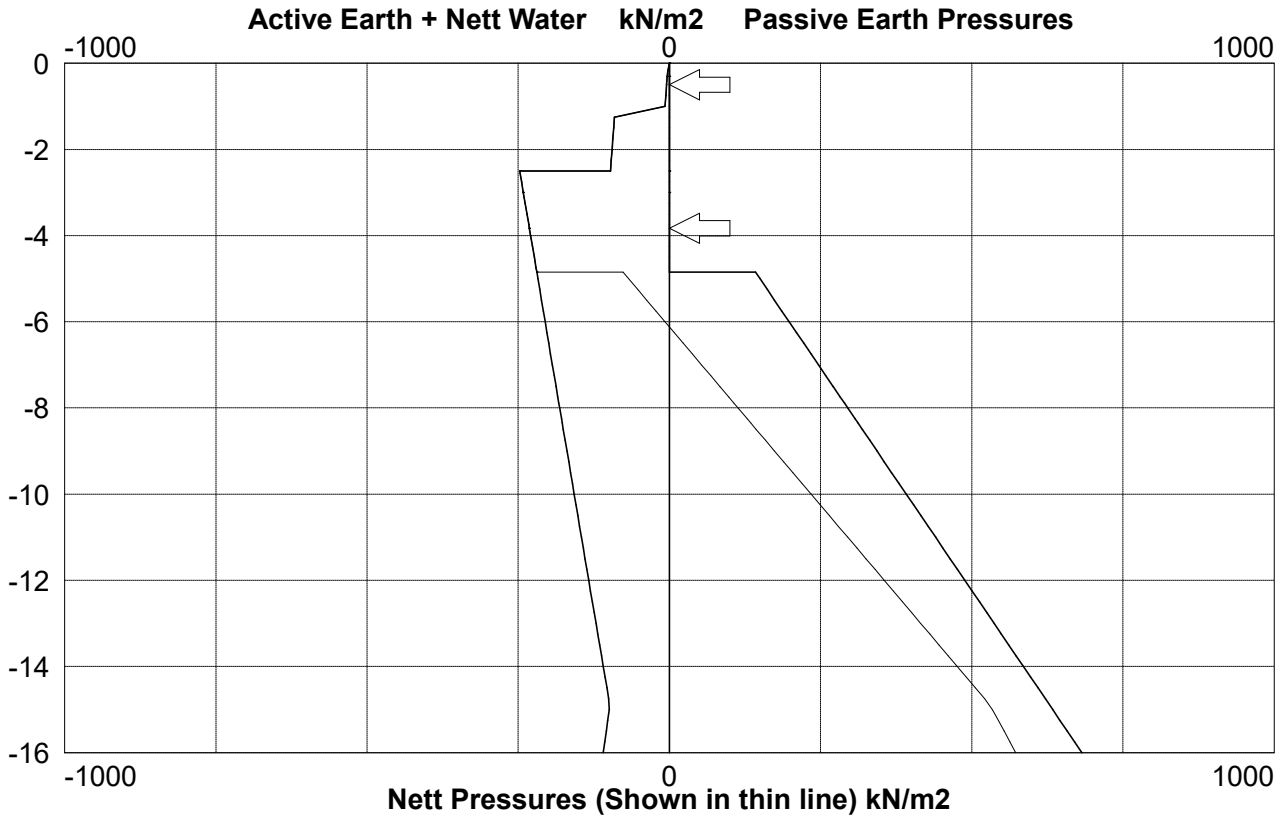
Stage ref. **8**
Stage type **Remove prop**

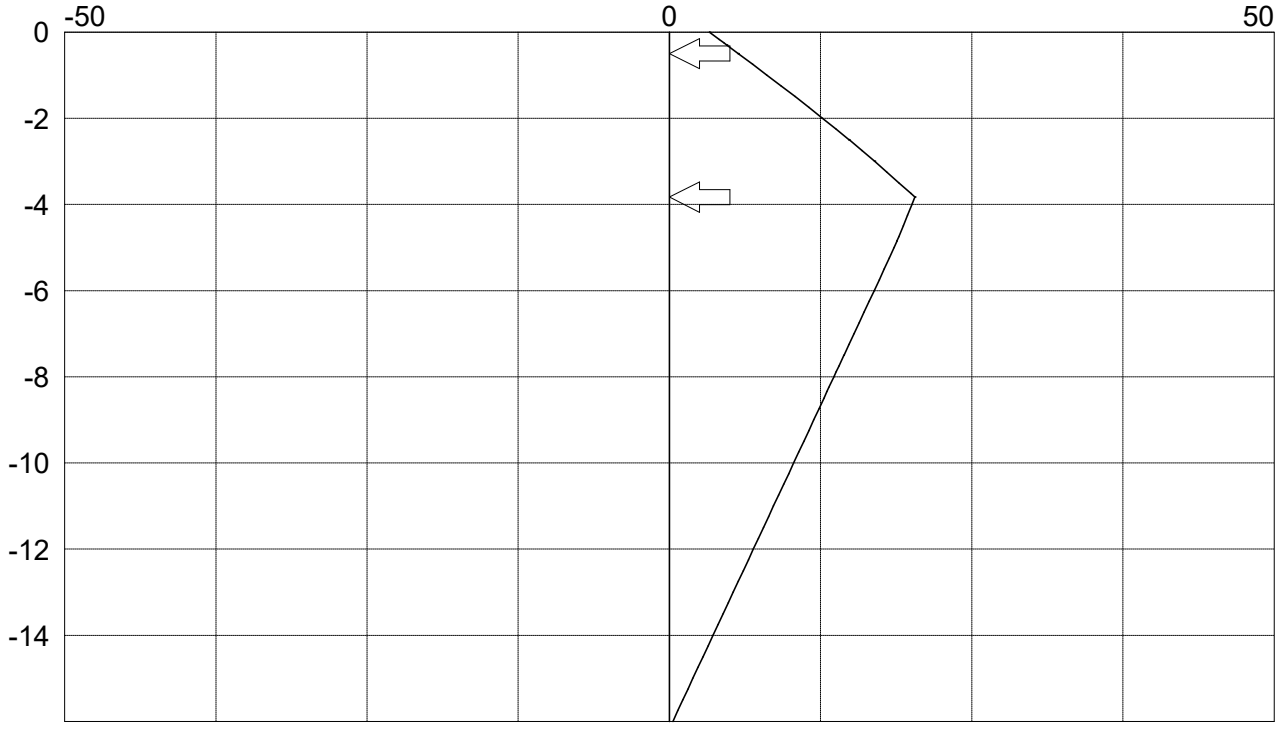


Tabular results from analysis of stage ref 8

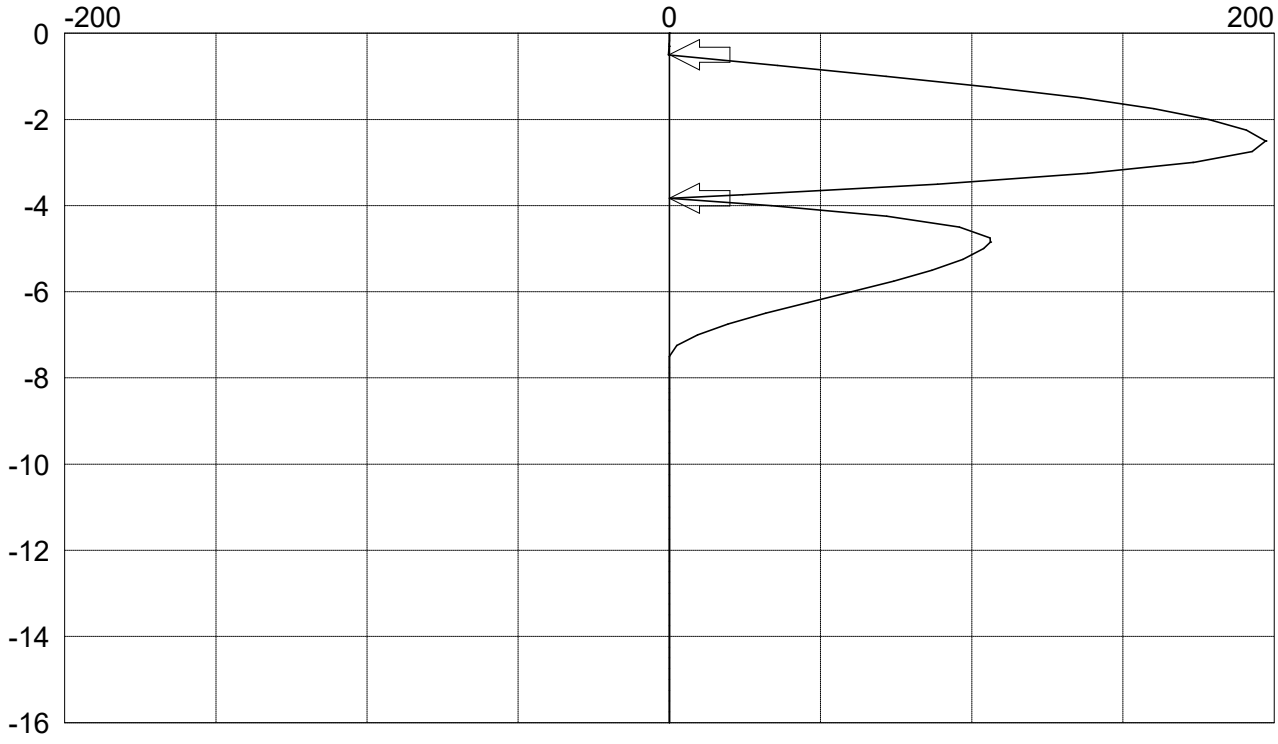
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	3.3		.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0	3.3		.00
-.17	13.1	2.6	.0	.0	.0	.0	2.6	0	-.2	4.1		.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	4.7	.0	.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	4.7		.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	.3	-1.4	5.7	147.1	.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	.3	145.8	5.7		.00
-1.00	28.0	7.1	.0	.0	.0	.0	7.1	-71.7	142.9	8.1		.00
-2.00	316.0	94.7	.0	.0	.0	.0	94.7	-178.5	61.2	12.7		.00
-2.50	325.0	97.4	.0	.0	.0	.0	97.4	-197.2	13.2	14.9	.0	.00
-2.50	325.0	247.5	.0	.0	.0	.0	247.5	-197.2	13.2	14.9		.00
-2.50	325.0	247.4	.0	.0	.0	.0	247.4	-197.2	12.7	14.9		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-173.3	-108.5	17.0		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-173.1	-109.0	17.0		.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	-.6	-305.3	20.3	525.8	.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	0	220.1	20.3		.00
-4.00	353.5	229.4	.0	.0	.0	.0	229.4	-33.7	181.3	20.1		.00
-4.85	369.6	219.3	.0	.0	.0	.0	219.3	-106.2	-8.9	18.8		.00
-4.85	369.7	219.2	.0	.0	142.6	.0	76.7	-106.2	-9.2	18.8		.00
-5.00	372.5	217.4	.0	2.9	149.8	.0	67.6	-104.0	-20.0	18.6		.16
-6.00	391.5	205.4	.0	21.9	198.2	.0	7.2	-60.2	-57.4	16.9		.63
-7.00	410.5	193.4	.0	40.9	246.6	.0	-53.2	-9.3	-34.4	15.3		.89
-7.51	420.1	187.3	.0	50.5	271.1	.0	-83.8	0	0	14.4		1.00
-7.88	427.3	182.8	.0	57.6	289.4	.0	-106.6	0	0	13.8		1.09
-8.00	429.5	181.4	.0	59.9	295.0	.0	-113.6	0	0	13.6		1.11
-8.35	436.1	177.2	.0	66.5	311.8	.0	-134.6	0	0	13.0		1.19
-9.00	448.5	169.4	.0	78.9	343.4	.0	-174.0	0	0	11.9		1.34
-10.00	467.5	157.4	.0	97.9	391.8	.0	-234.4	0	0	10.3		1.59
-11.00	486.5	145.3	.0	116.9	440.2	.0	-294.8	0	0	8.6		1.85
-12.00	505.5	133.3	.0	135.9	488.6	.0	-355.3	0	0	6.9		2.14
-13.00	524.5	121.3	.0	154.9	537.0	.0	-415.7	0	0	5.3		2.45
-14.00	543.5	109.3	.0	173.9	585.4	.0	-476.1	0	0	3.6		2.80
w -15.00	562.5	.0	99.5	192.9	633.8	.0	-534.3	0	0	2.0		3.19
w -16.00	581.5	.0	109.3	211.9	682.2	.0	-572.9	0	0	.3		3.56

Graphical results from analysis of stage ref 8

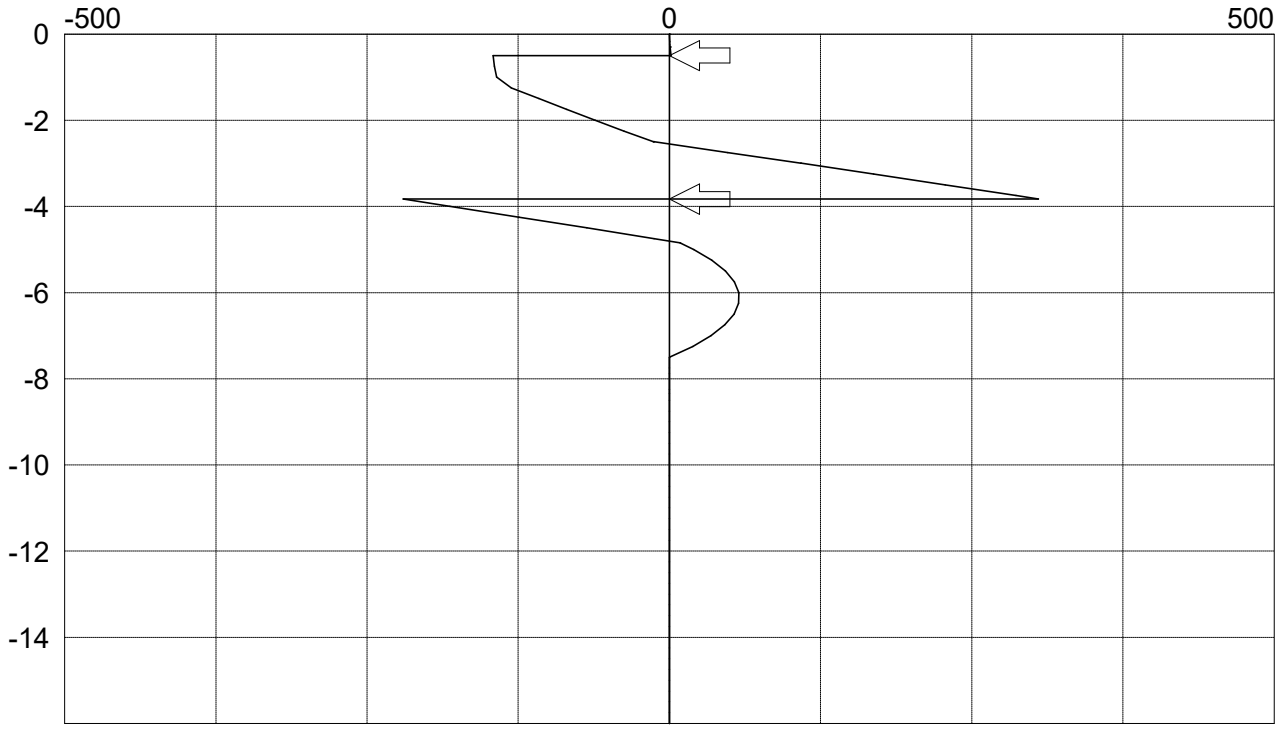




Graphical results from analysis of stage ref 8 continued

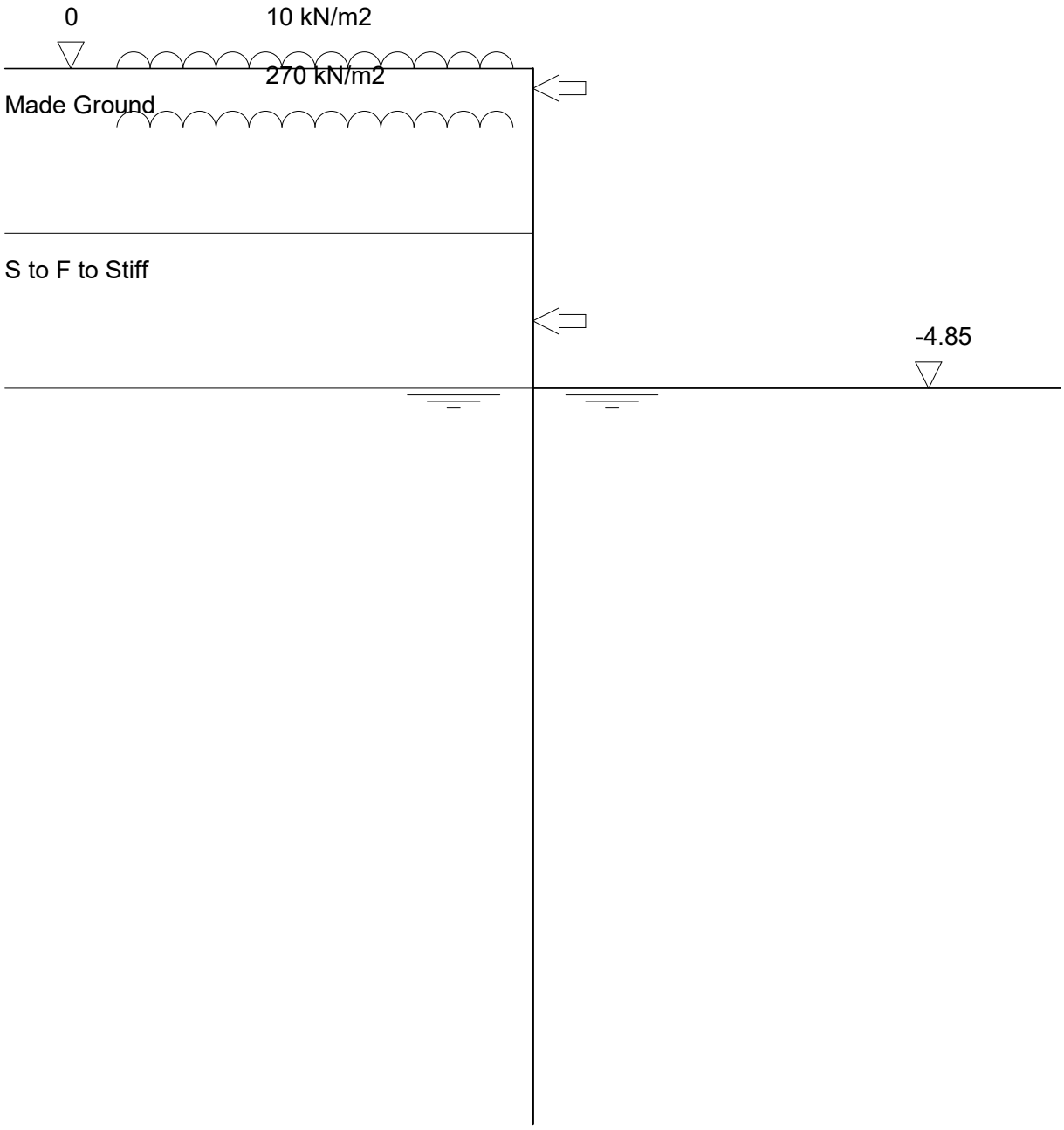


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

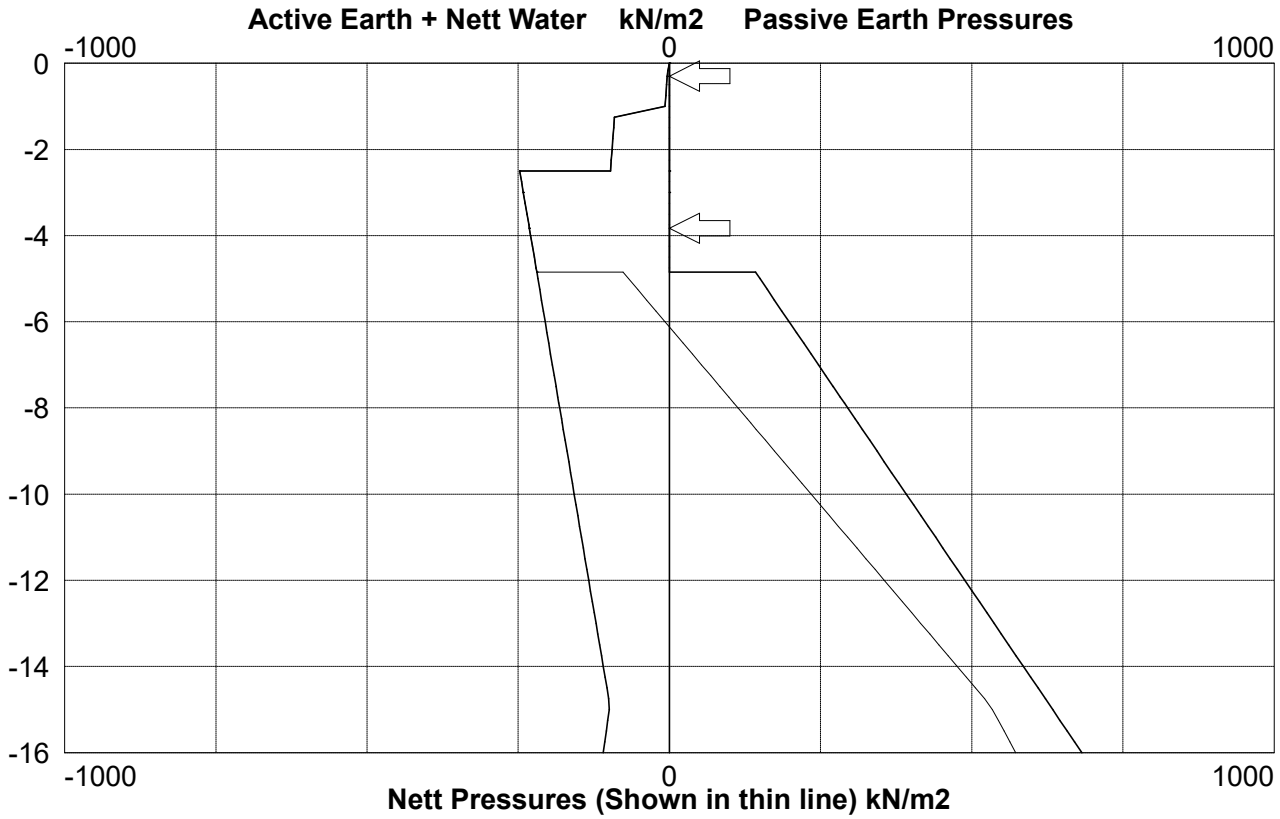
Stage ref. **10**
Stage type **Remove prop**

