

UCL Student Centre

Ground Movement and Damage Assessment

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Client Name: University College London

Client Address:

Gower Street, vacant site between No. 26 and Bloomsbury Theatre



Rev	Description	Issued by	Checked	Date
00	Preliminary issue for comment	JJ	SS	15/07/2015
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02	Revised with CIRIA C580 ground settlement calculations	SS	SS	19/08/2015
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Table of Contents

1. Introduction	1
2. Ground movement due to secant piled wall installation	2
3. Ground movements arising from excavation in front of wall.....	4
4. Ground movements due to retaining wall deflection.....	5
5. Control of Ground Movement	6
6. Building Damage Assessment	7
APPENDICES	9
APPENDIX A	9
APPENDIX B	10

1. Introduction

The site is located on the west side of Gordon Street and consists of an urban setting constrained by a row of houses to the South (No.26/27/28/29 Gordon Street), the ACBE building to the West and Bloomsbury Theatre to the North.

The proposed development is a multi-storey building with a two-storey basement approximately 9.5 meters deep.

It is intended that an 880mm diameter secant piled retaining wall will support the sides of the excavation. This will be installed first followed by the bulk excavation. The excavation of the basement will be carried out in stages with three levels of temporary props. Once the excavation has been completed a thick slab will be cast to permanently prop the base of the retaining wall. The construction will then progress upwards with the permanent lining walls and floor slabs installed at B1 and ground, each slab propping the secant piled wall in the permanent condition. The superstructure will then be erected once sub ground structure is constructed.

Ground conditions comprise of made ground overlying River Terrace gravel and stiff London clay. The clay is homogenous, therefore it is assumed to behave in an undrained manner during the excavation period and in a drained manner in the long term.

Following the CIRIA C580 Guide tables to assign the category wall, it has been specified the wall is geotechnical Category 2 (Figure 2.4). Category 2 walls comprise conventional structures with no abnormal risks or unusual or exceptionally difficult ground or loading conditions.

The ground movements arising depend upon the ground conditions, the construction duration, methods used and the quality of workmanship

This report will concentrate on predicting the horizontal and vertical ground movements of the wall installation and soil excavation under adjacent structures using the procedure outlined in CIRIA guide C580.

2. Ground movement due to secant piled wall installation

Sequential construction of piles to form a wall causes the ground to move and to take up support in adjacent ground or on the back of an adjacent pile. Movements are therefore confined to local areas around the piles.

Ground surface settlements are greatest at the face of the wall and reduce to zero at a lateral distance corresponding to approximately 1 to 2 times the wall depth behind the wall. Vibrations caused by boring or piling may have caused densification of the coarse grained soils close to the piles.

Figures 2.8a and 2.8b in CIRIA C580 have been used to estimate the ground movements when installing the secant piled retaining wall in stiff clay (a for horizontal and b for vertical movement).

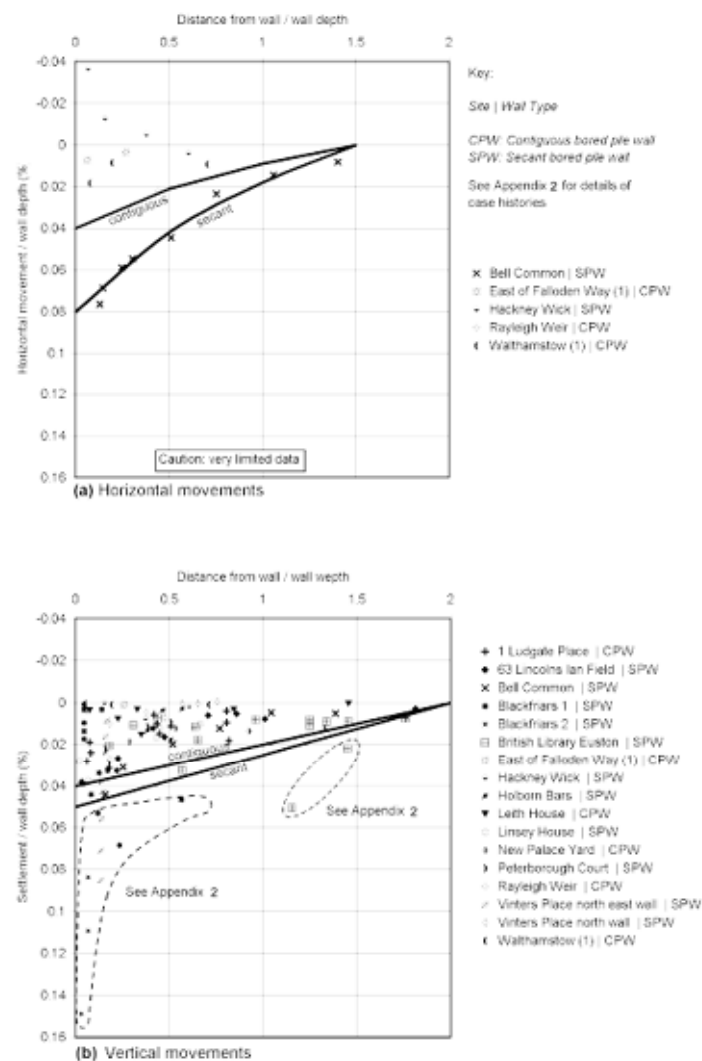


Figure 2.8 Ground surface movements due to bored pile wall installation in stiff clay

Figure 1 - Figures 2.8a and 2.8b from CIRIA C580

Ground Movement and Damage Assessment

The calculations of the predicted installation ground movement are shown in Appendix A. Calculations have been made on each condition around the perimeter of the excavation, a total of 8 different sections, as shown in figure 2 below.