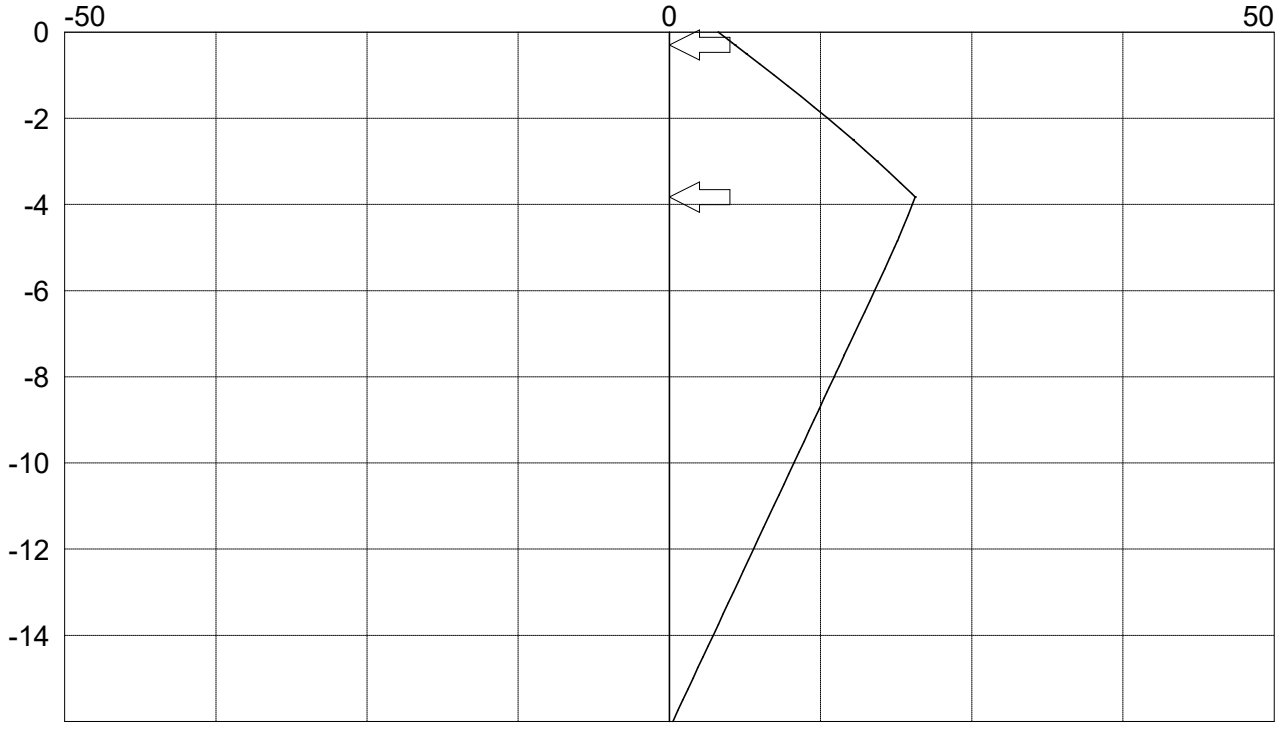


Tabular results from analysis of stage ref 10

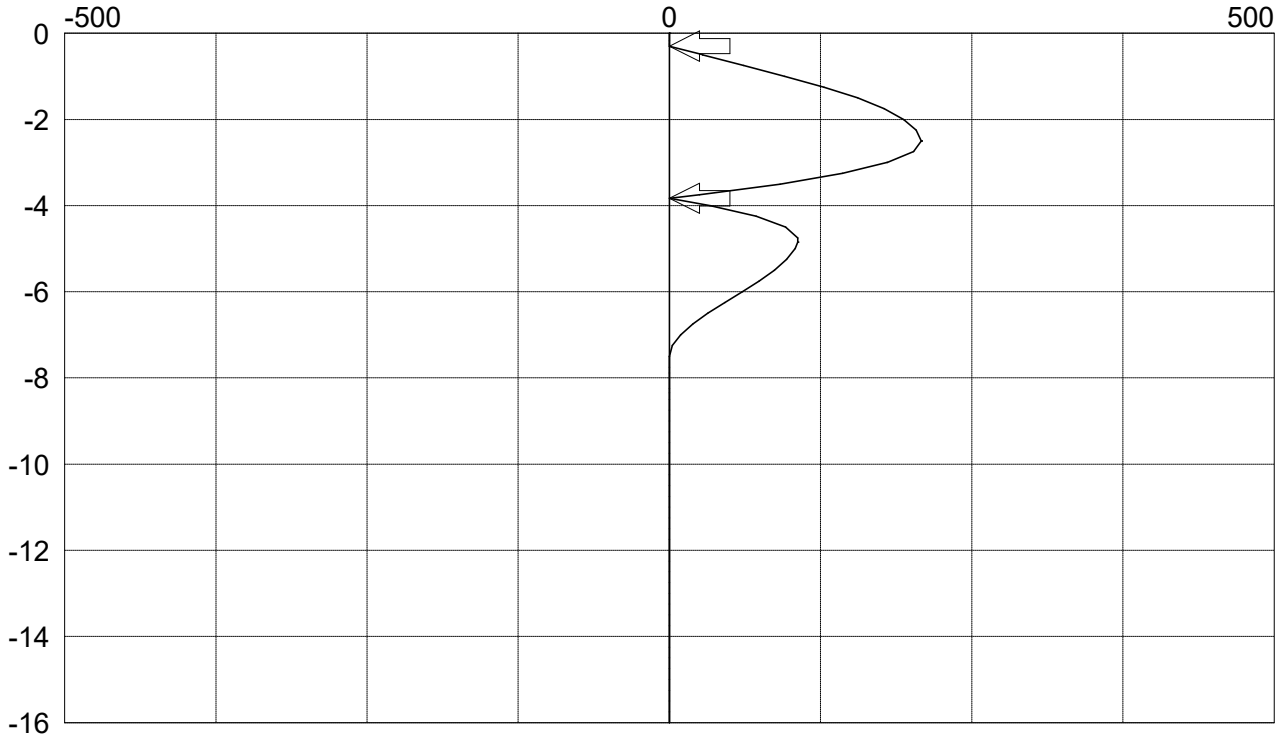
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	4.0		.00
t .00	.0	.0	.0	.0	.0	.0	0	0	0	4.0		.00
-.17	13.1	2.6	.0	.0	.0	.0	2.6	0	-.2	4.8		.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	5.4	138.8	.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	138.2	5.4		.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	-27.2	137.5	6.3	.0	.00
-.50	19.0	4.4	.0	.0	.0	.0	4.4	-27.5	137.4	6.4		.00
-1.00	28.0	7.1	.0	.0	.0	.0	7.1	-95.3	134.6	8.6		.00
-2.00	316.0	94.7	.0	.0	.0	.0	94.7	-193.8	52.9	13.1		.00
-2.50	325.0	97.4	.0	.0	.0	.0	97.4	-208.3	4.9	15.2	.0	.00
-2.50	325.0	247.5	.0	.0	.0	.0	247.5	-208.3	4.9	15.2		.00
-2.50	325.0	247.4	.0	.0	.0	.0	247.4	-208.3	4.4	15.2		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-180.3	-116.9	17.2		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-180.1	-117.3	17.2		.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	-.6	-313.6	20.3	534.1	.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	0	220.1	20.3		.00
-4.00	353.5	229.4	.0	.0	.0	.0	229.4	-33.7	181.3	20.1		.00
-4.85	369.6	219.3	.0	.0	.0	.0	219.3	-106.2	-8.9	18.9		.00
-4.85	369.7	219.2	.0	.0	142.6	.0	76.7	-106.2	-9.2	18.9		.00
-5.00	372.5	217.4	.0	2.9	149.8	.0	67.6	-104.0	-20.0	18.6		.16
-6.00	391.5	205.4	.0	21.9	198.2	.0	7.2	-60.2	-57.4	17.0		.63
-7.00	410.5	193.4	.0	40.9	246.6	.0	-53.2	-9.3	-34.4	15.3		.89
-7.51	420.1	187.3	.0	50.5	271.1	.0	-83.8	0	0	14.5		1.00
-7.88	427.3	182.8	.0	57.6	289.4	.0	-106.6	0	0	13.8		1.09
-8.00	429.5	181.4	.0	59.9	295.0	.0	-113.6	0	0	13.6		1.11
-8.35	436.1	177.2	.0	66.5	311.8	.0	-134.6	0	0	13.1		1.19
-9.00	448.5	169.4	.0	78.9	343.4	.0	-174.0	0	0	12.0		1.34
-10.00	467.5	157.4	.0	97.9	391.8	.0	-234.4	0	0	10.3		1.59
-11.00	486.5	145.3	.0	116.9	440.2	.0	-294.8	0	0	8.6		1.85
-12.00	505.5	133.3	.0	135.9	488.6	.0	-355.3	0	0	7.0		2.14
-13.00	524.5	121.3	.0	154.9	537.0	.0	-415.7	0	0	5.3		2.45
-14.00	543.5	109.3	.0	173.9	585.4	.0	-476.1	0	0	3.6		2.80
w -15.00	562.5	.0	99.5	192.9	633.8	.0	-534.3	0	0	2.0		3.19
w -16.00	581.5	.0	109.3	211.9	682.2	.0	-572.9	0	0	.3		3.56

Graphical results from analysis of stage ref 10

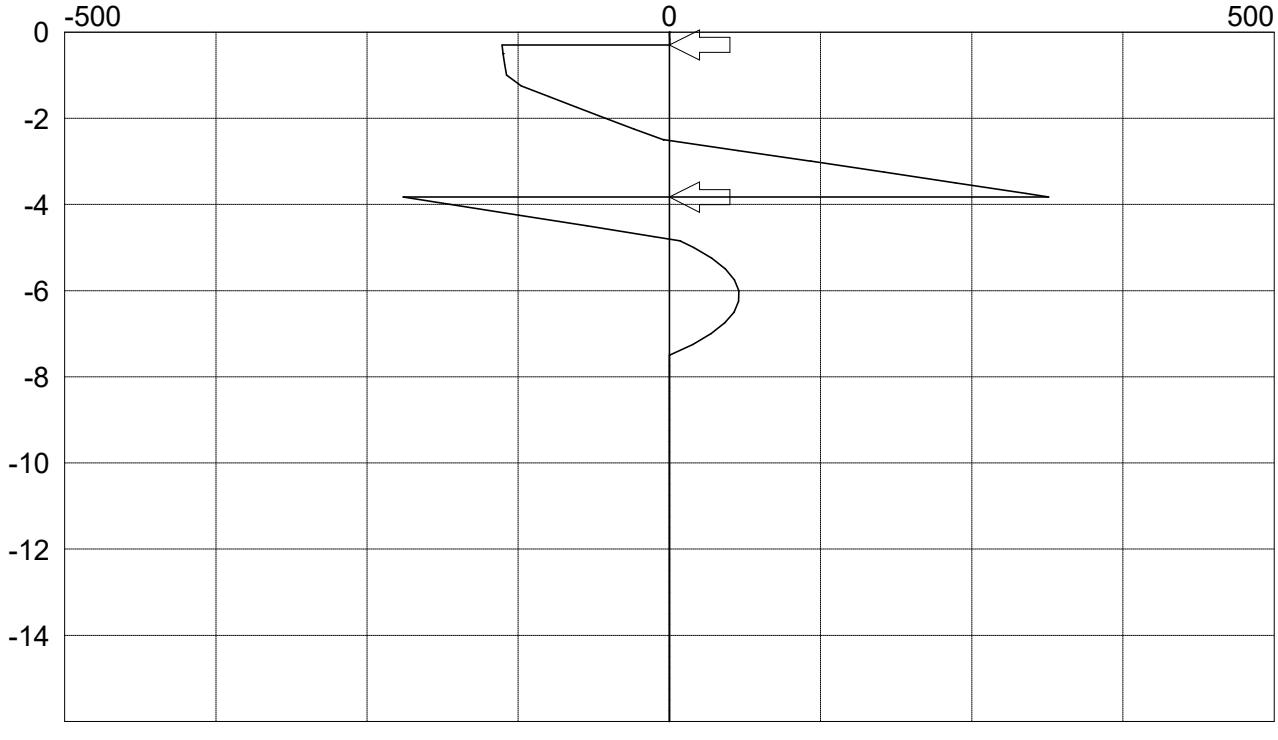




Graphical results from analysis of stage ref 10 continued

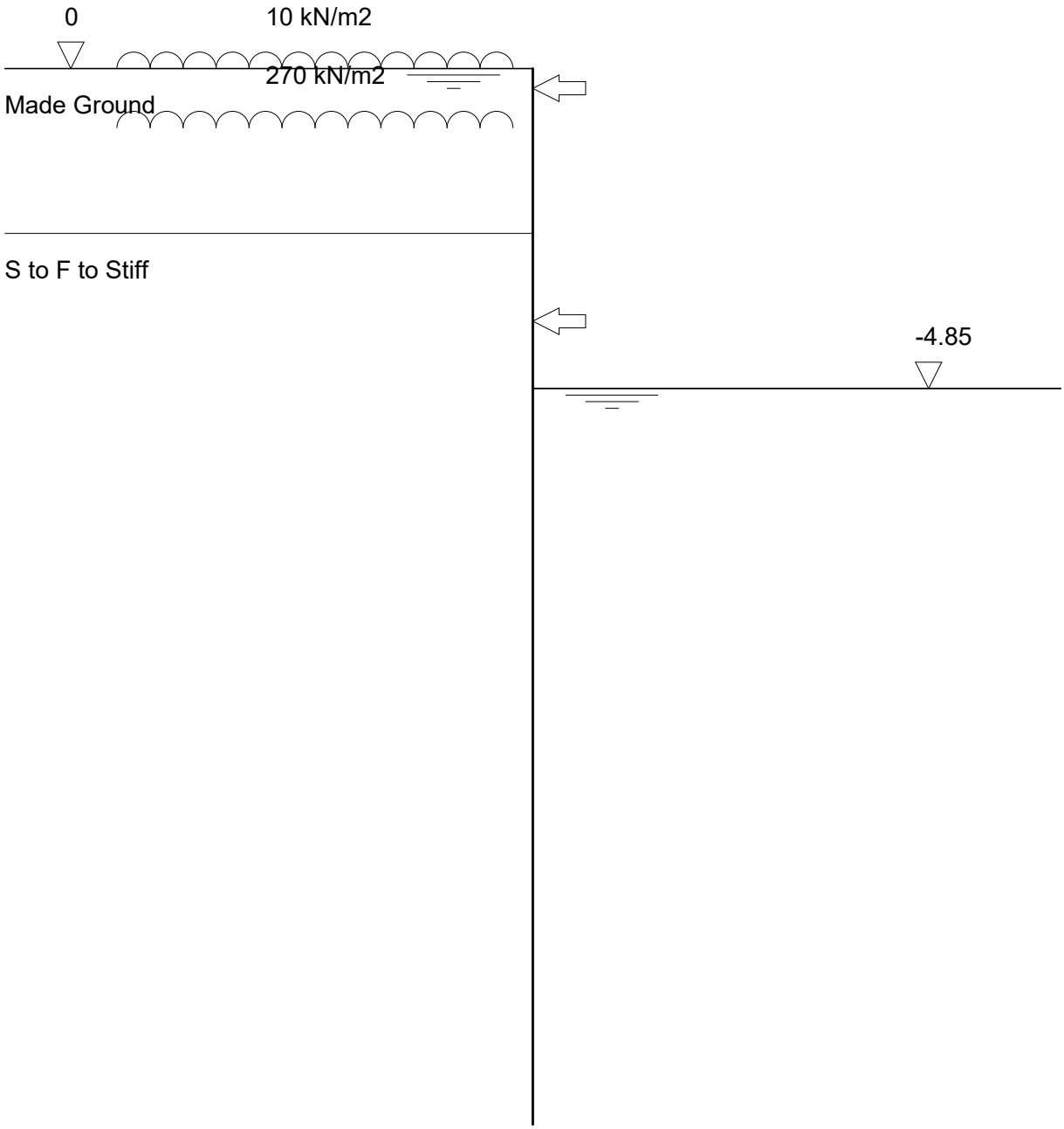


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

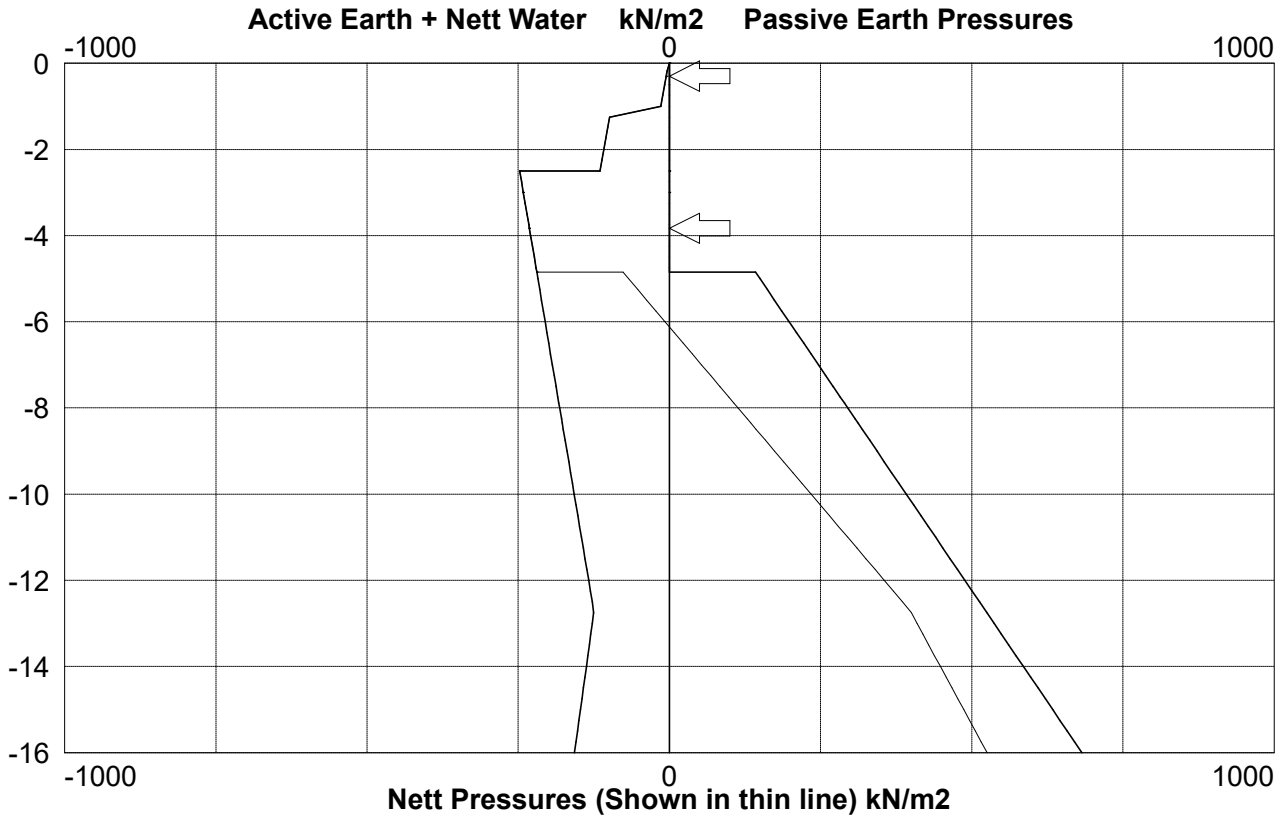
Stage ref. **11**
Stage type **Active water level**

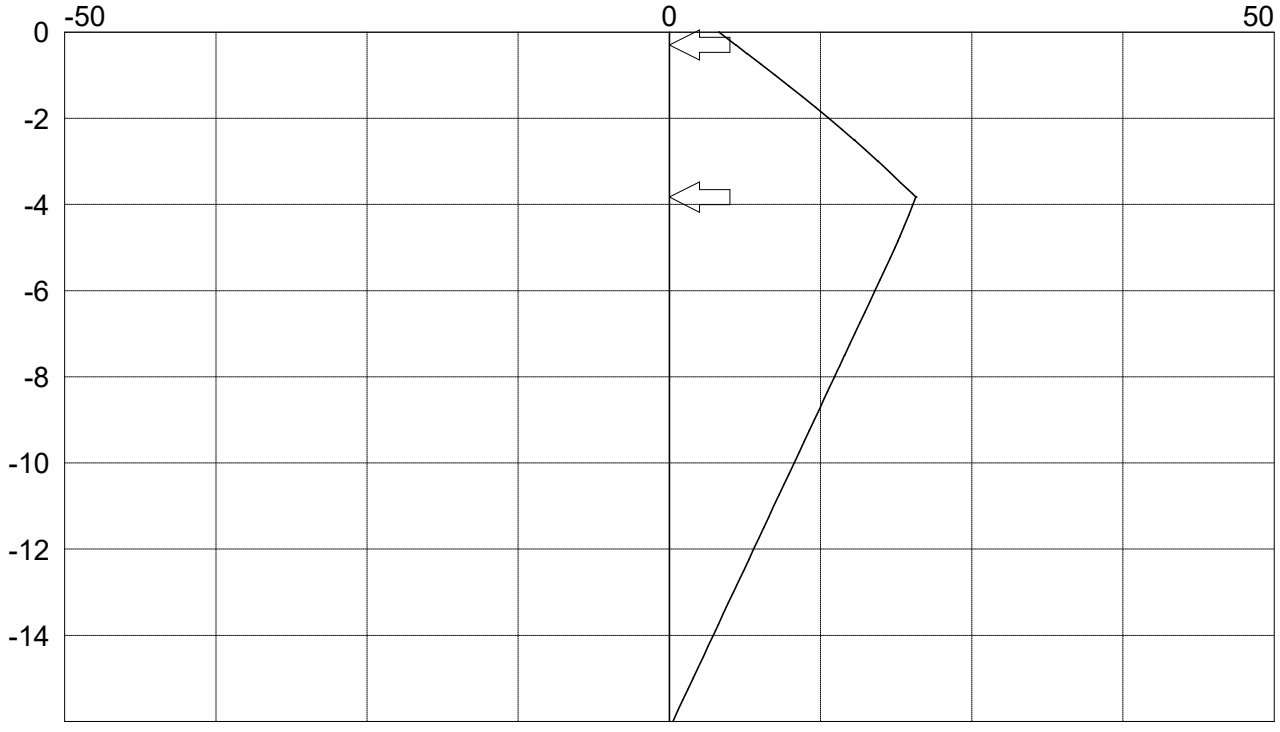


Tabular results from analysis of stage ref 11

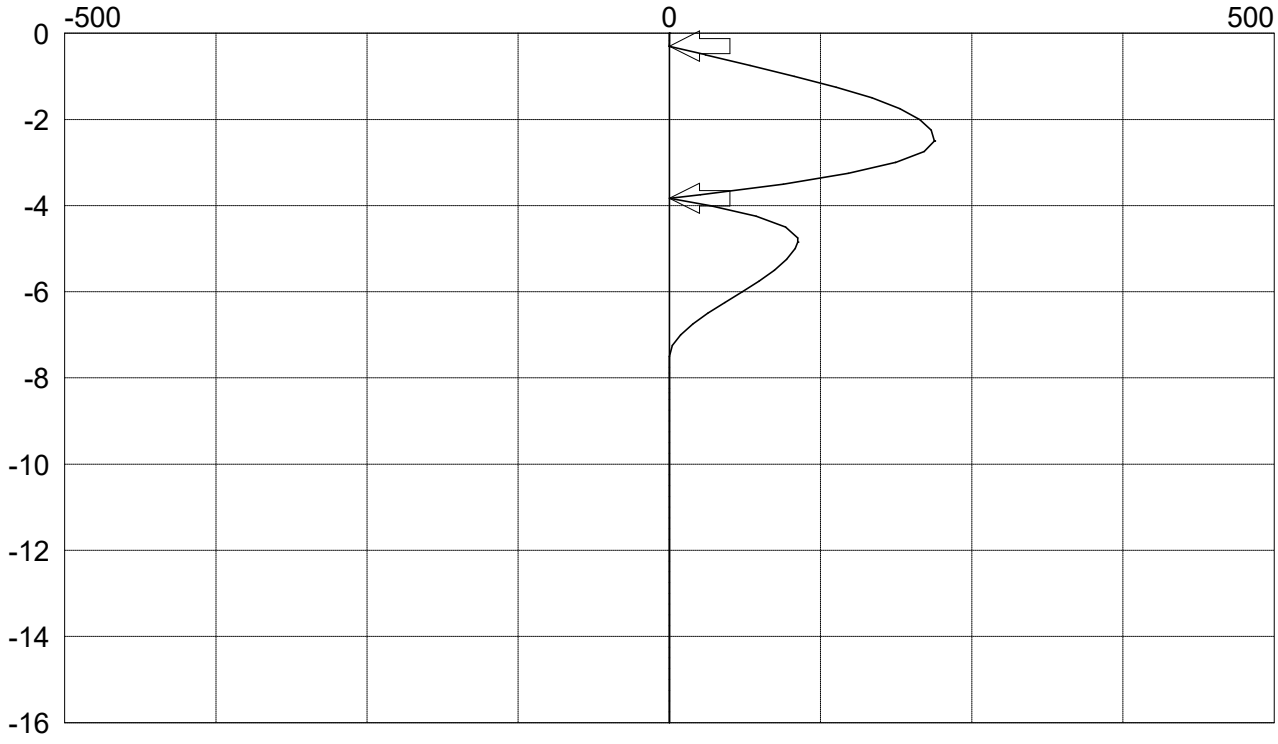
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	4.1		.00
.00	.0	.0	.0	.0	.0	.0	0	0	0	4.1		.00
-.17	11.4	2.0	1.7	.0	.0	.0	3.7	0	-.3	4.9		.00
-.30	12.5	2.4	2.9	.0	.0	.0	5.3	.1	-.9	5.5	151.9	.00
-.30	12.5	2.4	3.0	.0	.0	.0	5.3	.1	151.0	5.5		.00
-.50	14.1	2.9	4.9	.0	.0	.0	7.8	-29.7	149.7	6.4	.0	.00
-.50	14.1	2.9	4.9	.0	.0	.0	7.8	-30.0	149.7	6.4		.00
-1.00	18.2	4.1	9.8	.0	.0	.0	13.9	-103.3	144.3	8.7		.00
-2.00	296.4	88.7	19.6	.0	.0	.0	108.3	-206.9	52.3	13.2		.00
-2.50	300.5	90.0	24.5	.0	.0	.0	114.5	-219.3	-3.4	15.3	.0	.00
-2.50	325.0	247.5	.0	.0	.0	.0	247.5	-219.3	-3.4	15.3		.00
-2.50	325.0	247.4	.0	.0	.0	.0	247.4	-219.3	-3.9	15.3		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-187.2	-125.1	17.2		.00
-3.00	334.5	241.5	.0	.0	.0	.0	241.5	-186.9	-125.6	17.2		.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	-.6	-321.9	20.4	542.4	.00
-3.83	350.3	231.5	.0	.0	.0	.0	231.5	0	220.1	20.4		.00
-4.00	353.5	229.4	.0	.0	.0	.0	229.4	-33.7	181.3	20.1		.00
-4.85	369.6	219.3	.0	.0	.0	.0	219.3	-106.2	-8.9	18.9		.00
-4.85	369.7	219.2	.0	.0	142.6	.0	76.7	-106.2	-9.2	18.9		.00
-5.00	372.5	217.4	.0	2.9	149.8	.0	67.6	-104.0	-20.0	18.7		.16
-6.00	391.5	205.4	.0	21.9	198.2	.0	7.2	-60.2	-57.4	17.0		.63
-7.00	410.5	193.4	.0	40.9	246.6	.0	-53.2	-9.3	-34.4	15.3		.89
-7.51	420.1	187.3	.0	50.5	271.1	.0	-83.8	0	0	14.5		1.00
-7.88	427.3	182.8	.0	57.6	289.4	.0	-106.6	0	0	13.9		1.09
-8.00	429.5	181.4	.0	59.9	295.0	.0	-113.6	0	0	13.7		1.11
-8.35	436.1	177.2	.0	66.5	311.8	.0	-134.6	0	0	13.1		1.19
-9.00	448.5	169.4	.0	78.9	343.4	.0	-174.0	0	0	12.0		1.34
-10.00	467.5	157.4	.0	97.9	391.8	.0	-234.4	0	0	10.3		1.59
-11.00	486.5	145.3	.0	116.9	440.2	.0	-294.8	0	0	8.6		1.85
-12.00	505.5	133.3	.0	135.9	488.6	.0	-355.3	0	0	7.0		2.14
w -13.00	524.5	.0	127.4	154.9	537.0	.0	-409.6	0	0	5.3		2.45
w -14.00	543.5	.0	137.2	173.9	585.4	.0	-448.2	0	0	3.6		2.74
w -15.00	562.5	.0	147.0	192.9	633.8	.0	-486.8	0	0	2.0		2.99
w -16.00	581.5	.0	156.8	211.9	682.2	.0	-525.4	0	0	.3		3.20

Graphical results from analysis of stage ref 11

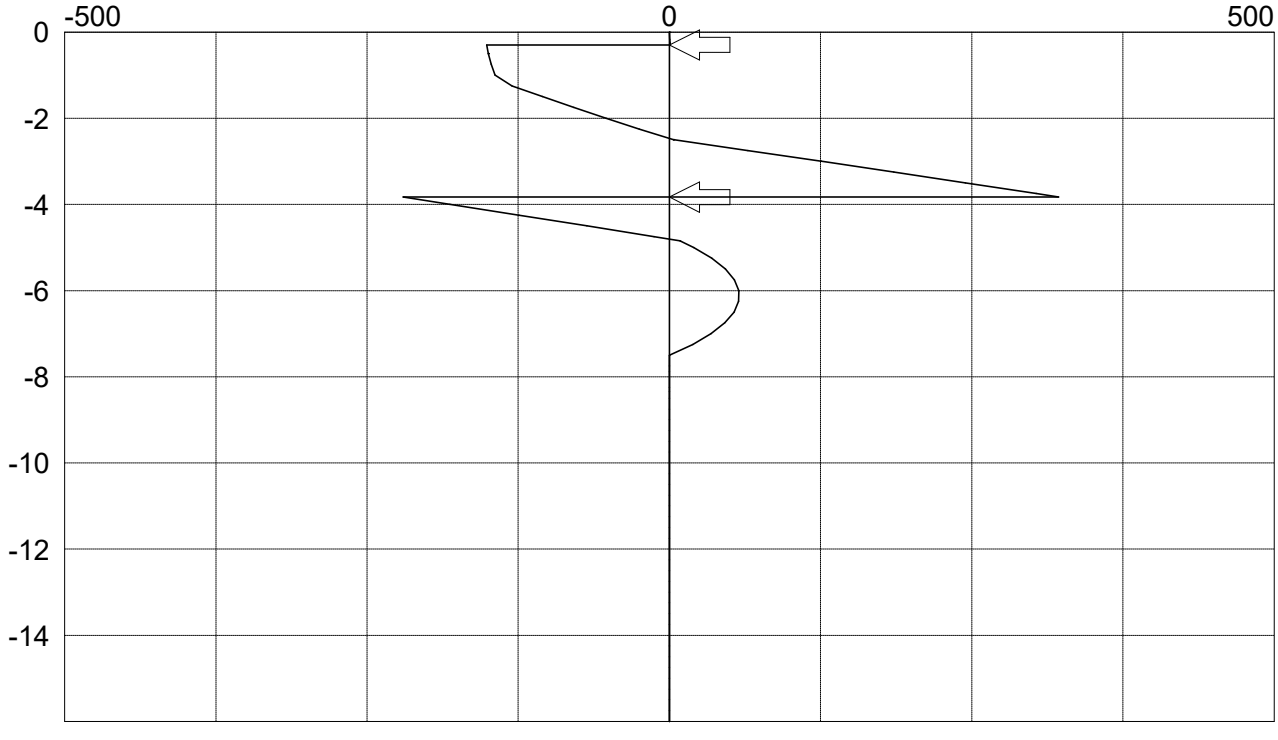




Graphical results from analysis of stage ref 11 continued

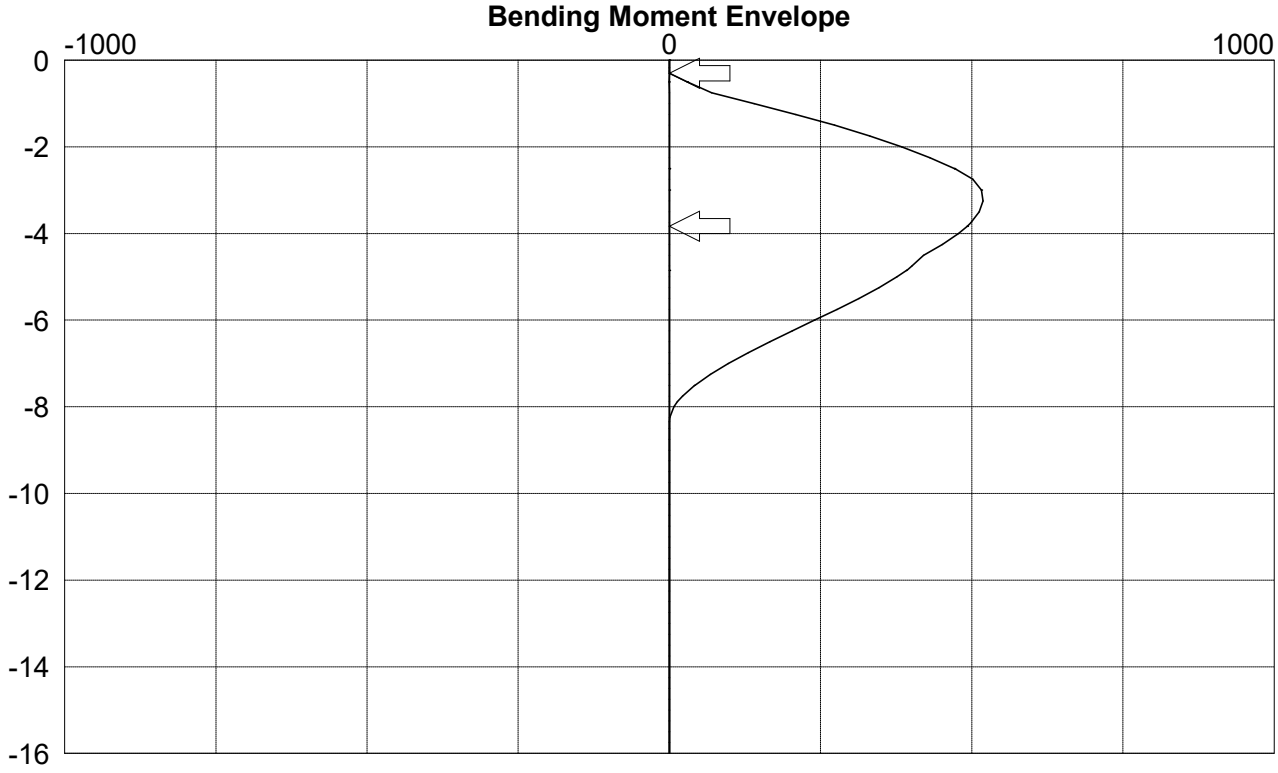


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Graphical plot of envelope from selected construction stages



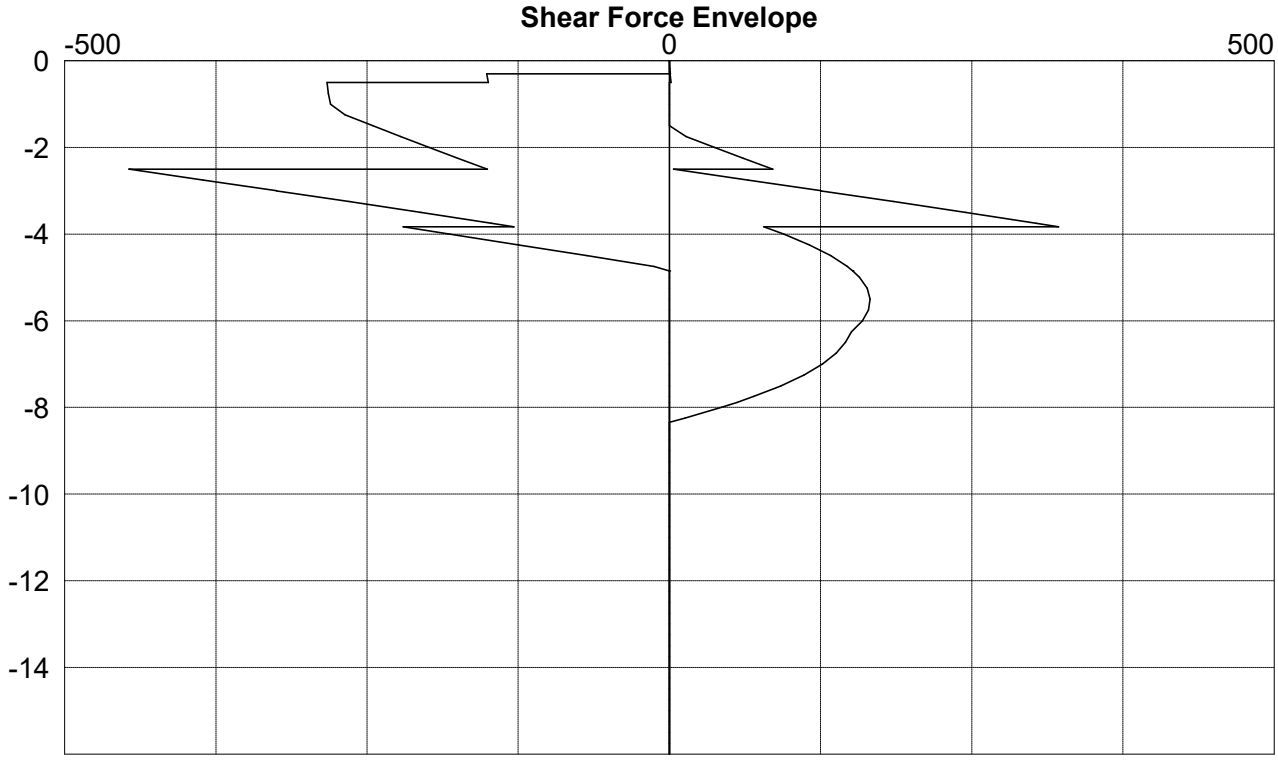


Table of envelope for wall forces

Calc Level m	Bending Minimum kNm/m	Bending Maximum kNm/m	Shear Minimum kN/m	Shear Maximum kN/m	Prop Force kN/m
.00	.0	.0	.0	.0	
.00	.0	.0	.0	.0	
-.17	.0	.0	-.3	.0	
-.30	.0	.1	-.9	.0	151.9
-.30	.0	.1	-.6	151.0	
-.50	-29.7	.3	-1.4	149.7	284.5
-.50	-30.0	.3	.0	283.1	
-1.00	-140.1	.0	.0	280.3	
-2.00	-384.3	.0	-37.4	198.6	
-2.50	-471.6	.0	-85.4	150.6	532.3
-2.50	-471.8	.0	-3.4	446.9	
-2.50	-471.9	.0	-3.9	446.4	
-3.00	-516.2	.0	-125.1	325.2	
-3.00	-516.2	.0	-125.6	324.7	
-3.83	-492.8	.0	-321.9	128.4	542.4
-3.83	-492.6	.0	-78.2	220.1	
-4.00	-478.1	.0	-94.6	181.3	
-4.85	-392.7	.0	-151.7	.0	
-4.85	-392.5	.0	-151.7	.0	
-5.00	-376.5	.0	-157.3	.0	
-6.00	-240.6	.0	-159.5	.0	
-7.00	-97.5	.0	-126.5	.0	
-7.51	-41.7	.0	-91.8	.0	
-7.88	-13.4	.0	-55.9	.0	
-8.00	-7.7	.0	-43.1	.0	
-8.35	.0	.0	.0	.0	
-9.00	.0	.0	.0	.0	
-10.00	.0	.0	.0	.0	
-11.00	.0	.0	.0	.0	
-12.00	.0	.0	.0	.0	
-13.00	.0	.0	.0	.0	
-14.00	.0	.0	.0	.0	
-15.00	.0	.0	.0	.0	
-16.00	.0	.0	.0	.0	

Structural design of wall

Wall section properties

Primary pile diameter	600	mm
Primary pile spacing	700	mm
Infill pile diameter		mm
Main rebar bar diameter	40	mm
Main rebar number of bars	12	
Links/Helix bar diameter	16	mm
Links/Helix spacing/pitch	150	mm

Wall material properties

Concrete cube strength	35	N/mm2
Concrete cover	50	mm
Main rebar steel grade	500	N/mm2
Link rebar steel grade	500	N/mm2
Ultimate load factor	1.35	

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Bending resistance. BS8110 plane strain analysis	490	996	kNm
Max longitudinal steel. BS8110 max 6% by area	16965	15080	mm2
Min longitudinal steel. BS8110 min 0.4% by area	1131	15080	mm2
Shear resistance. BS8110	422	696	kN
Min link dia. BS8110 6mm or 0.25x bar dia	10	16	mm
Max link spacing. BS8110 12x main bar dia or 0.75d	311	150	mm
Min shear link area. BS8110 Clause 3.4.5	1163	2681	mm2/m