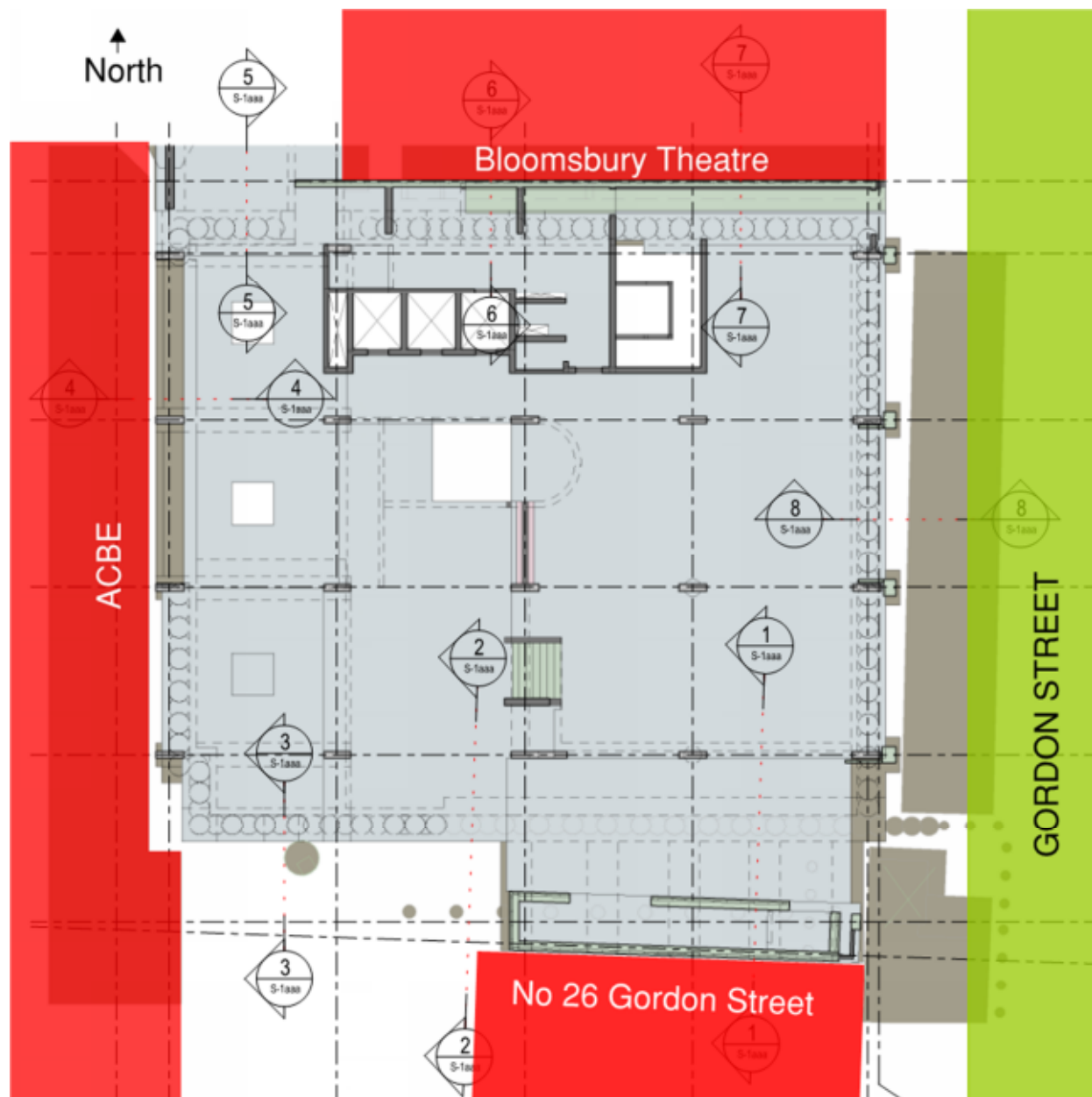


Figure 2 - Site with surrounding buildings and sections where ground movement has been calculated

3. Ground movements arising from excavation in front of wall

Movements induced by the excavation are made up of the response to the removal of lateral support to the sides of the wall and vertical load at the base of the excavation.

Figure 3 below shows typical movement patterns of the soil after excavation, the horizontal and vertical movements in the soil. The magnitude of the vertical movement depends on the plan and depth of the excavation and ground stratigraphy.

The construction of the retaining wall in this project has been taken as a high support stiffness being a propped secant pile retaining wall (Carder, Table 2.3 CIRIA C580).

From previous cases, the magnitude of horizontal wall deflection is almost totally dependent on the effectiveness of the support system.

The initial deflection, which takes place as the wall cantilevers after an initial excavation and before the first prop is installed, can, on occasions, be the largest component of the overall wall deflection. It is also the form of displacement most likely to cause damage to nearby structures. The early installation of a stiff first prop with a shallow first-stage excavation is one of the best ways to reduce wall deflections. Preloading the supports help to limit movements, and also could be obtained by using pre-stressed anchors.

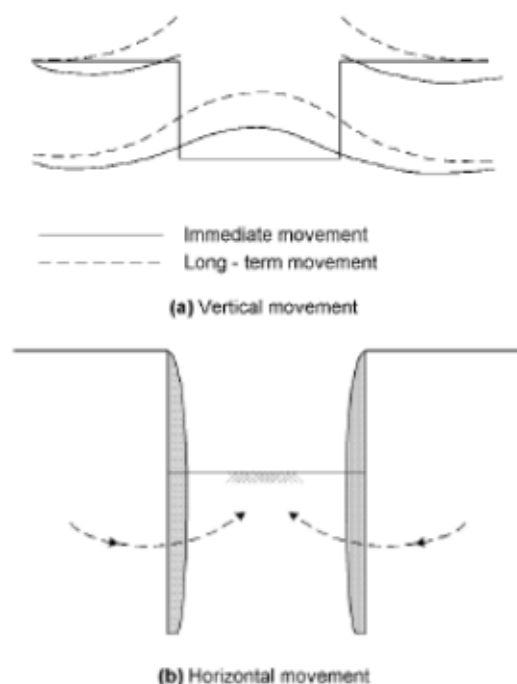


Figure 2.10 Typical ground movement pattern associated with excavation stress relief

Figure 3 - Figure 2.10 from CIRIA C580

4. Ground movements due to retaining wall deflection

At this stage the deflection of the piled wall has been assessed using the method described in CIRIA C580. At a later design stage the piling contractor will undertake a retaining wall analysis using WALLAP software or similar.