Pile geometry

Pile top Level	0	m
Pile Length	16	m
Pile toe level	-16	m

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level -4.85

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
.00	Made Ground	18.00	18.00	15000	0	1		28	.67	.30	1.43
						1		28	.50	4.15	4.99
-2.50	S to F to Stiff	19.00	19.00	19200	7680	10		25	.67	.35	1.52
						10		25	.50	3.38	4.51

Construction sequence

Stage Ref	Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1 A	Active surcharge	-0.90	270.0	.3		
2 A	Active surcharge	0.00	10.0	.3		
3 A	Insert prop	-3.83				
4	Insert prop	-0.30				
5 A	Passive side excavation	-4.85				
6 A	Active water level	0.00				

Code of practice

Code of practice or reference document	
Application of pressures for stability	Not applicable for FOS=1 on moments
FOS on moments (stability check)	1.00
ULS factor on Tan(Phi) values	1.00
ULS fFactor on drained cohesion values	1.00
ULS factor on undrained cohesion values	1.00
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.00

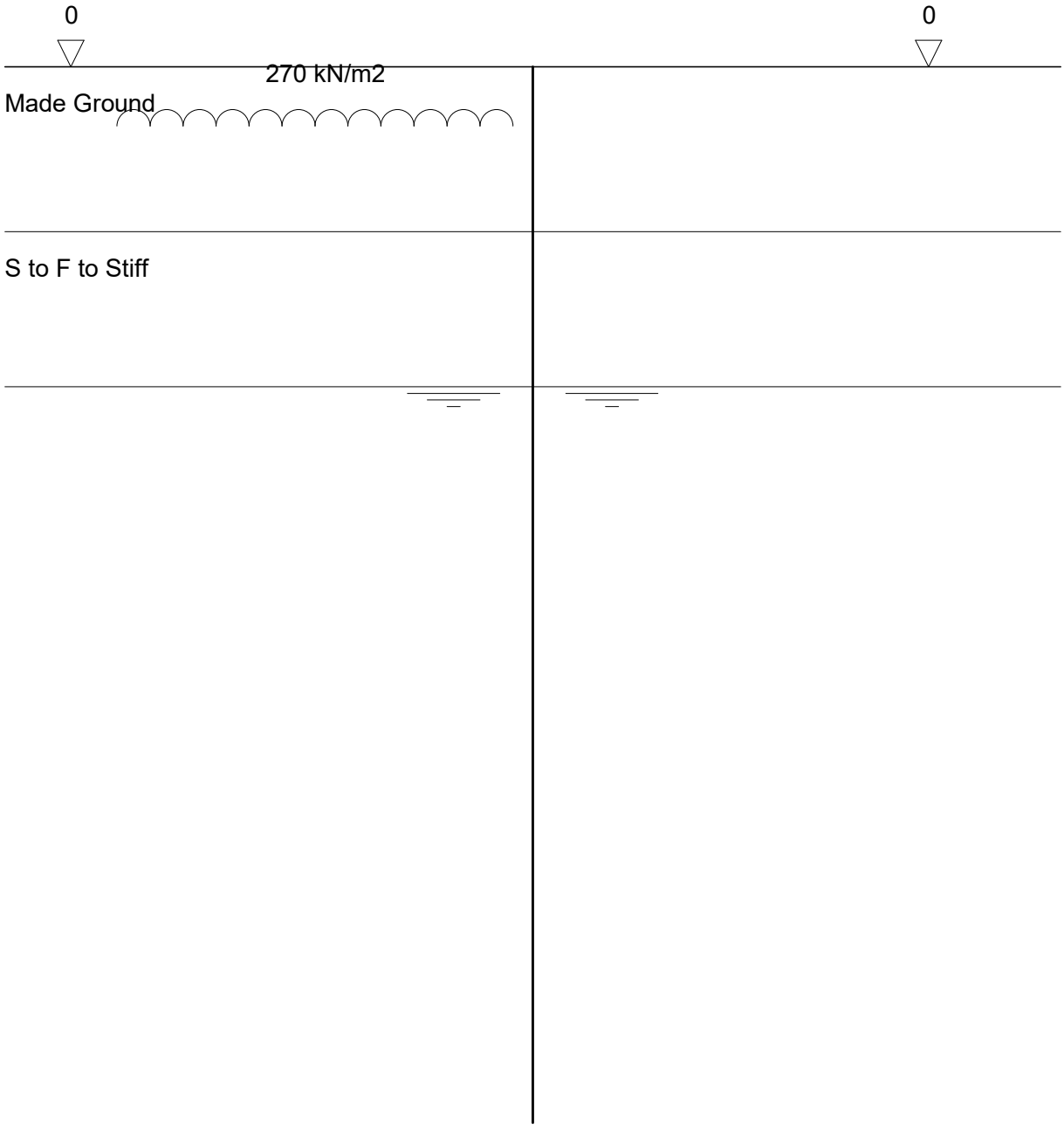
Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	9.8	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	.0	m
Continuity model for wall analysis	Pins at second and lower props	

Deflection parameters

Wall moment of inertia	1908818	cm4/m
Wall Youngs modulus	28000000	kN/m2
Properties for prop at -3.83		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm
Properties for prop at -0.3		
Prop/Tie cross sectional area	72	cm2 each
Prop/Tie Youngs modulus	28000000	kN/m2
Prop/Tie length	1.0	m
Prop/Tie spacing	1.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

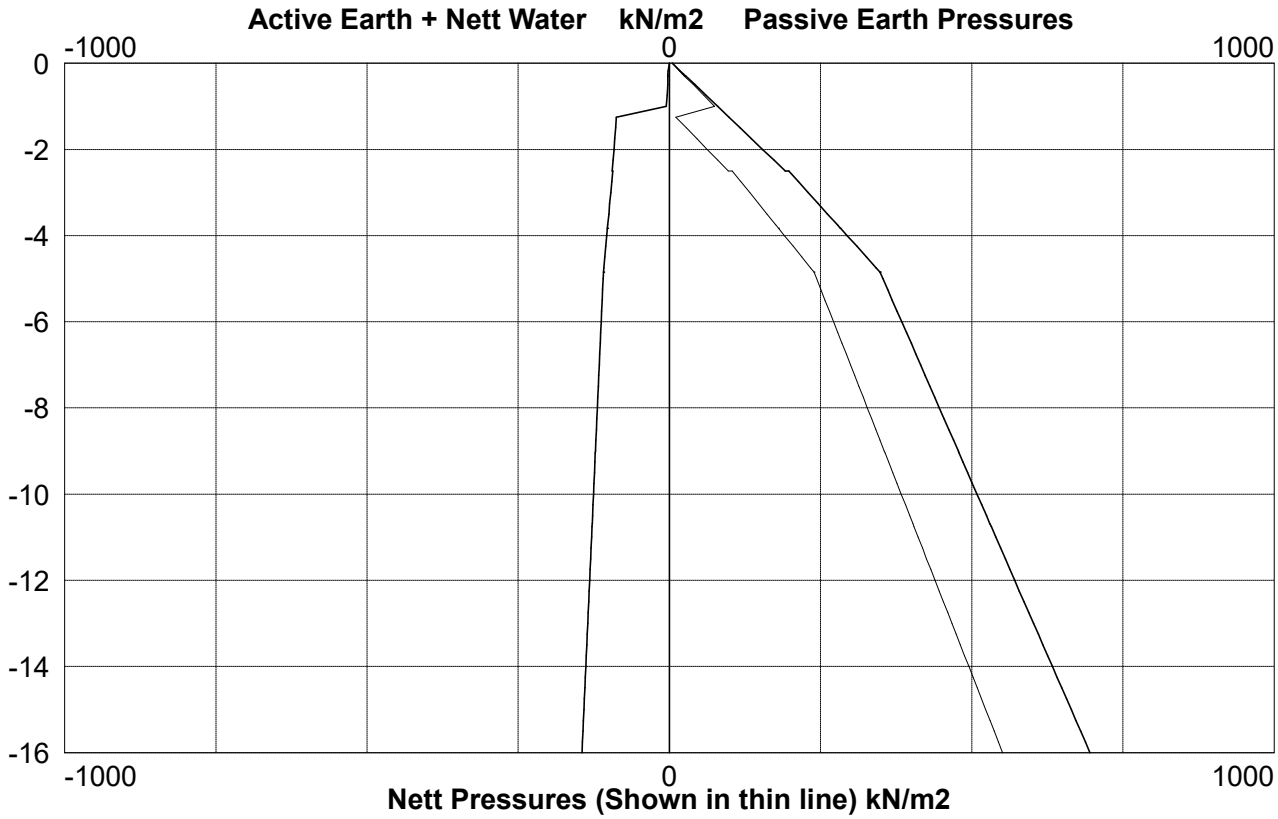
Stage ref. **1**
Stage type **Active surcharge**

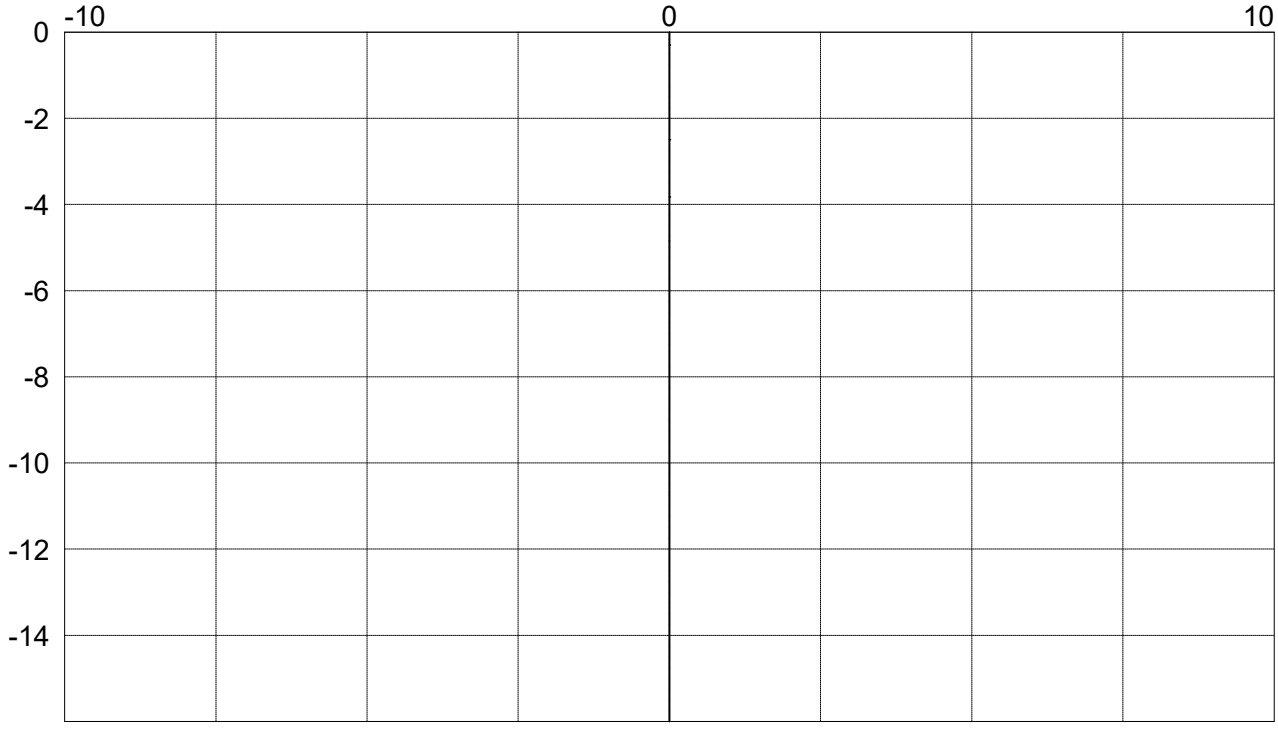


Tabular results from analysis of stage ref 1

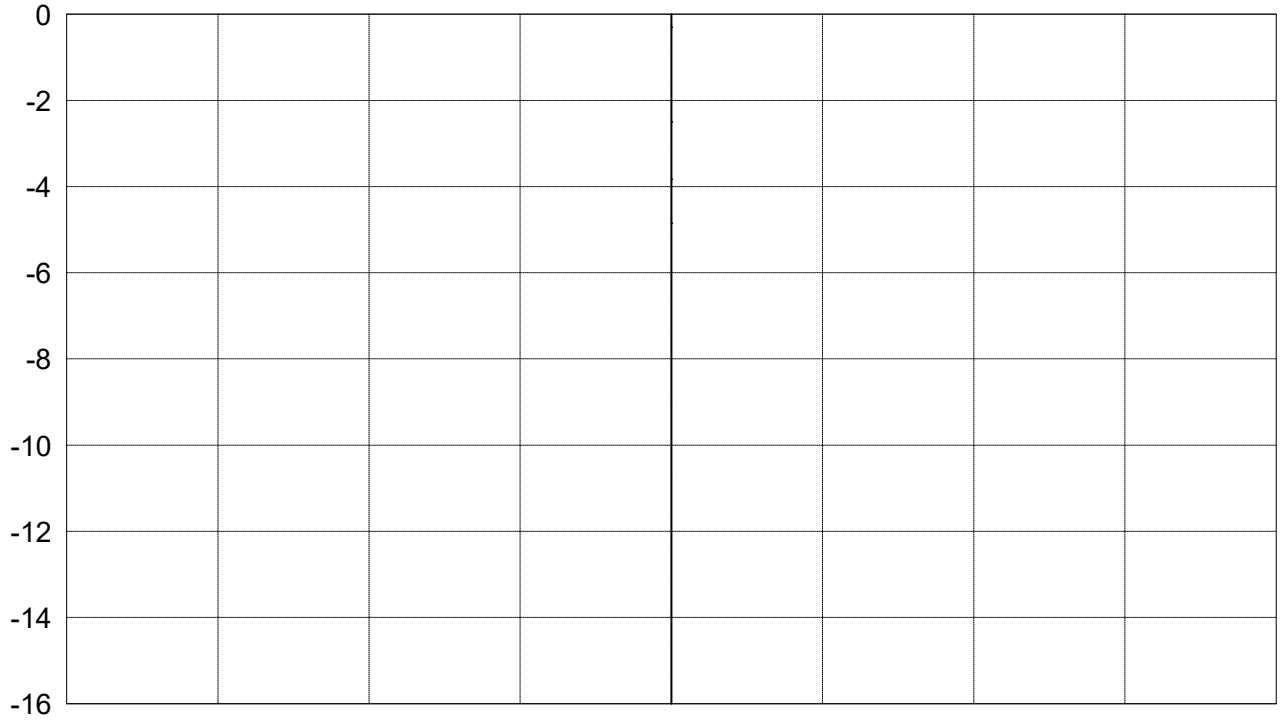
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	5.0	.0	-5.0	0	0	0		.00
t -.17	3.1	.0	1.7	3.1	17.9	.0	-16.2	0	0	0		>100.00
t -.30	5.4	.0	2.5	5.4	27.4	.0	-25.0	0	0	0	.0	>100.00
t -.30	5.4	.0	2.5	5.4	27.6	.0	-25.1	0	0	0		>100.00
m -1.00	18.0	5.0	.0	18.0	79.7	.0	-74.7	0	0	0		>100.00
-2.00	306.0	91.6	.0	36.0	154.4	.0	-62.8	0	0	0		>100.00
-2.50	315.0	94.4	.0	45.0	191.8	.0	-97.4	0	0	0		>100.00
-2.50	315.0	93.6	.0	45.0	197.3	.0	-103.7	0	0	0		>100.00
-3.00	324.5	96.9	.0	54.5	229.5	.0	-132.6	0	0	0		>100.00
-3.83	340.3	102.3	.0	70.3	282.9	.0	-180.5	0	0	0	.0	>100.00
-3.83	340.3	102.4	.0	70.3	283.0	.0	-180.6	0	0	0		>100.00
-4.00	343.5	103.5	.0	73.5	293.8	.0	-190.3	0	0	0		>100.00
-4.85	359.6	109.0	.0	89.6	348.3	.0	-239.3	0	0	0		>100.00
-4.85	359.7	109.0	.0	89.6	348.5	.0	-239.4	0	0	0		>100.00
-5.00	361.0	109.5	1.5	91.0	353.1	1.5	-243.6	0	0	0		>100.00
-6.00	370.2	112.7	11.3	100.2	384.3	11.3	-271.6	0	0	0		>100.00
-7.00	379.4	115.9	21.1	109.4	415.4	21.1	-299.5	0	0	0		>100.00
-8.00	388.6	119.0	30.9	118.6	446.5	30.9	-327.5	0	0	0		>100.00
-9.00	397.8	122.2	40.7	127.8	477.7	40.7	-355.4	0	0	0		>100.00
-9.05	398.3	122.4	41.1	128.3	479.1	41.1	-356.7	0	0	0		>100.00
-10.00	407.0	125.4	50.5	137.0	508.8	50.5	-383.4	0	0	0		>100.00
-10.68	413.3	127.6	57.2	143.3	530.1	57.2	-402.5	0	0	0		>100.00
-11.00	416.2	128.6	60.3	146.2	539.9	60.3	-411.4	0	0	0		>100.00
-12.00	425.4	131.8	70.1	155.4	571.1	70.1	-439.3	0	0	0		>100.00
-13.00	434.6	134.9	79.9	164.6	602.2	79.9	-467.3	0	0	0		>100.00
-14.00	443.8	138.1	89.7	173.8	633.3	89.7	-495.2	0	0	0		>100.00
-15.00	453.0	141.3	99.5	183.0	664.5	99.5	-523.2	0	0	0		>100.00
-16.00	462.2	144.5	109.3	192.2	695.6	109.3	-551.1	0	0	0		>100.00

Graphical results from analysis of stage ref 1

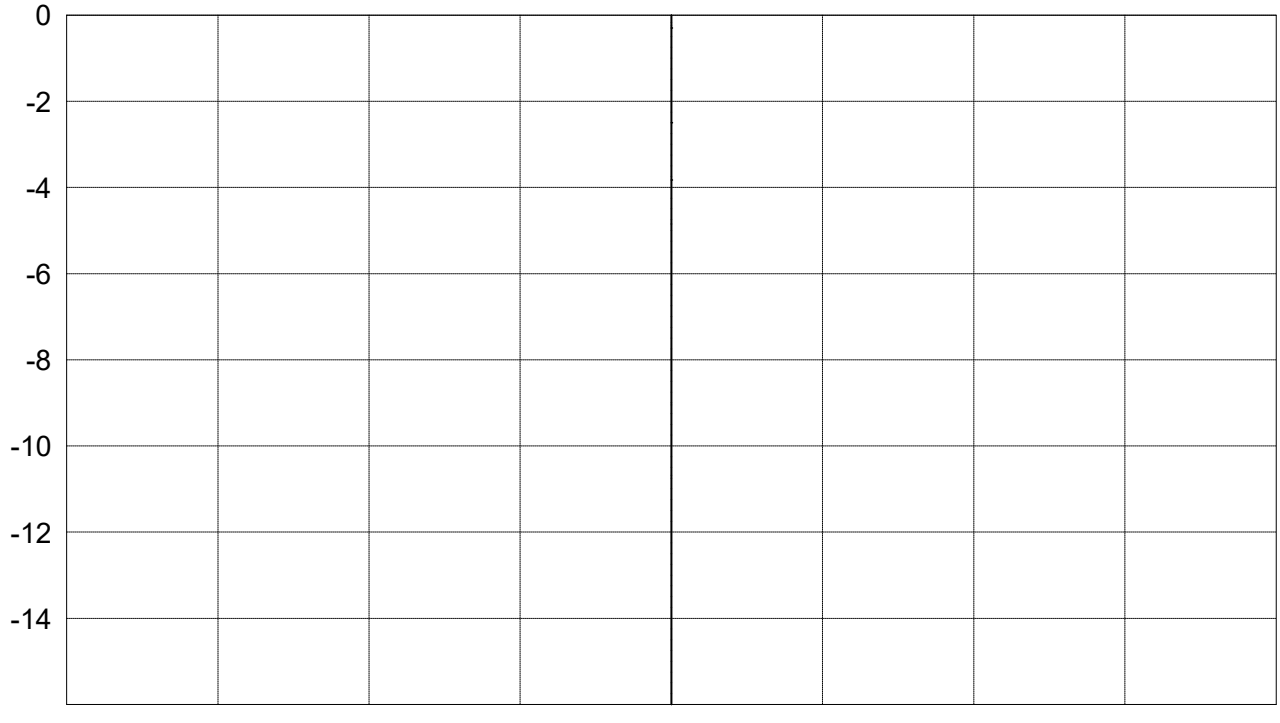




Graphical results from analysis of stage ref 1 continued

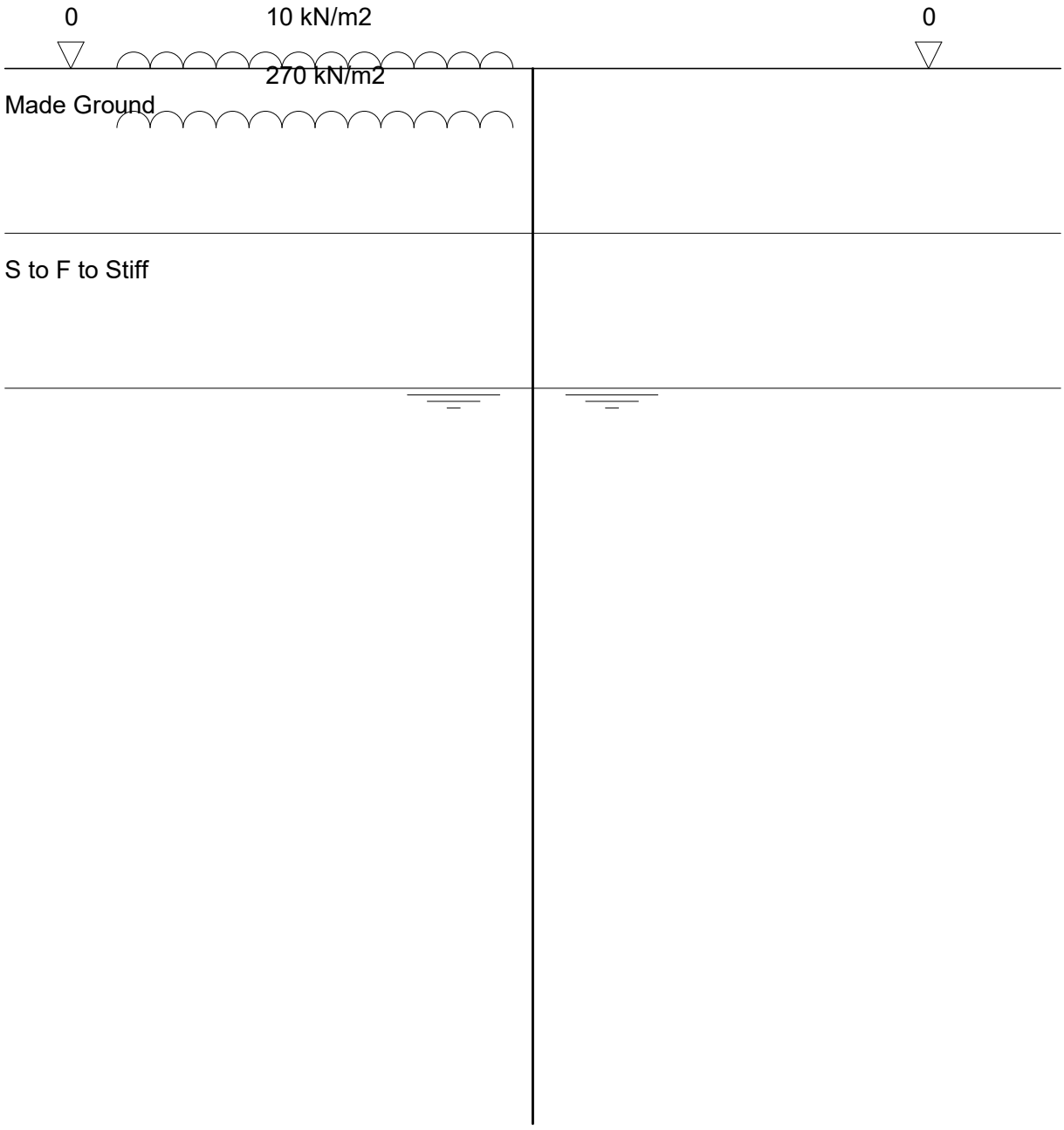


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

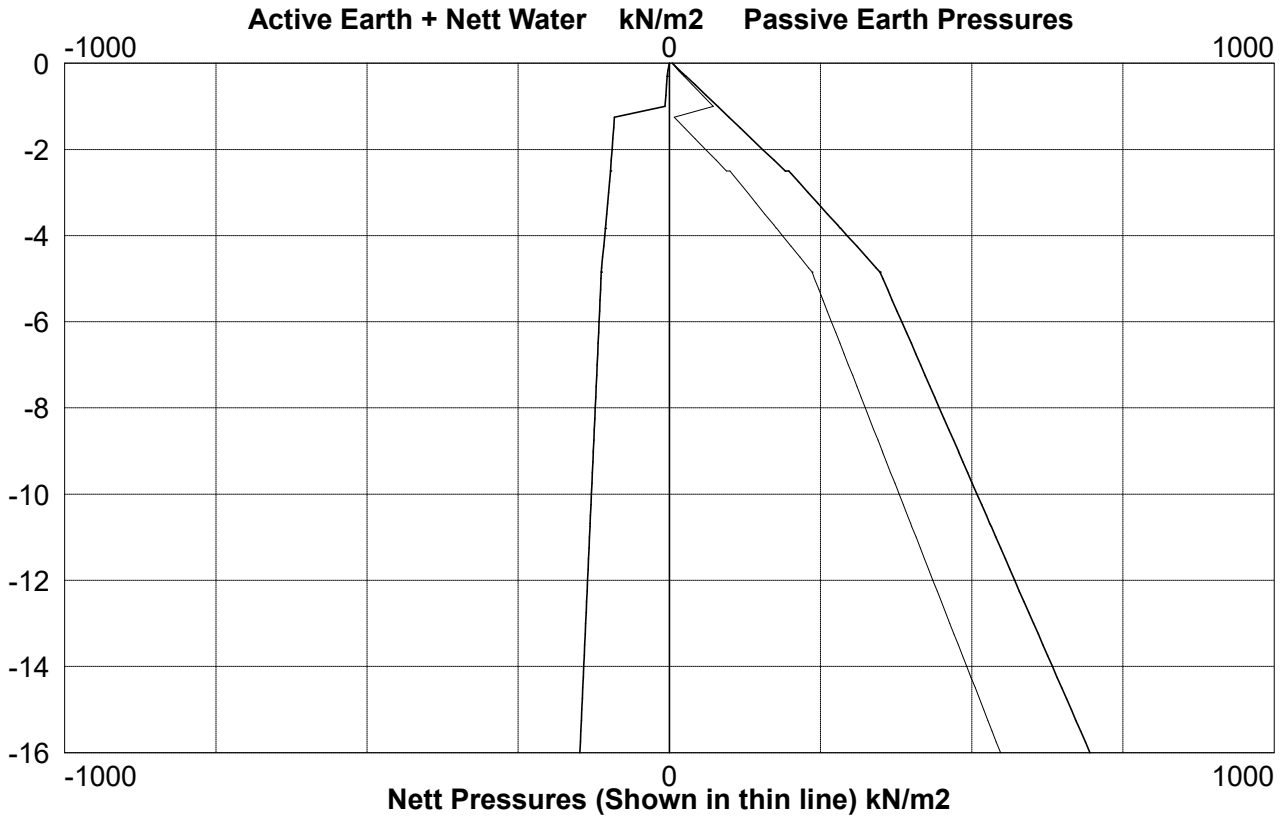
Stage ref. **2**
Stage type **Active surcharge**

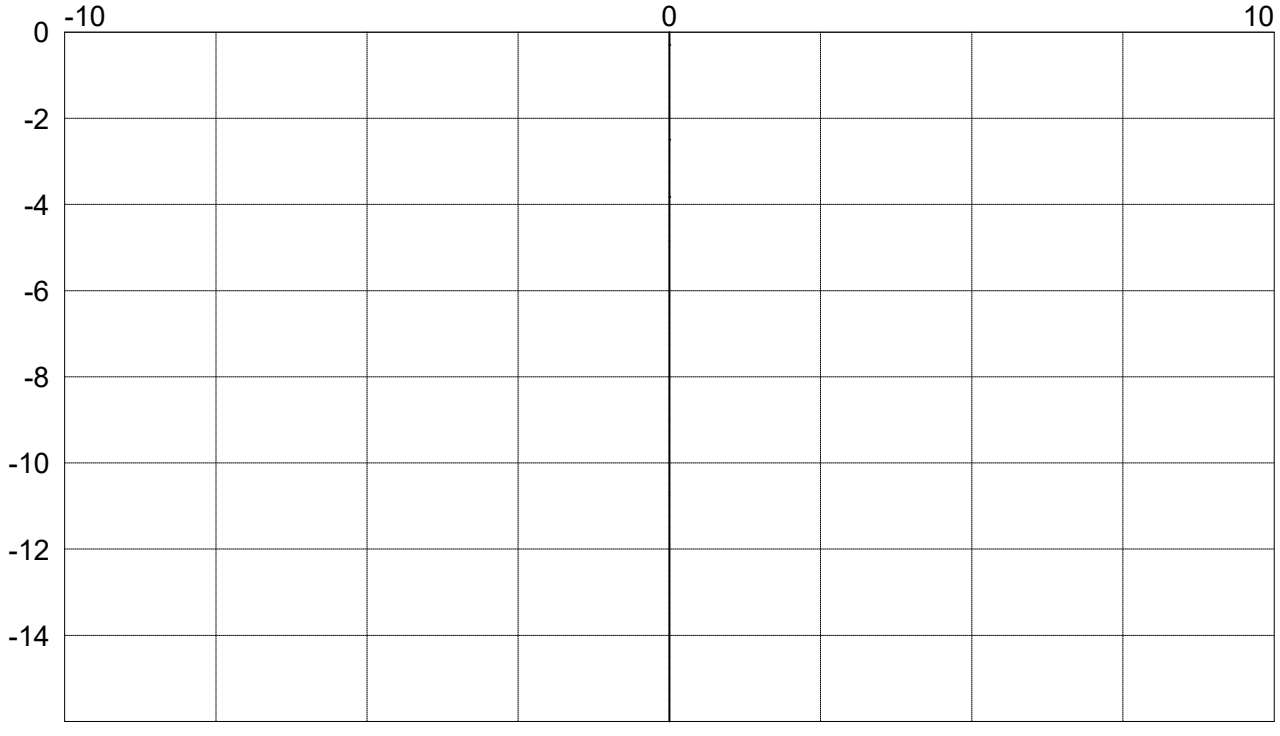


Tabular results from analysis of stage ref 2

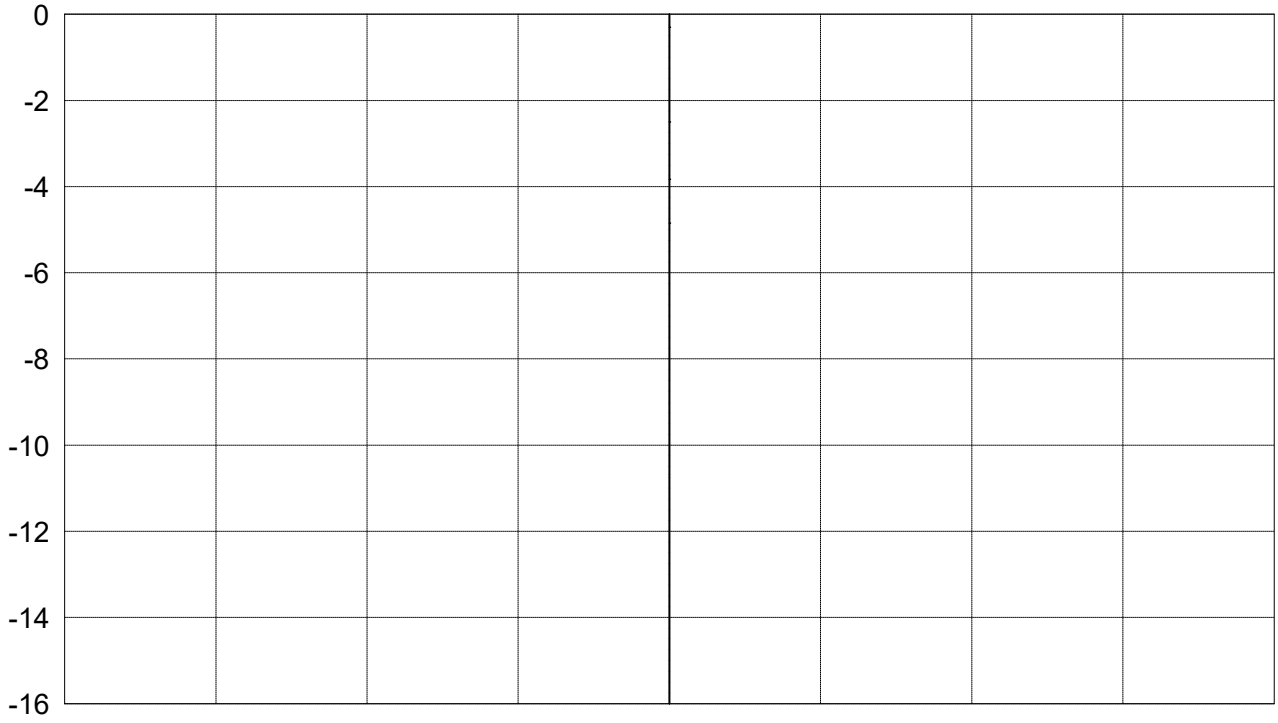
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	5.0	.0	-5.0	0	0	0		.00
-.17	13.1	2.6	.0	3.1	17.9	.0	-15.4	0	0	0		>100.00
-.30	15.4	3.3	.0	5.4	27.4	.0	-24.1	0	0	0	.0	>100.00
-.30	15.4	3.3	.0	5.4	27.6	.0	-24.3	0	0	0		>100.00
-1.00	28.0	7.1	.0	18.0	79.7	.0	-72.6	0	0	0		>100.00
-2.00	316.0	94.7	.0	36.0	154.4	.0	-59.7	0	0	0		>100.00
-2.50	325.0	97.4	.0	45.0	191.8	.0	-94.3	0	0	0		>100.00
-2.50	325.0	97.1	.0	45.0	197.3	.0	-100.3	0	0	0		>100.00
-3.00	334.5	100.3	.0	54.5	229.5	.0	-129.2	0	0	0		>100.00
-3.83	350.3	105.8	.0	70.3	282.9	.0	-177.1	0	0	0	.0	>100.00
-3.83	350.3	105.8	.0	70.3	283.0	.0	-177.2	0	0	0		>100.00
-4.00	353.5	106.9	.0	73.5	293.8	.0	-186.9	0	0	0		>100.00
-4.85	369.6	112.5	.0	89.6	348.3	.0	-235.8	0	0	0		>100.00
-4.85	369.7	112.5	.0	89.6	348.5	.0	-236.0	0	0	0		>100.00
-5.00	371.0	113.0	1.5	91.0	353.1	1.5	-240.2	0	0	0		>100.00
-6.00	380.2	116.1	11.3	100.2	384.3	11.3	-268.1	0	0	0		>100.00
-7.00	389.4	119.3	21.1	109.4	415.4	21.1	-296.1	0	0	0		>100.00
-8.00	398.6	122.5	30.9	118.6	446.5	30.9	-324.0	0	0	0		>100.00
-9.00	407.8	125.7	40.7	127.8	477.7	40.7	-352.0	0	0	0		>100.00
-9.05	408.3	125.8	41.1	128.3	479.1	41.1	-353.3	0	0	0		>100.00
-10.00	417.0	128.9	50.5	137.0	508.8	50.5	-379.9	0	0	0		>100.00
-10.68	423.3	131.0	57.2	143.3	530.1	57.2	-399.1	0	0	0		>100.00
-11.00	426.2	132.0	60.3	146.2	539.9	60.3	-407.9	0	0	0		>100.00
-12.00	435.4	135.2	70.1	155.4	571.1	70.1	-435.9	0	0	0		>100.00
-13.00	444.6	138.4	79.9	164.6	602.2	79.9	-463.8	0	0	0		>100.00
-14.00	453.8	141.6	89.7	173.8	633.3	89.7	-491.8	0	0	0		>100.00
-15.00	463.0	144.7	99.5	183.0	664.5	99.5	-519.7	0	0	0		>100.00
-16.00	472.2	147.9	109.3	192.2	695.6	109.3	-547.7	0	0	0		>100.00