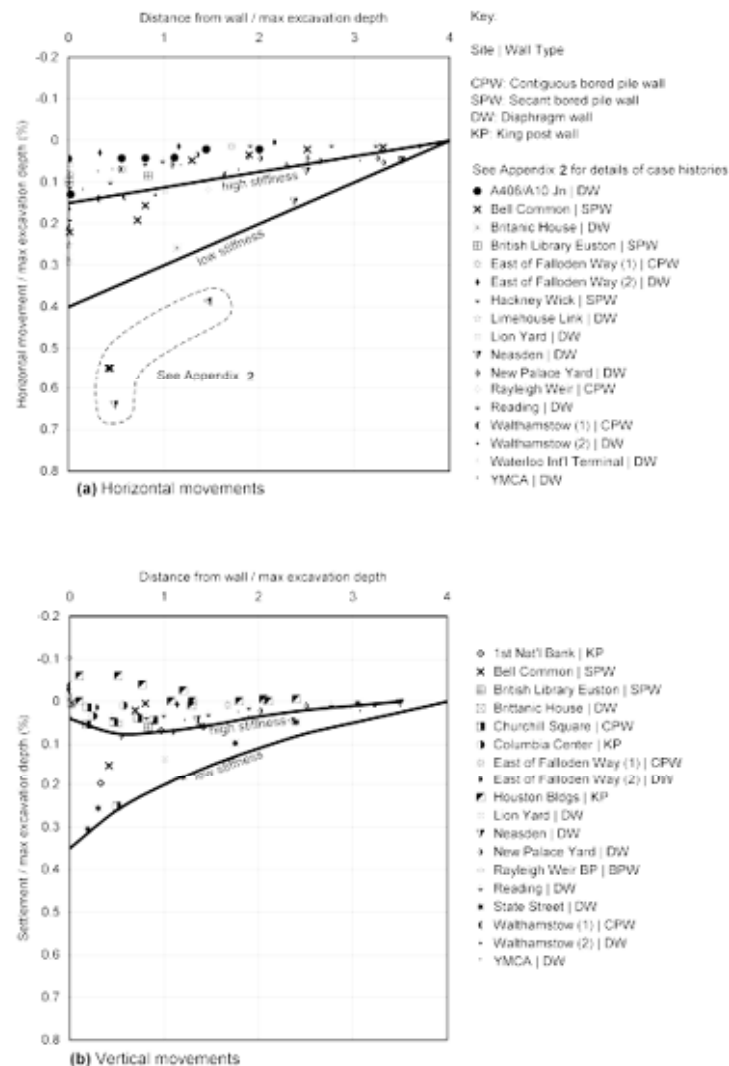


Figure 2.11 Ground surface movements due to excavation in front of wall in stiff clay

Figure 4 - Figures 2.11a and 2.11b from CIRIA C580

Figure 2.11a of CIRIA C580 has been used to determine the horizontal ground movement on the back of the wall due to the basement excavation in front of it. Figure 2.11b has been used to calculate the corresponding vertical movement. The results of the calculations around the perimeter of the basement are summarised in Appendix A.

5. Control of Ground Movement

The calculations of the ground movement to the back of the retaining wall around the perimeter of the basement have been undertaken with the methodology described in CIRIA C580. Graphs showing the predicted ground vertical movement resulting from the piled installation, basement excavation and a combination of both have been plotted for each section considered and included in appendix A, together with the sample of the excel spreadsheet used to plot the movement curves in the worst situation.

Some measures can be adopted to minimise ground movements around and beneath the excavation. These are summarised below:

- Good workmanship is essential. Supports should be installed tight to the wall. The prop, and any packing between the prop and waling, should not rely on friction or adhesion between the prop end and waling to hold it in place
- The wall should have adequate embedment in stiff strata for satisfactory vertical and lateral stability
- Minimise the first-stage excavation and install the first (stiff) support as early as possible in the construction sequence
- Minimise the extent of the dig beyond the proposed support levels
- Minimise delays to the construction of the wall and its support system
- Prevent deterioration of lateral support from a clay berm by blinding it or covering it with a waterproof membrane to maintain the berm's natural moisture content
- Avoid over-excavation
- Minimise removal of fines during dewatering
- Minimise drawdown outside excavation

At locations where such movements are critically important, appropriate instrumentation should be installed and the ground movements monitored. It is crucial to show good workmanship and effective control of construction operation to minimise ground movements as this is usually the reason for larger magnitudes of ground movements than predicted.

6. Building Damage Assessment

The calculated ground movement have been used to assess potential 'damage categories' that may apply to neighbouring properties due to the proposed basement construction, as per CIRIA C580 section 2.5.4. The methodology proposed by *Burland and Wroth* and later supplemented by the work of *Boscardin and Cording* has been used, as described in CIRIA C580.

General damage categories are summarised in figure 5 below:

Table 2.5 Classification of visible damage to walls (after Burland et al, 1977, Boscardin and Cording, 1989; and Burland, 2001)

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain ϵ_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible.	< 0.1	0.0–0.05
1 Very slight	<u>Fine cracks that can easily be treated during normal decoration.</u> Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection.	< 1	0.05–0.075
2 Slight	<u>Cracks easily filled. Redecoration probably required.</u> Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	< 5	0.075–0.15
3 Moderate	<u>The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced.</u> Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5–15 or a number of cracks > 3	0.15–0.3
4 Severe	<u>Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows.</u> Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 but also depends on number of cracks	> 0.3
5 Very severe	<u>This requires a major repair involving partial or complete rebuilding.</u> Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually > 25 but depends on number of cracks.	

Notes

1. In assessing the degree of damage, account must be taken of its location in the building or structure.
2. Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

Figure 5 - Table 2.5 from CIRIA C580

For the critical neighbouring developments the combined impact of ground movement due to secant piled wall deflection and installation have been combined to determine the overall ground movement and impact on adjacent properties due to the construction of the basement.

The method for calculating the deflection ratios for the structures of No. 26 Gordon Street, Bloomsbury and ACBE are represented graphically in design calculations in Appendix A. The deflection ratio is calculated by using the relationship between the ground displacements and the perpendicular length of the adjacent structure. The lateral movements are considered to dissipate from a maximum at point of excavation to zero at a distance equivalent to 1.5 to 3 times the pile depth. Differential movements taken at footing levels across the span of adjacent structure are used to calculate lateral strain when considering the structure width.

The predicted ground movement and damage assessment at each boundary has been assessed; see Appendix A, with a worse case of a damage category 2 indicating that only slight damage to the neighbouring properties is expected.

APPENDICES

APPENDIX A

Short Term Heave and Long Term Heave Calculations

In the short term PDISP model the removal of the 10m of soil is modeled. In the long term the weight of the building is added as an equivalent raft at 2/3 the length of the preliminary piles. The weight of the building was taken as 85.8MN or 110kPa over the raft area.

The stiffness and Poisson's ratios used are as follows:

Made Ground : 10MPa and $w_4'=0.2$

River Terrace : Deposits: 50MPa and $w_4'=0.2$

London Clay: Burland and Kalra (1986) where $E_u = 10 + 5.2z$ and $E' = 7.5 + 3.9z$
where $w_4 = 0.5$ and $w_4' = 0.2$

Lambeth Group (top) : $E_u = 550 p'$ assuming a K_0 of 1 and $E' = 0.8 E_u$

Lambeth Group (bottom): $E_u = 1100 p'$ and $E' = 0.8 E_u$
where $w_4 = 0.5$ and $w_4' = 0.2$

Thanet Sands : $E' = 900 p'$

A rigid boundary was taken at -21mOD and it was assumed that the groundwater was hydrostatic from +24mOD.