Graphical results from analysis of stage ref 2

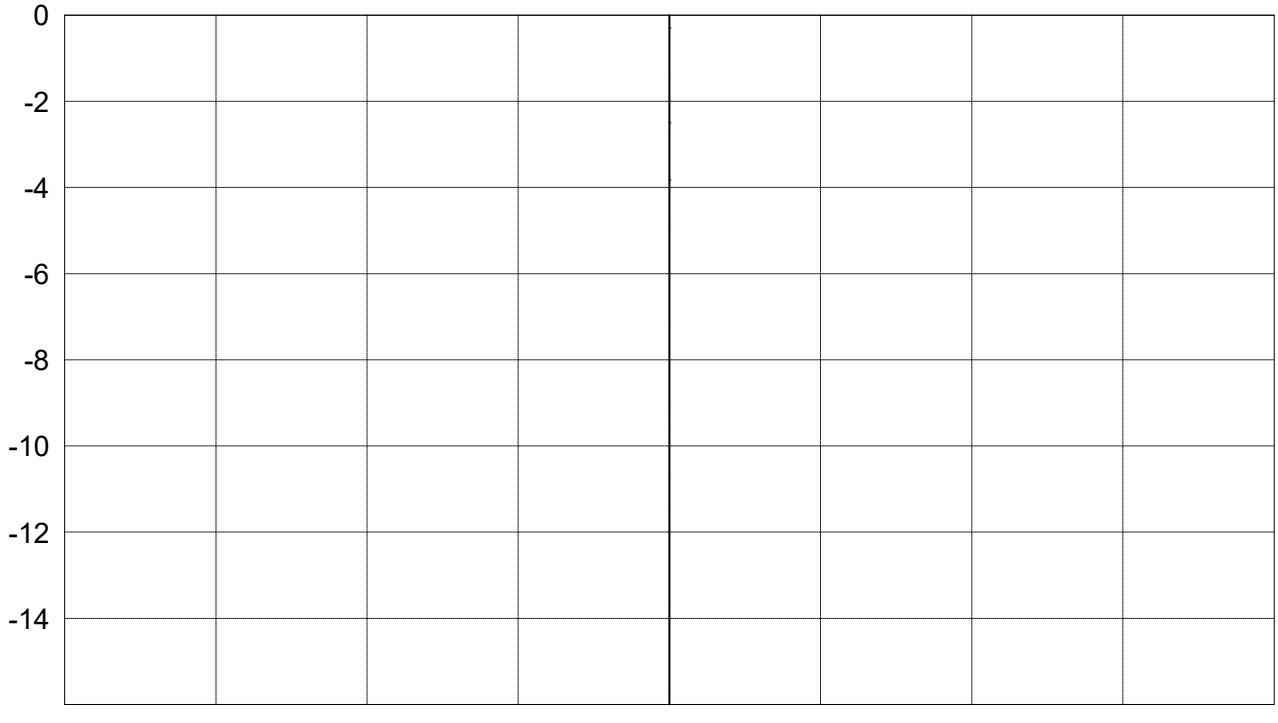




Graphical results from analysis of stage ref 2 continued

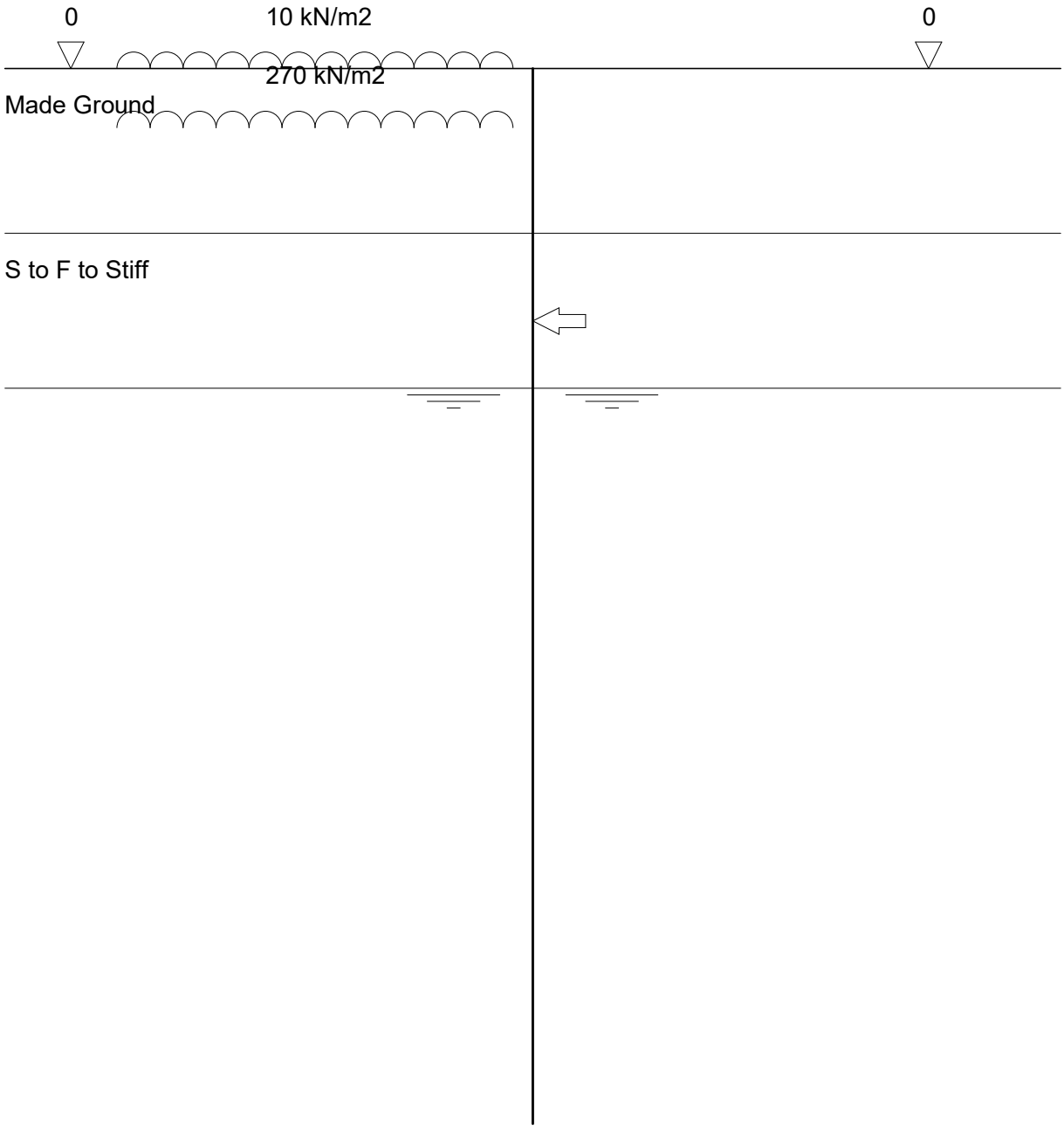


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

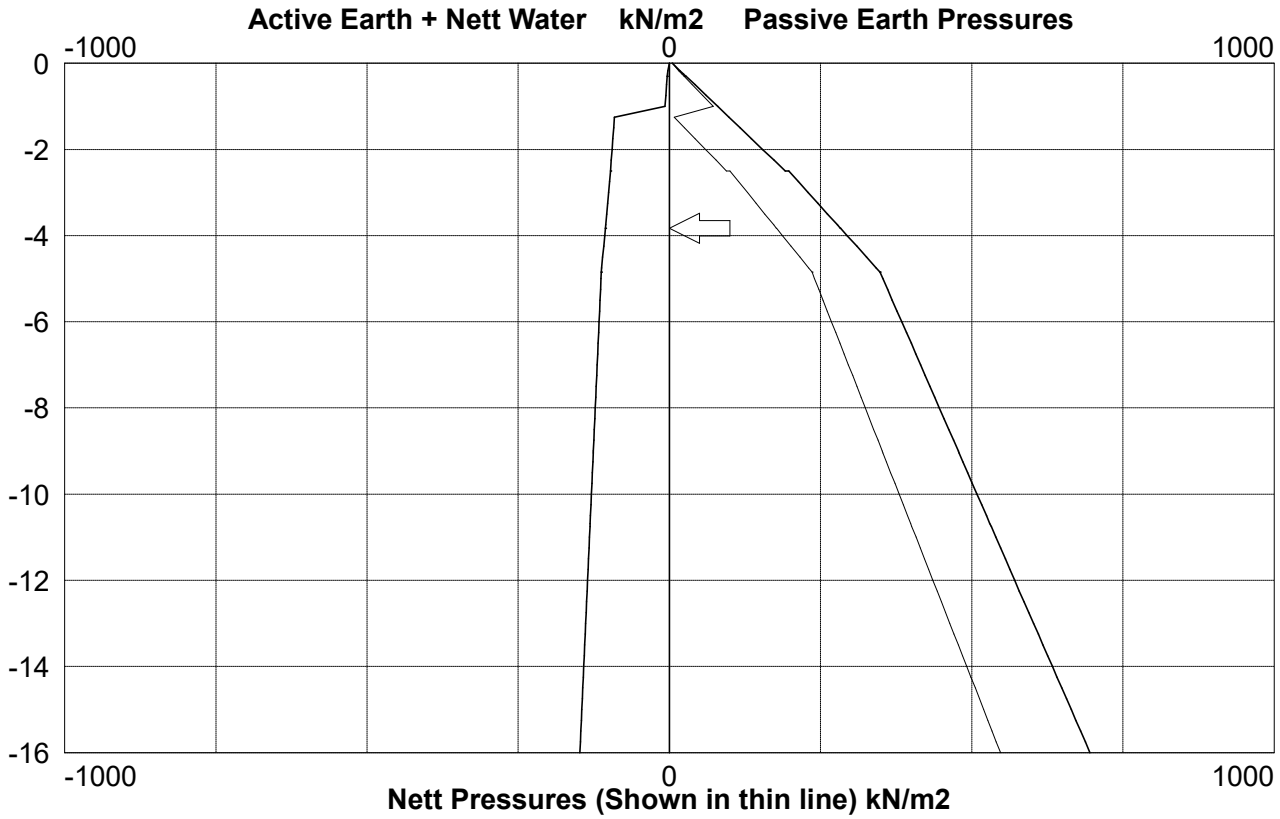
Stage ref. **3**
Stage type **Insert prop**

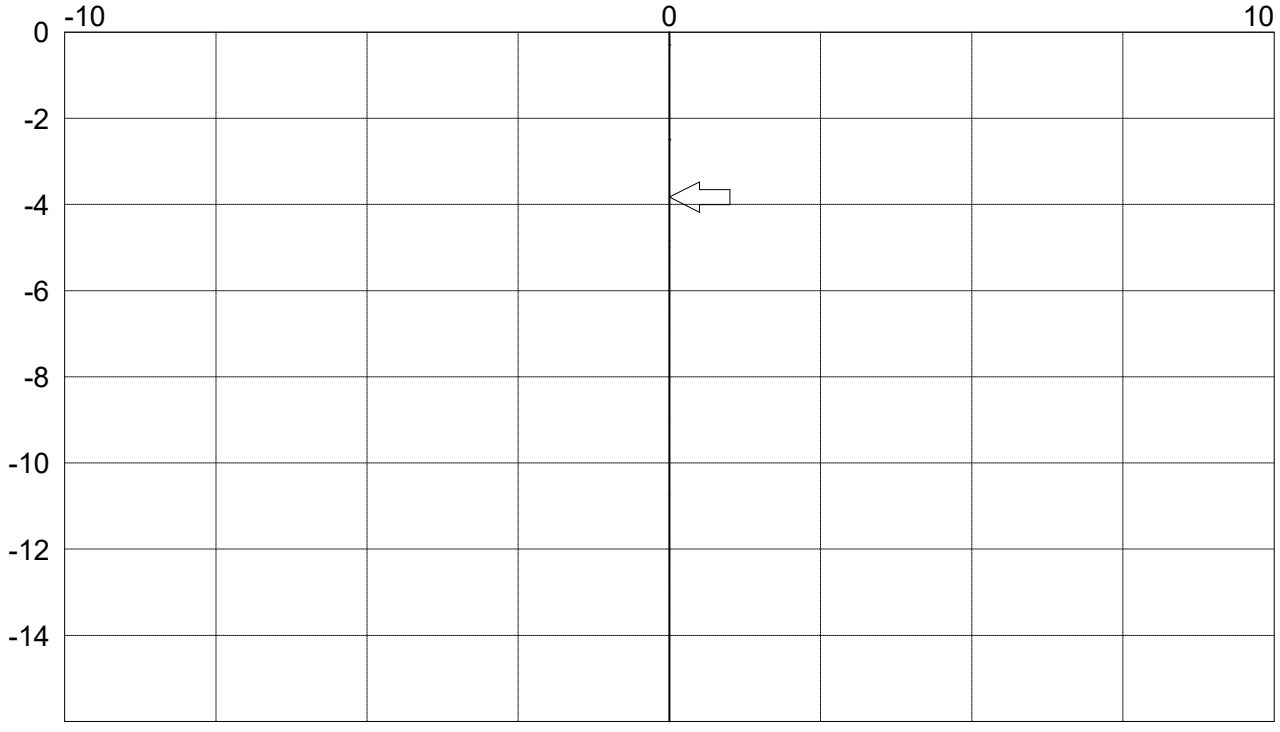


Tabular results from analysis of stage ref 3

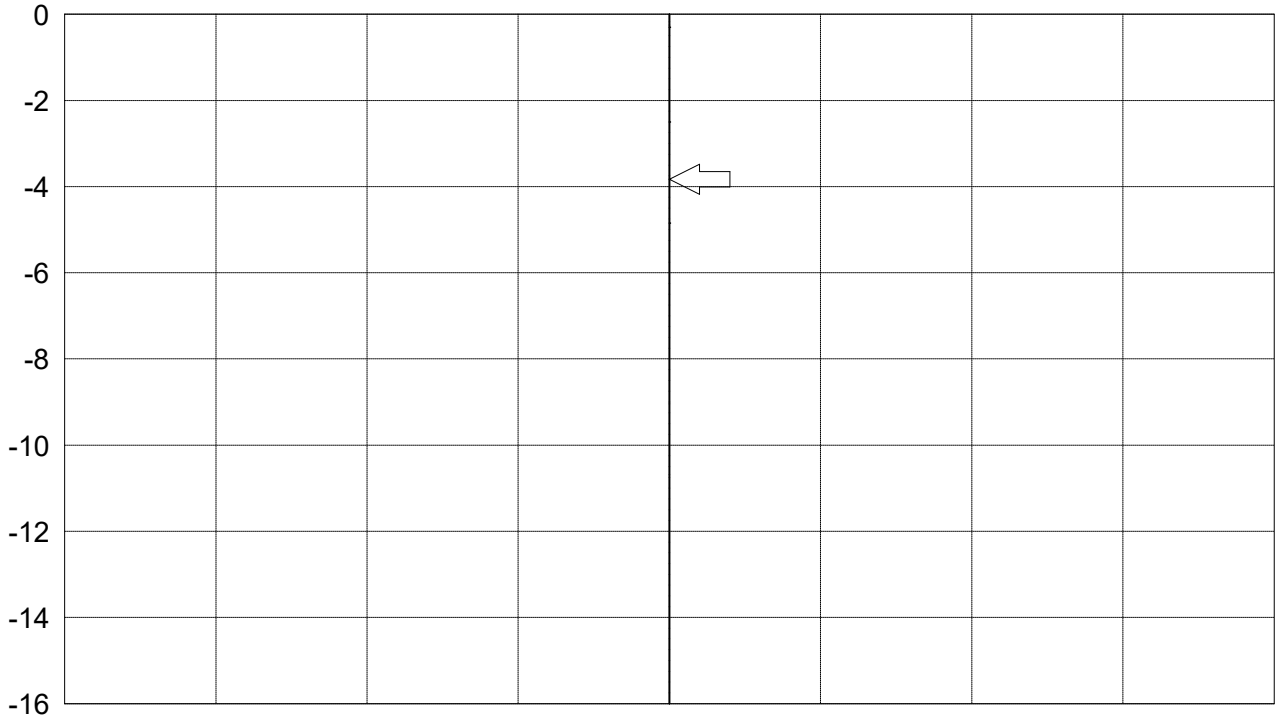
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	5.0	.0	-5.0	0	0	0		.00
-.17	13.1	2.6	.0	3.1	17.9	.0	-15.4	0	0	0		>100.00
-.30	15.4	3.3	.0	5.4	27.4	.0	-24.1	0	0	0	.0	>100.00
-.30	15.4	3.3	.0	5.4	27.6	.0	-24.3	0	0	0		>100.00
-1.00	28.0	7.1	.0	18.0	79.7	.0	-72.6	0	0	0		>100.00
-2.00	316.0	94.7	.0	36.0	154.4	.0	-59.7	0	0	0		>100.00
-2.50	325.0	97.4	.0	45.0	191.8	.0	-94.3	0	0	0		>100.00
-2.50	325.0	97.1	.0	45.0	197.3	.0	-100.3	0	0	0		>100.00
-3.00	334.5	100.3	.0	54.5	229.5	.0	-129.2	0	0	0		>100.00
-3.83	350.3	105.8	.0	70.3	282.9	.0	-177.1	0	0	0	.0	>100.00
-3.83	350.3	105.8	.0	70.3	283.0	.0	-177.2	0	0	0		>100.00
-4.00	353.5	106.9	.0	73.5	293.8	.0	-186.9	0	0	0		>100.00
-4.85	369.6	112.5	.0	89.6	348.3	.0	-235.8	0	0	0		>100.00
-4.85	369.7	112.5	.0	89.6	348.5	.0	-236.0	0	0	0		>100.00
-5.00	371.0	113.0	1.5	91.0	353.1	1.5	-240.2	0	0	0		>100.00
-6.00	380.2	116.1	11.3	100.2	384.3	11.3	-268.1	0	0	0		>100.00
-7.00	389.4	119.3	21.1	109.4	415.4	21.1	-296.1	0	0	0		>100.00
-8.00	398.6	122.5	30.9	118.6	446.5	30.9	-324.0	0	0	0		>100.00
-9.00	407.8	125.7	40.7	127.8	477.7	40.7	-352.0	0	0	0		>100.00
-9.05	408.3	125.8	41.1	128.3	479.1	41.1	-353.3	0	0	0		>100.00
-10.00	417.0	128.9	50.5	137.0	508.8	50.5	-379.9	0	0	0		>100.00
-10.68	423.3	131.0	57.2	143.3	530.1	57.2	-399.1	0	0	0		>100.00
-11.00	426.2	132.0	60.3	146.2	539.9	60.3	-407.9	0	0	0		>100.00
-12.00	435.4	135.2	70.1	155.4	571.1	70.1	-435.9	0	0	0		>100.00
-13.00	444.6	138.4	79.9	164.6	602.2	79.9	-463.8	0	0	0		>100.00
-14.00	453.8	141.6	89.7	173.8	633.3	89.7	-491.8	0	0	0		>100.00
-15.00	463.0	144.7	99.5	183.0	664.5	99.5	-519.7	0	0	0		>100.00
-16.00	472.2	147.9	109.3	192.2	695.6	109.3	-547.7	0	0	0		>100.00

Graphical results from analysis of stage ref 3

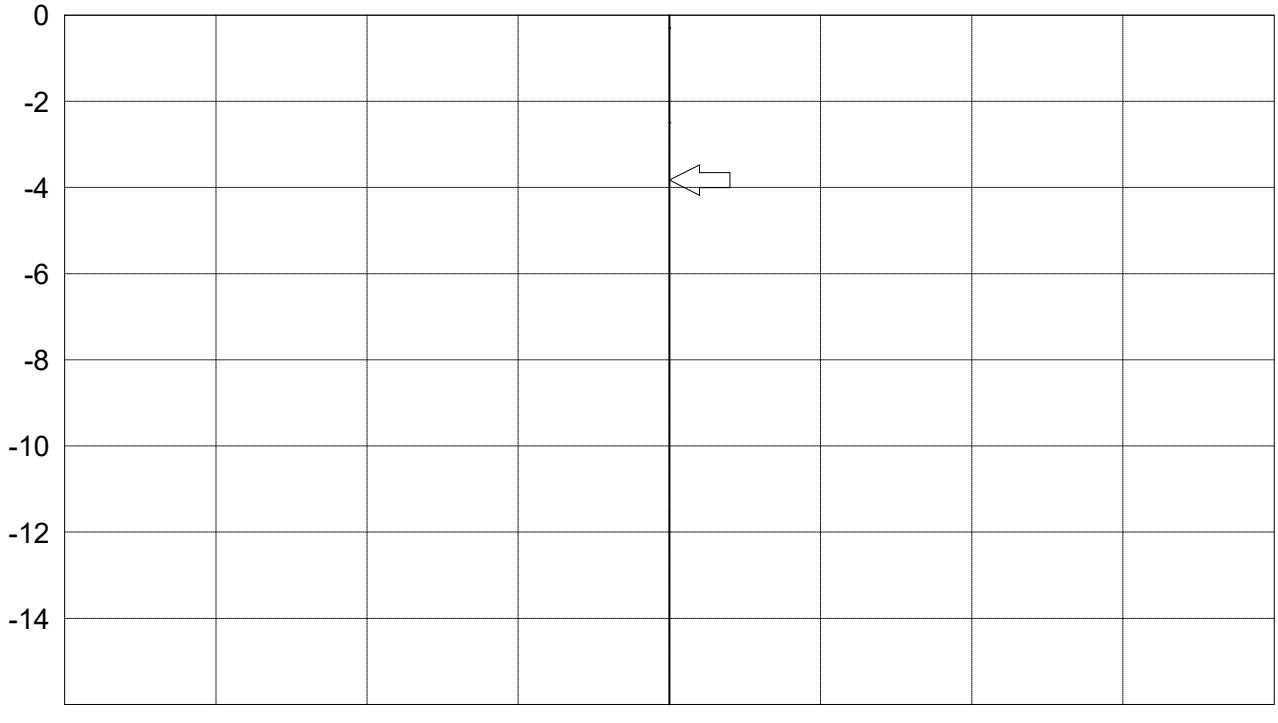




Graphical results from analysis of stage ref 3 continued

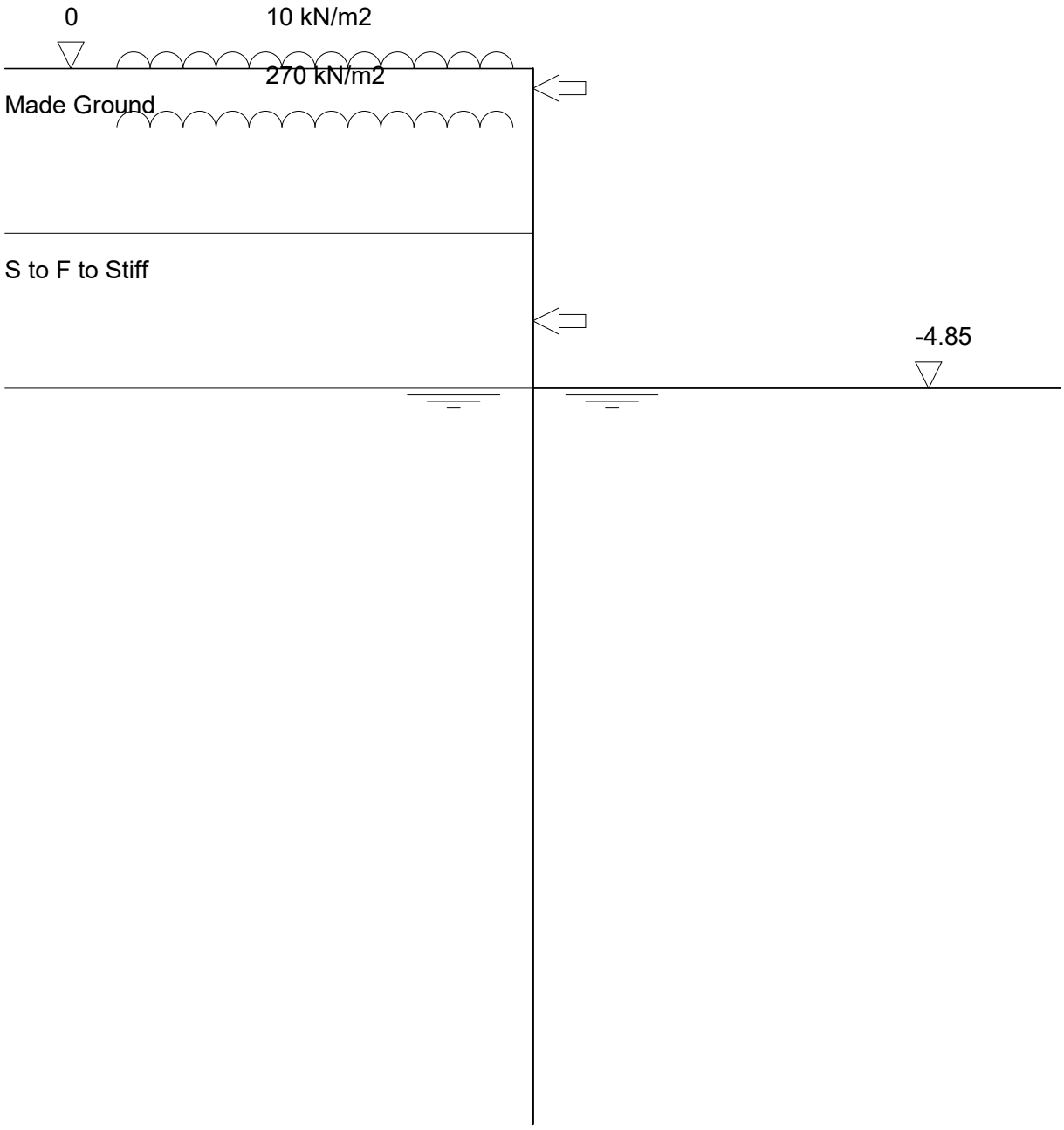


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

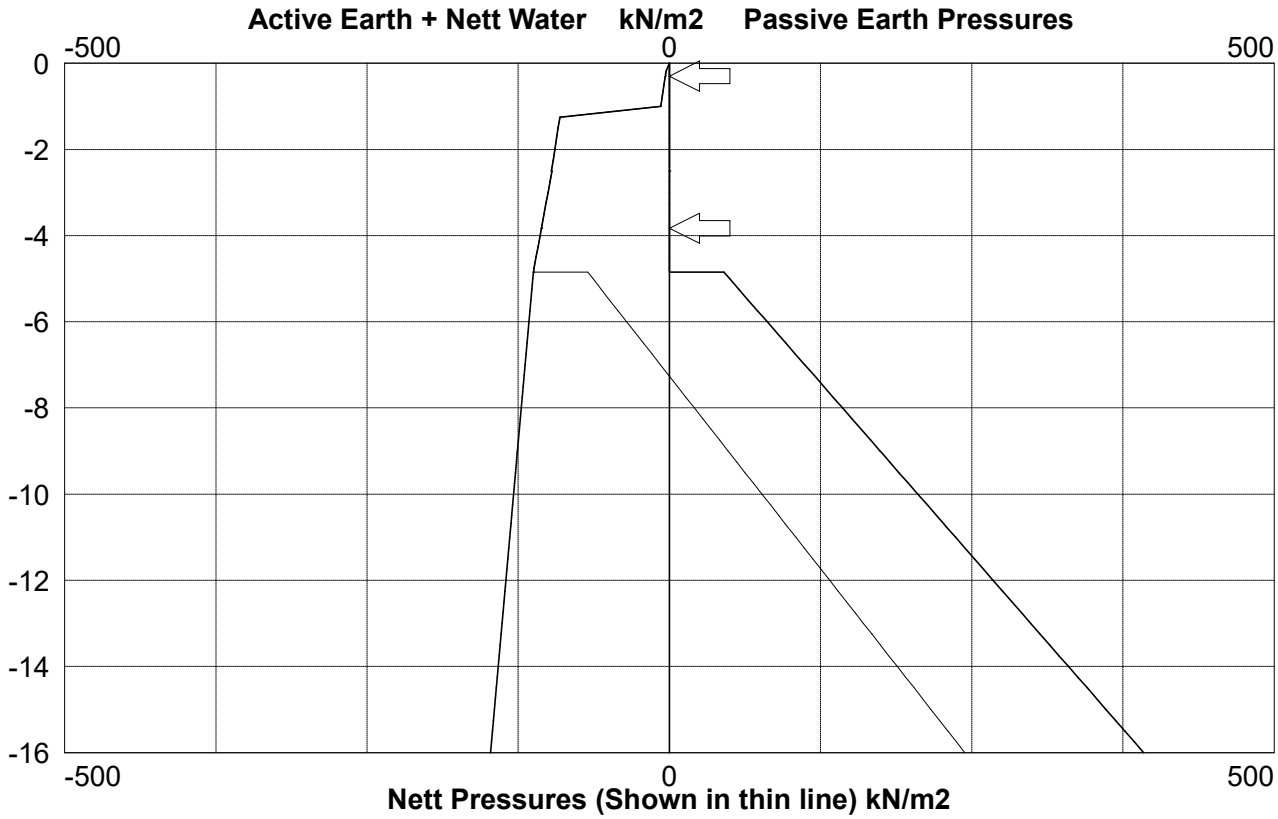
Stage ref. **5**
Stage type **Passive side excavation**