It can be seen that time dependent movements outside the excavation are small.

Excluding the effect of installation of the wall, movements occur outside an excavation in stiff clay due to horizontal stress relief (the bowing out of the wall) and vertical stress relief (at the bottom of the excavation). The CIRIA C580 curve for "ground surface movements— due to excavation in front of wall in stiff clay" accounts for the short term components of both of these stress reliefs and was derived from a database of observed settlements with the installation effects removed.

In this case the retaining wall will act as stiff box and will tend to restrain any time dependent heave to inside the excavation. It is also worth noting that elastic analyses tend to overestimate the extent and magnitude of movement beyond the loaded/unloaded area. This is based on the small strain studies by Jardine et al (1986). This combined with reductions in effective stress adjacent to the excavations would indicate there would be very little change in settlements in the long term.

The use of the XDISP C580s curves should be sufficient for this building damage assessment. However if the PDISP movements are considered, the time dependent movements which are around 10mm (heave) would only serve to negate the short term settlements predicted by C580.



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Job No.	Sheet No.	Rev.
LO1254a		
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Made by SS	Date	Checked

Heave Calculation

Analysis Options

Analysis: Boussinesq
Global Poisson's ratio: 0.50
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: -21.00 [m OD]
Displacements at area centroids calculated.

Soil ProfilesSoil Profile 1

Layer	Level at top	Number of intermediate displacement levels	Youngs Modulus	Poissons ratio	Non-linear curve
	[mOD]		Top [kN/m ²]	Btm [kN/m ²]	
1	25.00	100	10000.	10000.	0.2000
2	21.50	100	50000.	50000.	0.2000
3	17.50	100	10000.	62000.	0.5000
4	7.500	100	101000.	407000.	0.5000
5	-11.00	100	333000.	423000.	0.2000

Soil Zones

Zone	Name	X coordinates min [m]	max [m]	Y coordinates min [m]	max [m]	Profile
1	1	-60.00	60.00	-60.00	60.00	Soil Profile 1

Non-linear Curve Coordinates - Non-linear Curve 1

Point	Strain [%]	Factor
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Load Data

Load ref.	Name	Shape	Orientation of Plane	Centre of load (Global)			Load position Angle of local x from Y	Width x or Radius	Length y	Polygon Coordinates	Rectangle tolerance	Number of rectangles	Load value			
				X	Y	Z (level)							Normal (local z)	Tangential (local x)	Tangential (local y)	
1	1	Rectangular	Horizontal	[m] 0.0	[m] 0.0	[m] 15.00	[Degrees] 0.0	[m] 26.00	[m] 30.00	N/A	[m]	N/A	1	[kN/m²] -200.0	[kN/m²] 0.0	[kN/m²] 0.0

Displacement Data

Ref.	Type	Name	Direction of Extrusion	First point X [m]	Y [m]	Z[level]	Second point X [m]	Y [m]	Z[level]	No. of intrvl across extrusion/line	Extrusion Depth [m]	No. of intrvl along extrusion	Calculate	Show Detailed results
1	Grid	Grid 2	Global Y	-40.00	-40.00	15.00	40.00	N/A	15.00	40	80.00	40	Yes	Yes

RESULTS FOR GRIDS

Analysis: Boussinesq
Global Poisson's ratio: 0.50
Horizontal rigid boundary level: -21.00 [m OD]

The maximum displacement difference between Boussinesq method (-3.322mm) and Mindlin method (-3.393mm) occurs at point X=0.0m Y=0.0m Level -3.490mOD and is 0.07070mm

Name	X [m]	Location Y [m]	Z[level]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m ²]	Sum Princ [kN/m ²]	Vert Strain [-]
1	0.000	0.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
Grid 2	-40.000	-40.000	15.000	0.2815	15.00	0.0	-77.87E-6	0.0
	-40.000	-38.000	15.000	0.2970	15.00	0.0	-84.31E-6	0.0
	-40.000	-36.000	15.000	0.3131	15.00	0.0	-91.26E-6	0.0
	-40.000	-34.000	15.000	0.3297	15.00	0.0	-98.74E-6	0.0
	-40.000	-32.000	15.000	0.3466	15.00	0.0	-106.8E-6	0.0
	-40.000	-30.000	15.000	0.3639	15.00	0.0	-115.3E-6	0.0
	-40.000	-28.000	15.000	0.3813	15.00	0.0	-124.3E-6	0.0
	-40.000	-26.000	15.000	0.3988	15.00	0.0	-133.8E-6	0.0
	-40.000	-24.000	15.000	0.4162	15.00	0.0	-143.5E-6	0.0
	-40.000	-22.000	15.000	0.4332	15.00	0.0	-153.6E-6	0.0
	-40.000	-20.000	15.000	0.4498	15.00	0.0	-163.7E-6	0.0
	-40.000	-18.000	15.000	0.4657	15.00	0.0	-173.7E-6	0.0
	-40.000	-16.000	15.000	0.4807	15.00	0.0	-183.5E-6	0.0
	-40.000	-14.000	15.000	0.4946	15.00	0.0	-192.7E-6	0.0
	-40.000	-12.000	15.000	0.5072	15.00	0.0	-201.3E-6	0.0
	-40.000	-10.000	15.000	0.5181	15.00	0.0	-209.0E-6	0.0
	-40.000	-8.000	15.000	0.5274	15.00	0.0	-215.5E-6	0.0
	-40.000	-6.000	15.000	0.5348	15.00	0.0	-220.8E-6	0.0
	-40.000	-4.000	15.000	0.5402	15.00	0.0	-224.7E-6	0.0
	-40.000	-2.000	15.000	0.5435	15.00	0.0	-227.1E-6	0.0
	-40.000	0.000	15.000	0.5446	15.00	0.0	-227.9E-6	0.0
	-40.000	2.000	15.000	0.5435	15.00	0.0	-227.1E-6	0.0
	-40.000	4.000	15.000	0.5402	15.00	0.0	-224.7E-6	0.0
	-40.000	6.000	15.000	0.5348	15.00	0.0	-220.8E-6	0.0
	-40.000	8.000	15.000	0.5274	15.00	0.0	-215.5E-6	0.0
	-40.000	10.000	15.000	0.5181	15.00	0.0	-209.0E-6	0.0
	-40.000	12.000	15.000	0.5072	15.00	0.0	-201.3E-6	0.0
	-40.000	14.000	15.000	0.4946	15.00	0.0	-192.7E-6	0.0
	-40.000	16.000	15.000	0.4807	15.00	0.0	-183.5E-6	0.0
	-40.000	18.000	15.000	0.4657	15.00	0.0	-173.7E-6	0.0
	-40.000	20.000	15.000	0.4498	15.00	0.0	-163.7E-6	0.0
	-40.000	22.000	15.000	0.4332	15.00	0.0	-153.6E-6	0.0
	-40.000	24.000	15.000	0.4162	15.00	0.0	-143.5E-6	0.0
	-40.000	26.000	15.000	0.3988	15.00	0.0	-133.8E-6	0.0
	-40.000	28.000	15.000	0.3813	15.00	0.0	-124.3E-6	0.0
	-40.000	30.000	15.000	0.3639	15.00	0.0	-115.3E-6	0.0
	-40.000	32.000	15.000	0.3466	15.00	0.0	-106.8E-6	0.0
	-40.000	34.000	15.000	0.3297	15.00	0.0	-98.74E-6	0.0
	-40.000	36.000	15.000	0.3131	15.00	0.0	-91.26E-6	0.0
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	-38.000	-30.000	15.000	0.3884	15.00	0.0	-128.4E-6	0.0
	-38.000	-28.000	15.000	0.4079	15.00	0.0	-139.3E-6	0.0
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	-38.000	-24.000	15.000	0.4470	15.00	0.0	-162.8E-6	0.0
	-38.000	-22.000	15.000	0.4663	15.00	0.0	-175.2E-6	0.0
	-38.000	-20.000	15.000	0.4851	15.00	0.0	-187.8E-6	0.0
	-38.000	-18.000	15.000	0.5031	15.00	0.0	-200.4E-6	0.0
	-38.000	-16.000	15.000	0.5202	15.00	0.0	-212.7E-6	0.0
	-38.000	-14.000	15.000	0.5360	15.00	0.0	-224.5E-6	0.0
	-38.000	-12.000	15.000	0.5503	15.00	0.0	-235.5E-6	0.0
	-38.000	-10.000	15.000	0.5629	15.00	0.0	-245.3E-6	0.0
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	-38.000	-6.000	15.000	0.5820	15.00	0.0	-260.5E-6	0.0
	-38.000	-4.000	15.000	0.5882	15.00	0.0	-265.5E-6	0.0
	-38.000	-2.000	15.000	0.5919	15.00	0.0	-268.5E-6	0.0
	-38.000	0.000	15.000	0.5932	15.00	0.0	-269.6E-6	0.0
	-38.000	2.000	15.000	0.5919	15.00	0.0	-268.5E-6	0.0
	-38.000	4.000	15.000	0.5882	15.00	0.0	-265.5E-6	0.0
	-38.000	6.000	15.000	0.5820	15.00	0.0	-260.5E-6	0.0
	-38.000	8.000	15.000	0.5735	15.00	0.0	-253.7E-6	0.0
	-38.000	10.000	15.000	0.5629	15.00	0.0	-245.3E-6	0.0
	-38.000	12.000	15.000	0.5503	15.00	0.0	-235.5E-6	0.0
	-38.000	14.000	15.000	0.5360	15.00	0.0	-224.5E-6	0.0
	-38.000	16.000	15.000	0.5202	15.00	0.0	-212.7E-6	0.0
	-38.000	18.000	15.000	0.5031	15.00	0.0	-200.4E-6	0.0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Heave Calculation