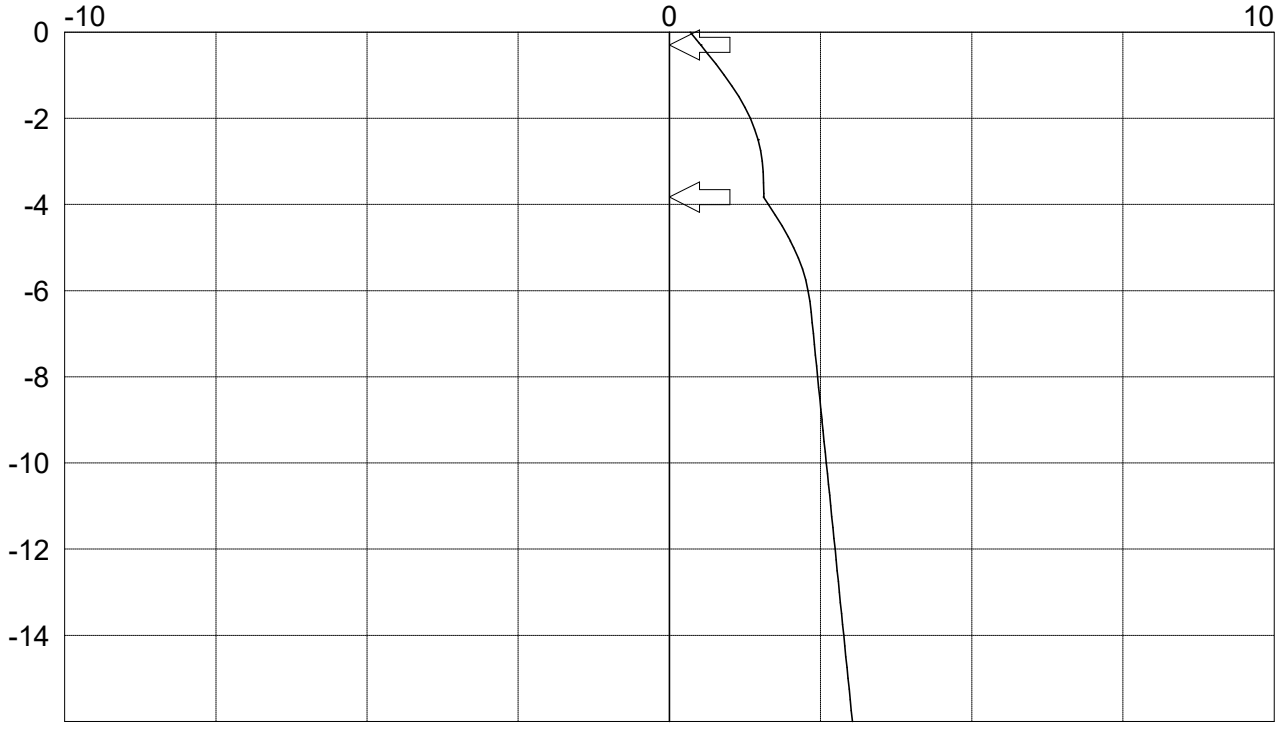


Tabular results from analysis of stage ref 5

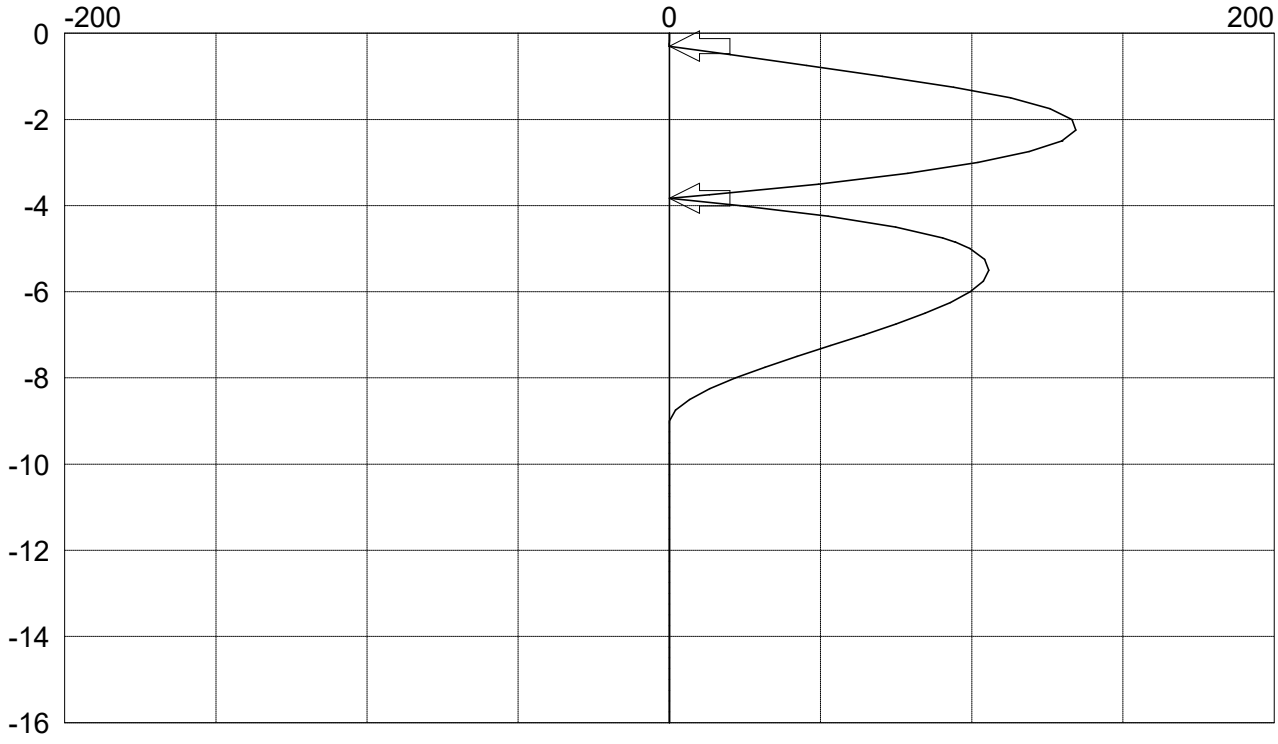
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	.3		.00
-.17	13.1	2.6	.0	.0	.0	.0	2.6	0	-.2	.4		.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	.5	103.1	.00
-.30	15.4	3.3	.0	.0	.0	.0	3.3	.1	102.5	.5		.00
-1.00	28.0	7.1	.0	.0	.0	.0	7.1	-70.4	98.9	.9		.00
-2.00	316.0	94.7	.0	.0	.0	.0	94.7	-133.1	17.2	1.3		.00
-2.50	325.0	97.4	.0	.0	.0	.0	97.4	-129.8	-30.8	1.5		.00
-2.50	325.0	97.1	.0	.0	.0	.0	97.1	-129.7	-30.8	1.5		.00
-3.00	334.5	100.3	.0	.0	.0	.0	100.3	-102.1	-80.2	1.5		.00
-3.83	350.3	105.8	.0	.0	.0	.0	105.8	-.3	-165.7	1.6	313.9	.00
-3.83	350.3	105.8	.0	.0	.0	.0	105.8	0	147.9	1.6		.00
-4.00	353.5	106.9	.0	.0	.0	.0	106.9	-23.4	130.1	1.6		.00
-4.85	369.6	112.5	.0	.0	.0	.0	112.5	-94.5	37.1	2.0		.00
-4.85	369.7	112.5	.0	.0	45.1	.0	67.4	-94.6	36.9	2.0		.00
-5.00	371.0	113.0	1.5	1.4	49.7	1.5	63.2	-99.4	27.1	2.1		.10
-6.00	380.2	116.1	11.3	10.6	80.9	11.3	35.3	-99.5	-22.2	2.3		.45
-7.00	389.4	119.3	21.1	19.8	112.0	21.1	7.3	-64.4	-43.5	2.4		.65
-8.00	398.6	122.5	30.9	29.0	143.1	30.9	-20.6	-21.9	-36.8	2.5		.83
-9.00	407.8	125.7	40.7	38.2	174.3	40.7	-48.6	0	-2.2	2.5		.99
-9.05	408.3	125.8	41.1	38.6	175.7	41.1	-49.9	0	0	2.5		1.00
-10.00	417.0	128.9	50.5	47.4	205.4	50.5	-76.6	0	0	2.6		1.15
-10.68	423.3	131.0	57.2	53.7	226.7	57.2	-95.7	0	0	2.6		1.25
-11.00	426.2	132.0	60.3	56.6	236.5	60.3	-104.5	0	0	2.7		1.30
-12.00	435.4	135.2	70.1	65.8	267.7	70.1	-132.5	0	0	2.7		1.44
-13.00	444.6	138.4	79.9	75.0	298.8	79.9	-160.4	0	0	2.8		1.58
-14.00	453.8	141.6	89.7	84.2	329.9	89.7	-188.4	0	0	2.9		1.71
-15.00	463.0	144.7	99.5	93.4	361.1	99.5	-216.3	0	0	3.0		1.84
-16.00	472.2	147.9	109.3	102.6	392.2	109.3	-244.3	0	0	3.0		1.97

Graphical results from analysis of stage ref 5

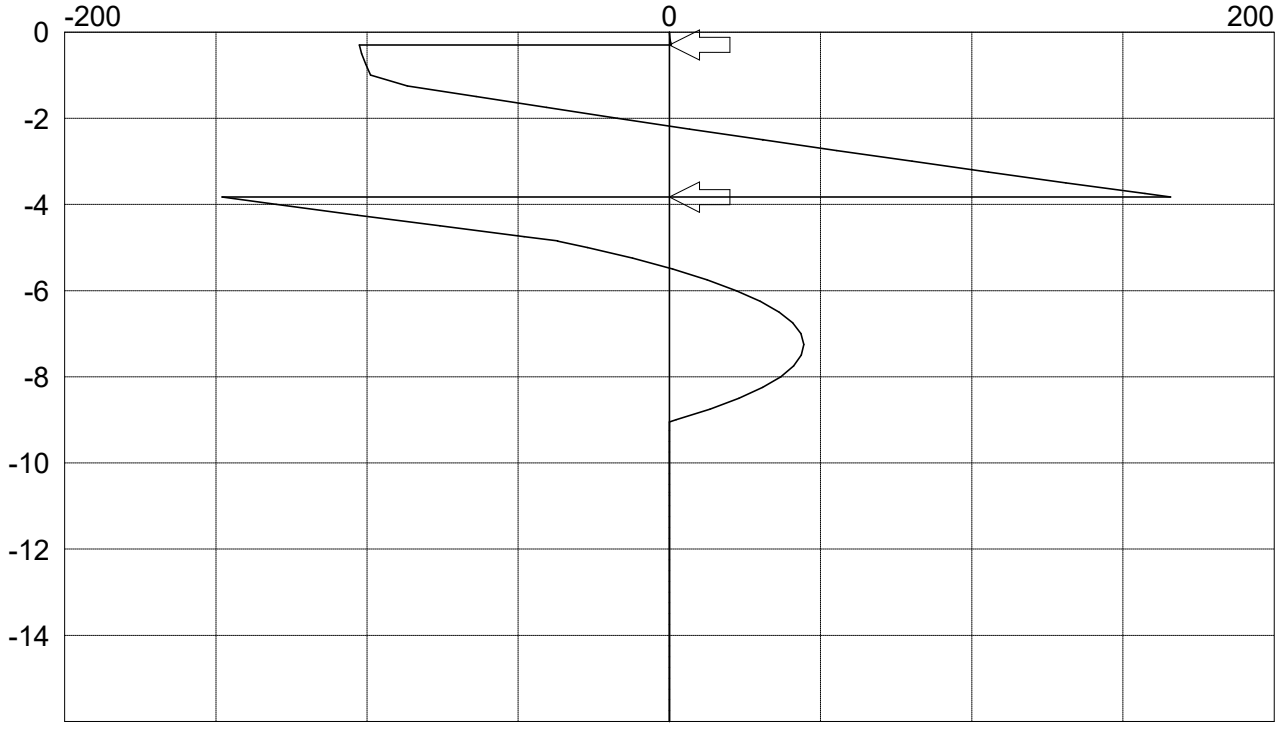




Graphical results from analysis of stage ref 5 continued

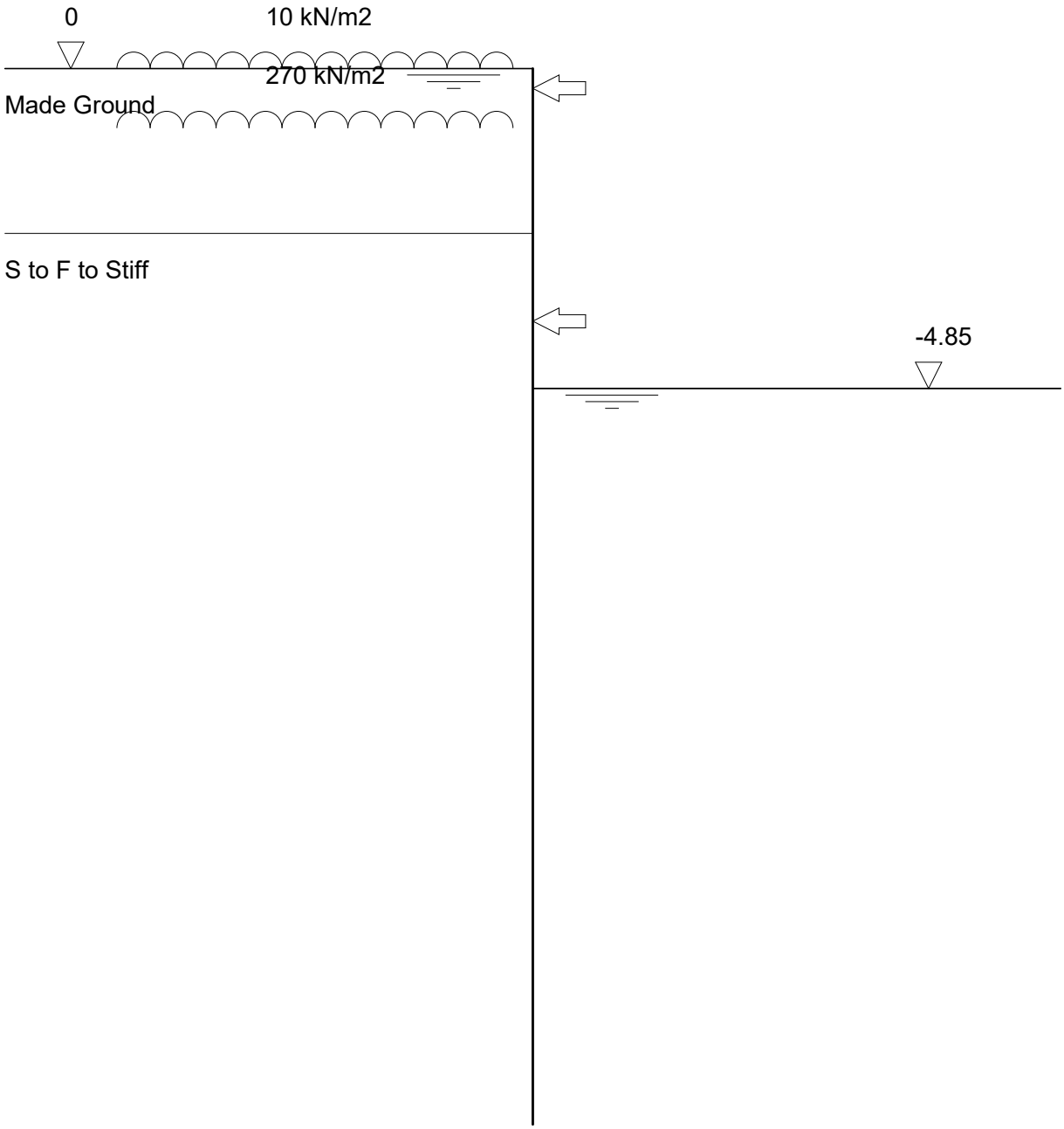


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

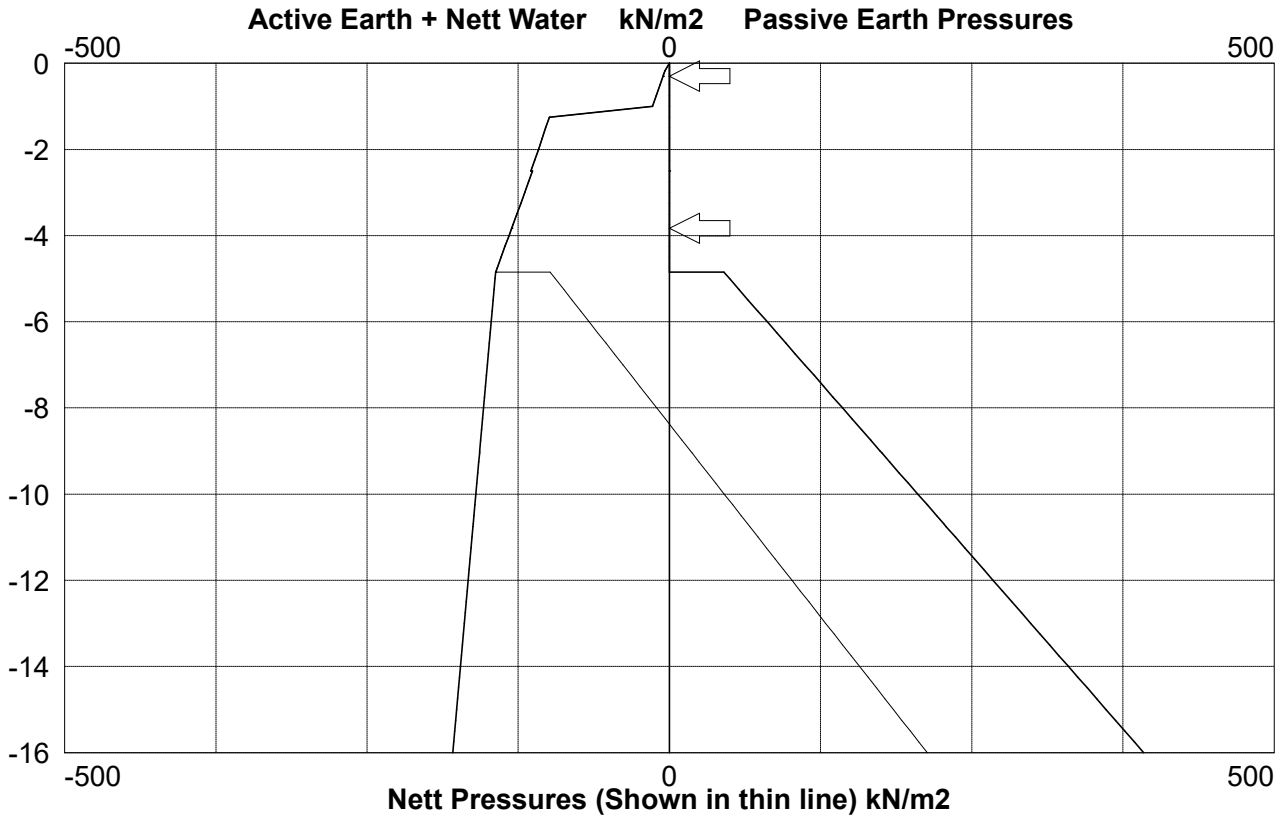
Stage ref. **6**
Stage type **Active water level**

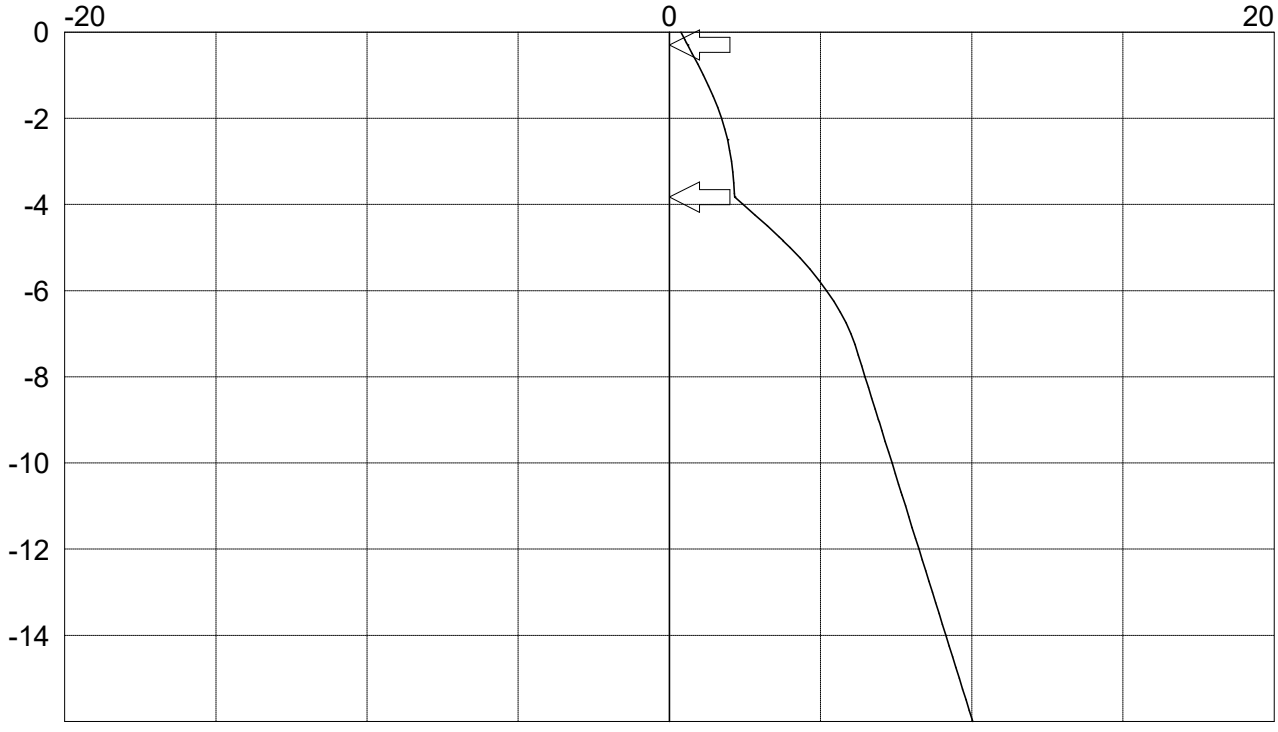


Tabular results from analysis of stage ref 6

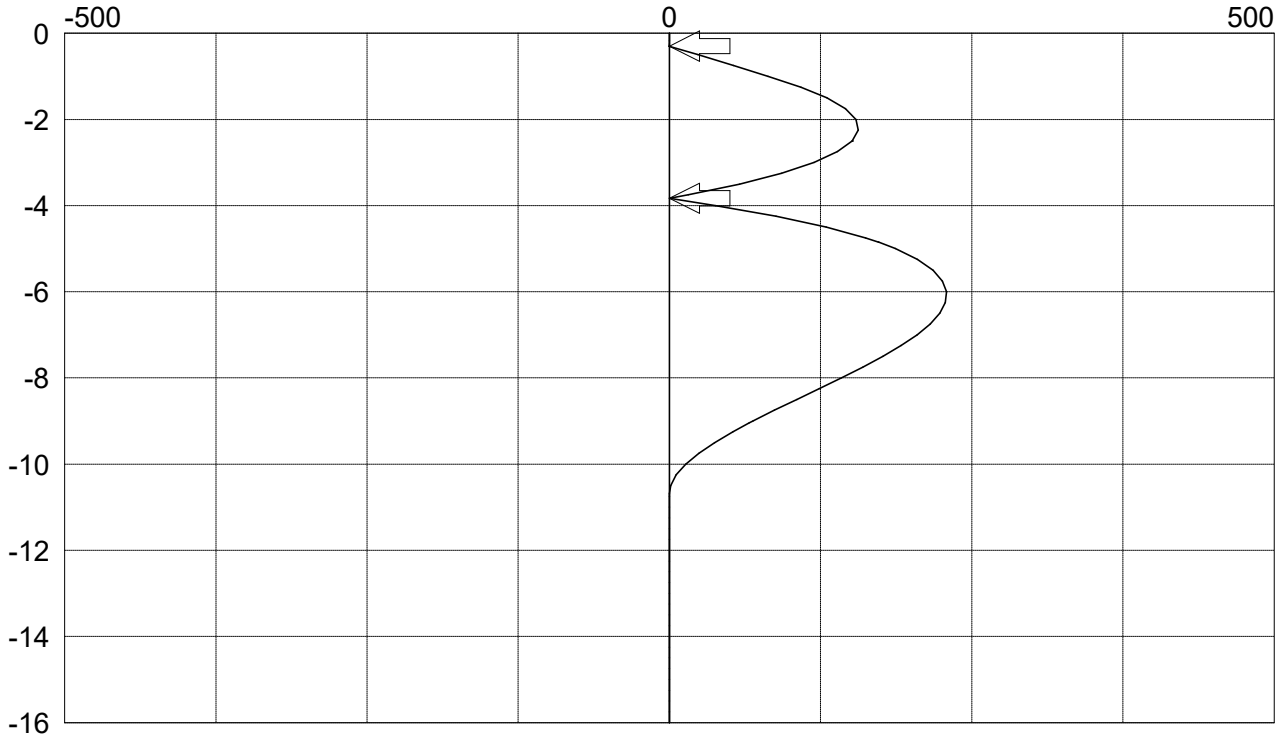
Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
.00	.0	.0	.0	.0	.0	.0	0	0	0	.4		.00
-.17	11.4	2.0	1.7	.0	.0	.0	3.7	0	-.3	.5		.00
-.30	12.5	2.4	2.9	.0	.0	.0	5.3	.1	-.9	.6	120.9	.00
-.30	12.5	2.4	3.0	.0	.0	.0	5.3	.1	120.0	.6		.00
-1.00	18.2	4.1	9.8	.0	.0	.0	13.9	-81.7	113.3	1.1		.00
-2.00	296.4	88.7	19.6	.0	.0	.0	108.3	-154.3	21.4	1.7		.00
-2.50	300.5	90.0	24.5	.0	.0	.0	114.5	-151.2	-34.3	1.9		.00
-2.50	300.5	88.6	24.5	.0	.0	.0	113.1	-151.1	-34.3	1.9		.00
-3.00	305.1	90.2	29.4	.0	.0	.0	119.6	-119.6	-92.5	2.1		.00
-3.83	312.7	92.8	37.5	.0	.0	.0	130.4	-.4	-196.2	2.2	435.1	.00
-3.83	312.8	92.8	37.6	.0	.0	.0	130.4	0	238.6	2.2		.00
-4.00	314.3	93.4	39.2	.0	.0	.0	132.6	-38.2	216.5	2.4		.00
-4.85	322.1	96.1	47.5	.0	.0	.0	143.6	-172.9	99.4	3.8		.00
-4.85	322.1	96.1	47.5	.0	45.1	.0	98.5	-173.1	99.2	3.8		.00
-5.00	323.5	96.5	49.0	1.4	49.7	1.5	94.3	-186.8	84.7	4.0		.08
-6.00	332.7	99.7	58.8	10.6	80.9	11.3	66.4	-229.1	4.4	5.2		.35
-7.00	341.9	102.9	68.6	19.8	112.0	21.1	38.4	-204.9	-48.1	6.0		.51
-8.00	351.1	106.1	78.4	29.0	143.1	30.9	10.5	-142.3	-72.5	6.5		.66
-9.00	360.3	109.3	88.2	38.2	174.3	40.7	-17.5	-69.2	-69.0	6.9		.79
-9.05	360.7	109.4	88.7	38.6	175.7	41.1	-18.8	-66.0	-68.2	6.9		.79
-10.00	369.5	112.4	98.0	47.4	205.4	50.5	-45.4	-13.6	-37.5	7.4		.92
-10.68	375.8	114.6	104.7	53.7	226.7	57.2	-64.6	0	0	7.7		1.00
-11.00	378.7	115.6	107.8	56.6	236.5	60.3	-73.4	0	0	7.8		1.04
-12.00	387.9	118.8	117.6	65.8	267.7	70.1	-101.4	0	0	8.3		1.16
-13.00	397.1	122.0	127.4	75.0	298.8	79.9	-129.3	0	0	8.7		1.27
-14.00	406.3	125.1	137.2	84.2	329.9	89.7	-157.3	0	0	9.1		1.38
-15.00	415.5	128.3	147.0	93.4	361.1	99.5	-185.2	0	0	9.6		1.49
-16.00	424.7	131.5	156.8	102.6	392.2	109.3	-213.2	0	0	10.0		1.60

Graphical results from analysis of stage ref 6

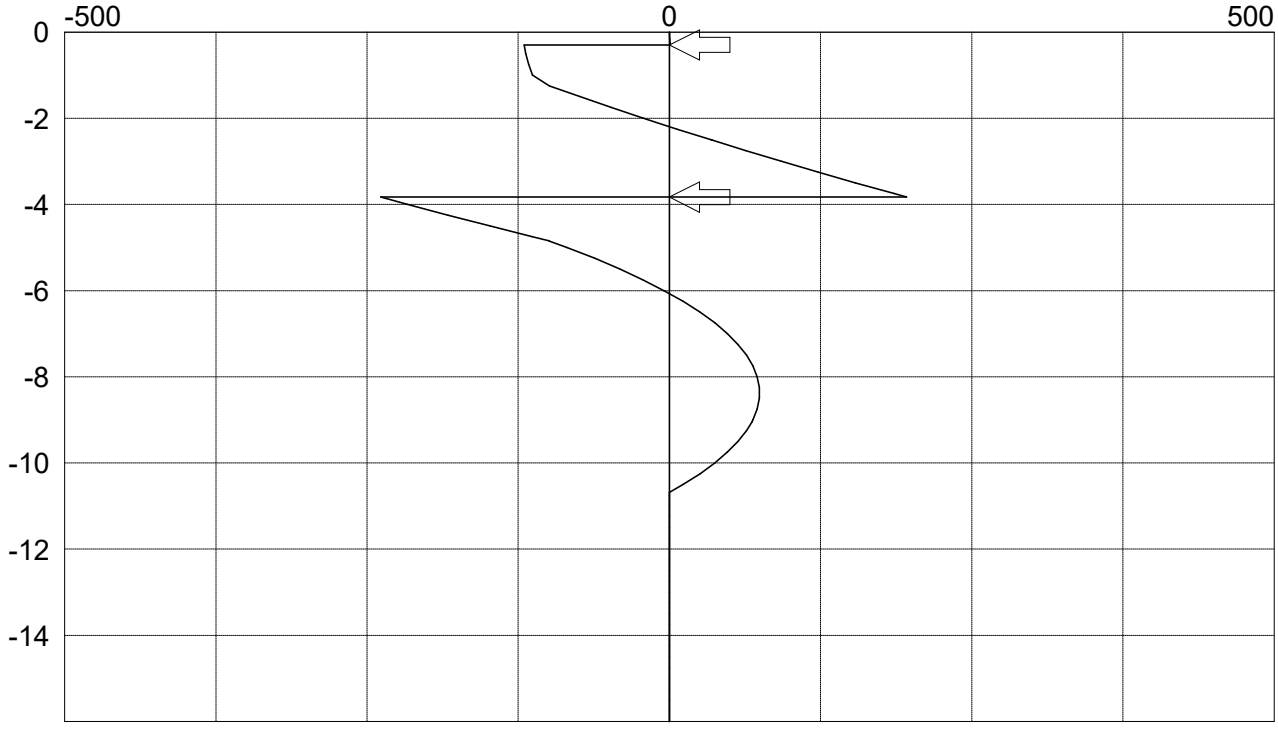




Graphical results from analysis of stage ref 6 continued

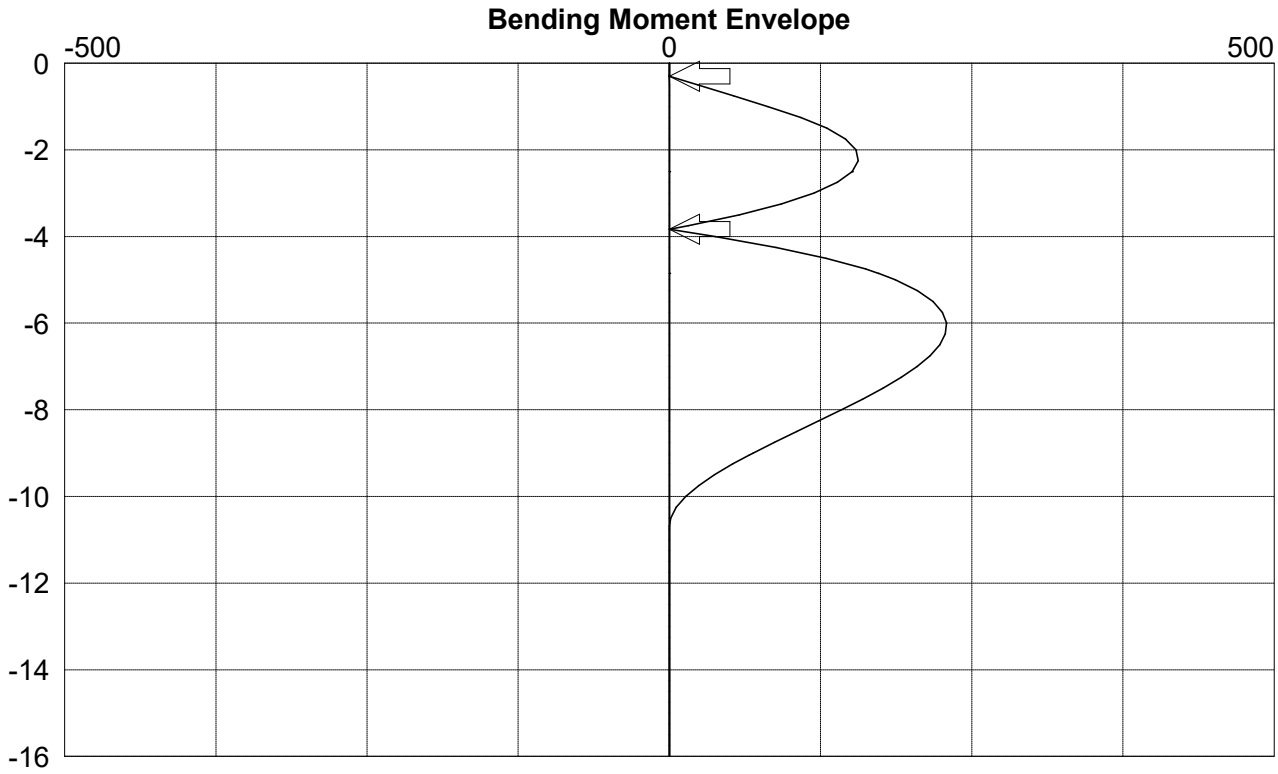


Bending Moment Diagram (kNm/m)



Shear Force Diagram (kN/m)

Graphical plot of envelope from selected construction stages



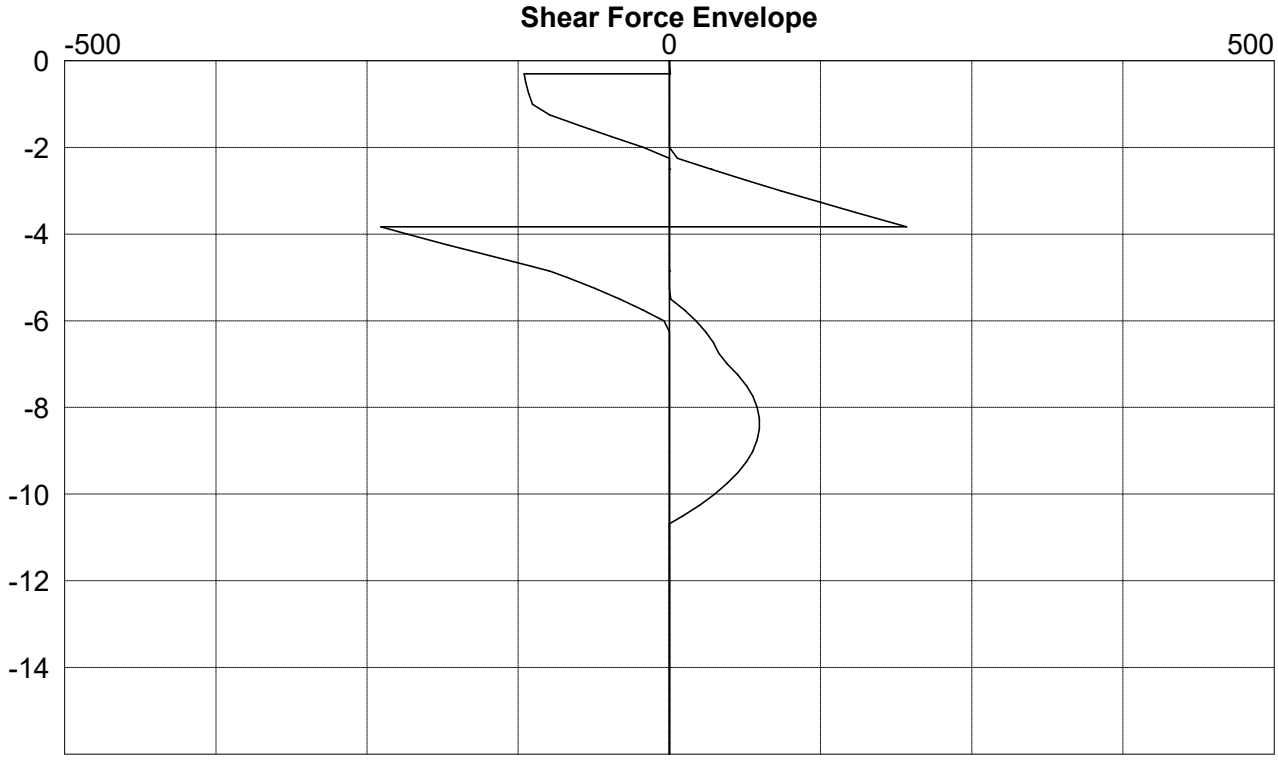


Table of envelope for wall forces

Calc Level m	Bending Minimum kNm/m	Bending Maximum kNm/m	Shear Minimum kN/m	Shear Maximum kN/m	Prop Force kN/m
.00	.0	.0	.0	.0	
-.17	.0	.0	-.3	.0	
-.30	.0	.1	-.9	.0	120.9
-.30	.0	.1	.0	120.0	
-1.00	-81.7	.0	.0	113.3	
-2.00	-154.3	.0	.0	21.4	
-2.50	-151.2	.0	-34.3	.0	
-2.50	-151.1	.0	-34.3	.0	
-3.00	-119.6	.0	-92.5	.0	
-3.83	-.4	.0	-196.2	.0	435.1
-3.83	.0	.0	.0	238.6	
-4.00	-38.2	.0	.0	216.5	
-4.85	-172.9	.0	.0	99.4	
-4.85	-173.1	.0	.0	99.2	
-5.00	-186.8	.0	.0	84.7	
-6.00	-229.1	.0	-22.2	4.4	
-7.00	-204.9	.0	-48.1	.0	
-8.00	-142.3	.0	-72.5	.0	
-9.00	-69.2	.0	-69.0	.0	
-9.05	-66.0	.0	-68.2	.0	
-10.00	-13.6	.0	-37.5	.0	
-10.68	.0	.0	.0	.0	
-11.00	.0	.0	.0	.0	
-12.00	.0	.0	.0	.0	
-13.00	.0	.0	.0	.0	
-14.00	.0	.0	.0	.0	
-15.00	.0	.0	.0	.0	
-16.00	.0	.0	.0	.0	

Structural design of wall

Wall section properties

Primary pile diameter	600	mm
Primary pile spacing	700	mm
Infill pile diameter		mm
Main rebar bar diameter	40	mm
Main rebar number of bars	12	
Links/Helix bar diameter	16	mm
Links/Helix spacing/pitch	150	mm

Wall material properties

Concrete cube strength	35	N/mm2
Concrete cover	50	mm
Main rebar steel grade	500	N/mm2
Link rebar steel grade	500	N/mm2
Ultimate load factor	1.35	

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Bending resistance. BS8110 plane strain analysis	216	996	kNm
Max longitudinal steel. BS8110 max 6% by area	16965	15080	mm2
Min longitudinal steel. BS8110 min 0.4% by area	1131	15080	mm2
Shear resistance. BS8110	225	696	kN
Min link dia. BS8110 6mm or 0.25x bar dia	10	16	mm
Max link spacing. BS8110 12x main bar dia or 0.75d	311	150	mm
Min shear link area. BS8110 Clause 3.4.5	390	2681	mm2/m