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-38.000	20.000	15.000	0.4851	15.00	0.0	-187.8E-6	0.0
	-38.000	22.000	15.000	0.4663	15.00	0.0	-175.2E-6	0.0
	-38.000	24.000	15.000	0.4470	15.00	0.0	-162.8E-6	0.0
	-38.000	26.000	15.000	0.4275	15.00	0.0	-150.8E-6	0.0
	-38.000	28.000	15.000	0.4079	15.00	0.0	-139.3E-6	0.0
	-38.000	30.000	15.000	0.3884	15.00	0.0	-128.4E-6	0.0
	-38.000	32.000	15.000	0.3692	15.00	0.0	-118.3E-6	0.0
	-38.000	34.000	15.000	0.3504	15.00	0.0	-108.8E-6	0.0
	-38.000	36.000	15.000	0.3321	15.00	0.0	-100.0E-6	0.0
	-38.000	38.000	15.000	0.3144	15.00	0.0	-91.94E-6	0.0
	-38.000	40.000	15.000	0.2974	15.00	0.0	-84.52E-6	0.0
	-36.000	-40.000	15.000	0.3139	15.00	0.0	-91.76E-6	0.0
	-36.000	-38.000	15.000	0.3326	15.00	0.0	-100.3E-6	0.0
	-36.000	-36.000	15.000	0.3520	15.00	0.0	-109.7E-6	0.0
	-36.000	-34.000	15.000	0.3722	15.00	0.0	-120.0E-6	0.0
	-36.000	-32.000	15.000	0.3930	15.00	0.0	-131.2E-6	0.0
	-36.000	-30.000	15.000	0.4144	15.00	0.0	-143.4E-6	0.0
	-36.000	-28.000	15.000	0.4361	15.00	0.0	-156.6E-6	0.0
	-36.000	-26.000	15.000	0.4581	15.00	0.0	-170.6E-6	0.0
	-36.000	-24.000	15.000	0.4806	15.00	0.0	-185.5E-6	0.0
	-36.000	-22.000	15.000	0.5018	15.00	0.0	-200.9E-6	0.0
	-36.000	-20.000	15.000	0.5230	15.00	0.0	-216.8E-6	0.0
	-36.000	-18.000	15.000	0.5435	15.00	0.0	-232.9E-6	0.0
	-36.000	-16.000	15.000	0.5629	15.00	0.0	-248.7E-6	0.0
	-36.000	-15.000	15.000	0.5809	15.00	0.0	-263.8E-6	0.0
	-36.000	-12.000	15.000	0.5973	15.00	0.0	-278.0E-6	0.0
	-36.000	-10.000	15.000	0.6117	15.00	0.0	-290.7E-6	0.0
	-36.000	-8.000	15.000	0.6239	15.00	0.0	-301.7E-6	0.0
	-36.000	-6.000	15.000	0.6336	15.00	0.0	-310.5E-6	0.0
	-36.000	-5.000	15.000	0.6407	15.00	0.0	-317.0E-6	0.0
	-36.000	-2.000	15.000	0.6450	15.00	0.0	-321.0E-6	0.0
	-36.000	0.000	15.000	0.6465	15.00	0.0	-322.3E-6	0.0
	-36.000	2.000	15.000	0.6450	15.00	0.0	-321.0E-6	0.0
	-36.000	4.000	15.000	0.6407	15.00	0.0	-317.0E-6	0.0
	-36.000	24.000	15.000	0.6336	15.00	0.0	-310.5E-6	0.0
	-36.000	8.000	15.000	0.6239	15.00	0.0	-301.7E-6	0.0
	-36.000	10.000	15.000	0.6117	15.00	0.0	-290.7E-6	0.0
	-36.000	12.000	15.000	0.5973	15.00	0.0	-278.0E-6	0.0
	-36.000	14.000	15.000	0.5809	15.00	0.0	-263.8E-6	0.0
	-36.000	16.000	15.000	0.5629	15.00	0.0	-248.7E-6	0.0
	-36.000	18.000	15.000	0.5435	15.00	0.0	-232.9E-6	0.0
	-36.000	20.000	15.000	0.5230	15.00	0.0	-216.8E-6	0.0
	-36.000	22.000	15.000	0.5018	15.00	0.0	-200.9E-6	0.0
	-36.000	24.000	15.000	0.4809	15.00	0.0	-185.5E-6	0.0
	-36.000	26.000	15.000	0.4581	15.00	0.0	-170.6E-6	0.0
	-36.000	28.000	15.000	0.4361	15.00	0.0	-156.6E-6	0.0
	-36.000	30.000	15.000	0.4144	15.00	0.0	-143.4E-6	0.0
	-36.000	32.000	15.000	0.3930	15.00	0.0	-131.2E-6	0.0
	-36.000	34.000	15.000	0.3722	15.00	0.0	-120.0E-6	0.0
	-36.000	36.000	15.000	0.3520	15.00	0.0	-109.7E-6	0.0
	-36.000	38.000	15.000	0.3326	15.00	0.0	-100.3E-6	0.0
	-36.000	40.000	15.000	0.3139	15.00	0.0	-91.76E-6	0.0
	-34.000	-40.000	15.000	0.3310	15.00	0.0	-99.62E-6	0.0
	-34.000	-38.000	15.000	0.3514	15.00	0.0	-109.5E-6	0.0
	-34.000	-36.000	15.000	0.3728	15.00	0.0	-120.4E-6	0.0
	-34.000	-34.000	15.000	0.3950	15.00	0.0	-132.6E-6	0.0
	-34.000	-32.000	15.000	0.4181	15.00	0.0	-145.9E-6	0.0
	-34.000	-30.000	15.000	0.4418	15.00	0.0	-160.6E-6	0.0
	-34.000	-28.000	15.000	0.4660	15.00	0.0	-176.6E-6	0.0
	-34.000	-26.000	15.000	0.4906	15.00	0.0	-193.9E-6	0.0
	-34.000	-24.000	15.000	0.5152	15.00	0.0	-212.4E-6	0.0
	-34.000	-22.000	15.000	0.5397	15.00	0.0	-231.9E-6	0.0
	-34.000	-20.000	15.000	0.5638	15.00	0.0	-252.2E-6	0.0
	-34.000	-18.000	15.000	0.5870	15.00	0.0	-272.8E-6	0.0
	-34.000	-16.000	15.000	0.6090	15.00	0.0	-293.3E-6	0.0
	-34.000	-14.000	15.000	0.6296	15.00	0.0	-313.2E-6	0.0
	-34.000	-12.000	15.000	0.6483	15.00	0.0	-331.7E-6	0.0
	-34.000	-10.000	15.000	0.6648	15.00	0.0	-348.5E-6	0.0
	-34.000	-8.000	15.000	0.6788	15.00	0.0	-362.9E-6	0.0
	-34.000	-6.000	15.000	0.6899	15.00	0.0	-374.6E-6	0.0
	-34.000	-4.000	15.000	0.6981	15.00	0.0	-383.1E-6	0.0
	-34.000	-2.000	15.000	0.7030	15.00	0.0	-388.4E-6	0.0
	-34.000	0.000	15.000	0.7047	15.00	0.0	-390.1E-6	0.0
	-34.000	2.000	15.000	0.7030	15.00	0.0	-388.4E-6	0.0
	-34.000	4.000	15.000	0.6981	15.00	0.0	-383.1E-6	0.0
	-34.000	6.000	15.000	0.6899	15.00	0.0	-374.6E-6	0.0
	-34.000	8.000	15.000	0.6788	15.00	0.0	-362.9E-6	0.0
	-34.000	10.000	15.000	0.6648	15.00	0.0	-348.5E-6	0.0
	-34.000	12.000	15.000	0.6483	15.00	0.0	-331.7E-6	0.0
	-34.000	14.000	15.000	0.6296	15.00	0.0	-313.2E-6	0.0
	-34.000	16.000	15.000	0.6090	15.00	0.0	-293.3E-6	0.0
	-34.000	18.000	15.000	0.5870	15.00	0.0	-272.8E-6	0.0
	-34.000	20.000	15.000	0.5638	15.00	0.0	-252.2E-6	0.0
	-34.000	22.000	15.000	0.5397	15.00	0.0	-231.9E-6	0.0
	-34.000	24.000	15.000	0.5152	15.00	0.0	-212.4E-6	0.0
	-34.000	26.000	15.000	0.4906	15.00	0.0	-193.9E-6	0.0
	-34.000	28.000	15.000	0.4660	15.00	0.0	-176.6E-6	0.0
	-34.000	30.000	15.000	0.4418	15.00	0.0	-160.6E-6	0.0
	-34.000	32.000	15.000	0.4181	15.00	0.0	-145.9E-6	0.0
	-34.000	34.000	15.000	0.3950	15.00	0.0	-132.6E-6	0.0
	-34.000	36.000	15.000	0.3728	15.00	0.0	-120.4E-6	0.0
	-34.000	38.000	15.000	0.3514	15.00	0.0	-109.5E-6	0.0
	-34.000	40.000	15.000	0.3310	15.00	0.0	-99.62E-6	0.0
	-32.000	-40.000	15.000	0.3485	15.00	0.0	-108.1E-6	0.0
	-32.000	-38.000	15.000	0.3708	15.00	0.0	-119.5E-6	0.0
	-32.000	-36.000	15.000	0.3943	15.00	0.0	-132.3E-6	0.0
	-32.000	-34.000	15.000	0.4187	15.00	0.0	-146.6E-6	0.0
	-32.000	-32.000	15.000	0.4442	15.00	0.0	-162.5E-6	0.0
	-32.000	-30.000	15.000	0.4705	15.00	0.0	-180.2E-6	0.0
	-32.000	-28.000	15.000	0.4975	15.00	0.0	-199.8E-6	0.0
	-32.000	-26.000	15.000	0.5249	15.00	0.0	-221.3E-6	



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-30.000	-26.000	15.000	0.5611	15.00	0.0	-253.6E-6	0.0
	-30.000	-24.000	15.000	0.5920	15.00	0.0	-283.3E-6	0.0
	-30.000	-22.000	15.000	0.6230	15.00	0.0	-315.5E-6	0.0
	-30.000	-20.000	15.000	0.6535	15.00	0.0	-349.9E-6	0.0
	-30.000	-18.000	15.000	0.6832	15.00	0.0	-385.8E-6	0.0
	-30.000	-16.000	15.000	0.7115	15.00	0.0	-422.2E-6	0.0
	-30.000	-14.000	15.000	0.7380	15.00	0.0	-458.0E-6	0.0
	-30.000	-12.000	15.000	0.7622	15.00	0.0	-491.7E-6	0.0
	-30.000	-10.000	15.000	0.7836	15.00	0.0	-522.3E-6	0.0
	-30.000	-8.000	15.000	0.8018	15.00	0.0	-548.5E-6	0.0
	-30.000	-6.000	15.000	0.8165	15.00	0.0	-569.6E-6	0.0
	-30.000	-4.000	15.000	0.8272	15.00	0.0	-585.1E-6	0.0
	-30.000	-2.000	15.000	0.8337	15.00	0.0	-594.5E-6	0.0
	-30.000	0.000	15.000	0.8359	15.00	0.0	-597.6E-6	0.0
	-30.000	2.000	15.000	0.8337	15.00	0.0	-594.5E-6	0.0
	-30.000	4.000	15.000	0.8272	15.00	0.0	-585.1E-6	0.0
	-30.000	6.000	15.000	0.8165	15.00	0.0	-569.6E-6	0.0
	-30.000	8.000	15.000	0.8018	15.00	0.0	-548.5E-6	0.0
	-30.000	10.000	15.000	0.7836	15.00	0.0	-522.3E-6	0.0
	-30.000	12.000	15.000	0.7622	15.00	0.0	-491.7E-6	0.0
	-30.000	14.000	15.000	0.7380	15.00	0.0	-458.0E-6	0.0
	-30.000	16.000	15.000	0.7115	15.00	0.0	-422.2E-6	0.0
	-30.000	18.000	15.000	0.6832	15.00	0.0	-385.8E-6	0.0
	-30.000	20.000	15.000	0.6535	15.00	0.0	-349.9E-6	0.0
	-30.000	22.000	15.000	0.6230	15.00	0.0	-315.5E-6	0.0
	-30.000	24.000	15.000	0.5920	15.00	0.0	-283.3E-6	0.0
	-30.000	26.000	15.000	0.5611	15.00	0.0	-253.6E-6	0.0
	-30.000	28.000	15.000	0.5305	15.00	0.0	-226.8E-6	0.0
	-30.000	30.000	15.000	0.5095	15.00	0.0	-202.7E-6	0.0
	-30.000	32.000	15.000	0.4714	15.00	0.0	-181.2E-6	0.0
	-30.000	34.000	15.000	0.4433	15.00	0.0	-162.1E-6	0.0
	-30.000	36.000	15.000	0.4164	15.00	0.0	-145.3E-6	0.0
	-30.000	38.000	15.000	0.3908	15.00	0.0	-130.4E-6	0.0
	-30.000	40.000	15.000	0.3665	15.00	0.0	-117.3E-6	0.0
	-28.000	-40.000	15.000	0.3847	15.00	0.0	-127.1E-6	0.0
	-28.000	-38.000	15.000	0.4111	15.00	0.0	-142.2E-6	0.0
	-28.000	-36.000	15.000	0.4391	15.00	0.0	-159.5E-6	0.0
	-28.000	-34.000	15.000	0.4685	15.00	0.0	-179.4E-6	0.0
	-28.000	-32.000	15.000	0.4994	15.00	0.0	-202.2E-6	0.0
	-28.000	-30.000	15.000	0.5315	15.00	0.0	-228.3E-6	0.0
	-28.000	-28.000	15.000	0.5648	15.00	0.0	-258.1E-6	0.0
	-28.000	-26.000	15.000	0.5988	15.00	0.0	-292.0E-6	0.0
	-28.000	-24.000	15.000	0.6333	15.00	0.0	-330.1E-6	0.0
	-28.000	-22.000	15.000	0.6679	15.00	0.0	-372.4E-6	0.0
	-28.000	-20.000	15.000	0.7021	15.00	0.0	-418.4E-6	0.0
	-28.000	-18.000	15.000	0.7353	15.00	0.0	-467.3E-6	0.0
	-28.000	-16.000	15.000	0.7670	15.00	0.0	-517.5E-6	0.0
	-28.000	-14.000	15.000	0.7967	15.00	0.0	-567.2E-6	0.0
	-28.000	-12.000	15.000	0.8238	15.00	0.0	-614.3E-6	0.0
	-28.000	-10.000	15.000	0.8480	15.00	0.0	-656.9E-6	0.0
	-28.000	-8.000	15.000	0.8686	15.00	0.0	-693.3E-6	0.0
	-28.000	-6.000	15.000	0.8852	15.00	0.0	-722.4E-6	0.0
	-28.000	-4.000	15.000	0.8974	15.00	0.0	-743.5E-6	0.0
	-28.000	-2.000	15.000	0.9048	15.00	0.0	-756.3E-6	0.0
	-28.000	0.000	15.000	0.9073	15.00	0.0	-760.6E-6	0.0
	-28.000	2.000	15.000	0.9048	15.00	0.0	-756.3E-6	0.0
	-28.000	4.000	15.000	0.8974	15.00	0.0	-743.5E-6	0.0
	-28.000	6.000	15.000	0.8852	15.00	0.0	-722.4E-6	0.0
	-28.000	8.000	15.000	0.8686	15.00	0.0	-693.3E-6	0.0
	-28.000	10.000	15.000	0.8480	15.00	0.0	-656.9E-6	0.0
	-28.000	12.000	15.000	0.8238	15.00	0.0	-614.3E-6	0.0
	-28.000	14.000	15.000	0.7967	15.00	0.0	-567.2E-6	0.0
	-28.000	16.000	15.000	0.7670	15.00	0.0	-517.5E-6	0.0
	-28.000	18.000	15.000	0.7353	15.00	0.0	-467.3E-6	0.0
	-28.000	20.000	15.000	0.7021	15.00	0.0	-418.4E-6	0.0
	-28.000	22.000	15.000	0.6679	15.00	0.0	-372.4E-6	0.0
	-28.000	24.000	15.000	0.6333	15.00	0.0	-330.1E-6	0.0
	-28.000	26.000	15.000	0.5988	15.00	0.0	-292.0E-6	0.0
	-28.000	28.000	15.000	0.5648	15.00	0.0	-258.1E-6	0.0
	-28.000	30.000	15.000	0.5315	15.00	0.0	-228.3E-6	0.0
	-28.000	32.000	15.000	0.4994	15.00	0.0	-202.2E-6	0.0
	-28.000	34.000	15.000	0.4685	15.00	0.0	-179.4E-6	0.0
	-28.000	36.000	15.000	0.4391	15.00	0.0	-159.5E-6	0.0
	-28.000	38.000	15.000	0.4111	15.00	0.0	-142.2E-6	0.0
	-26.000	-40.000	15.000	0.3847	15.00	0.0	-127.1E-6	0.0
	-26.000	-38.000	15.000	0.4031	15.00	0.0	-137.5E-6	0.0
	-26.000	-36.000	15.000	0.4317	15.00	0.0	-154.8E-6	0.0
	-26.000	-34.000	15.000	0.4621	15.00	0.0	-175.0E-6	0.0
	-26.000	-32.000	15.000	0.4943	15.00	0.0	-198.4E-6	0.0
	-26.000	-30.000	15.000	0.5281	15.00	0.0	-225.7E-6	0.0
	-26.000	-28.000	15.000	0.5634	15.00	0.0	-257.5E-6	0.0
	-26.000	-26.000	15.000	0.6001	15.00	0.0	-294.6E-6	0.0
	-26.000	-24.000	15.000	0.6378	15.00	0.0	-337.6E-6	0.0
	-26.000	-22.000	15.000	0.6761	15.00	0.0	-387.2E-6	0.0
	-26.000	-20.000	15.000	0.7144	15.00	0.0	-443.5E-6	0.0
	-26.000	-18.000	15.000	0.7522	15.00	0.0	-506.5E-6	0.0
	-26.000	-16.000	15.000	0.7887	15.00	0.0	-574.8E-6	0.0
	-26.000	-14.000	15.000	0.8235	15.00	0.0	-646.2E-6	0.0
	-26.000	-12.000	15.000	0.8560	15.00	0.0	-717.6E-6	0.0
	-26.000	-10.000	15.000	0.8858	15.00	0.0	-785.4E-6	0.0
	-26.000	-8.000	15.000	0.9124	15.00	0.0	-846.3E-6	0.0
	-26.000	-6.000	15.000	0.9353	15.00	0.0	-897.9E-6	0.0
	-26.000	-4.000	15.000	0.9539	15.00	0.0	-938.7E-6	0.0
	-26.000	-2.000	15.000	0.9676	15.00	0.0	-968.0E-6	0.0
	-26.000	0.000	15.000	0.9760	15.00	0.0	-985.6E-6	0.0
	-26.000	2.000	15.000	0.9788	15.00	0.0	-991.5E-6	0.0
	-26.000	4.000	15.000	0.9760	15.00	0.0	-985.6E-6	0.0
	-26.000	6.000	15.000	0.9676	15.00	0.0	-968.0E-6	0.0
	-26.000	8.000	15.000					



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-24.000	10.000	15.000	0.9697	15.00	0.0	-0.001125	0.0
	-24.000	12.000	15.000	0.9418	15.00	0.0	-0.001035	0.0
	-24.000	14.000	15.000	0.9109	15.00	0.0	-933.5E-6	0.0
	-24.000	16.000	15.000	0.8773	15.00	0.0	-826.5E-6	0.0
	-24.000	18.000	15.000	0.8418	15.00	0.0	-720.7E-6	0.0
	-24.000	20.000	15.000	0.8022	15.00	0.0	-621.9E-6	0.0
	-24.000	22.000	15.000	0.7615	15.00	0.0	-533.6E-6	0.0
	-24.000	24.000	15.000	0.7197	15.00	0.0	-457.0E-6	0.0
	-24.000	26.000	15.000	0.6777	15.00	0.0	-391.8E-6	0.0
	-24.000	28.000	15.000	0.6362	15.00	0.0	-336.8E-6	0.0
	-24.000	30.000	15.000	0.5959	15.00	0.0	-290.8E-6	0.0
	-24.000	32.000	15.000	0.5572	15.00	0.0	-251.8E-6	0.0
	-24.000	34.000	15.000	0.5203	15.00	0.0	-219.2E-6	0.0
	-24.000	36.000	15.000	0.4853	15.00	0.0	-191.6E-6	0.0
	-24.000	38.000	15.000	0.4524	15.00	0.0	-168.3E-6	0.0
	-24.000	40.000	15.000	0.4215	15.00	0.0	-148.4E-6	0.0
	-22.000	-40.000	15.000	0.4396	15.00	0.0	-159.8E-6	0.0
	-22.000	-38.000	15.000	0.4728	15.00	0.0	-182.4E-6	0.0
	-22.000	-36.000	15.000	0.5084	15.00	0.0	-209.4E-6	0.0
	-22.000	-34.000	15.000	0.5462	15.00	0.0	-241.6E-6	0.0
	-22.000	-32.000	15.000	0.5864	15.00	0.0	-280.5E-6	0.0
	-22.000	-30.000	15.000	0.6286	15.00	0.0	-327.7E-6	0.0
	-22.000	-28.000	15.000	0.6726	15.00	0.0	-385.3E-6	0.0
	-22.000	-26.000	15.000	0.7178	15.00	0.0	-455.9E-6	0.0
	-22.000	-24.000	15.000	0.7632	15.00	0.0	-542.6E-6	0.0
	-22.000	-22.000	15.000	0.8075	15.00	0.0	-648.6E-6	0.0
	-22.000	-20.000	15.000	0.8492	15.00	0.0	-776.5E-6	0.0
	-22.000	-18.000	15.000	0.8867	15.00	0.0	-925.9E-6	0.0
	-22.000	-16.000	15.000	0.9196	15.00	0.0	-0.001092	0.0
	-22.000	-14.000	15.000	0.9488	15.00	0.0	-0.001201	0.0
	-22.000	-12.000	15.000	0.9758	15.00	0.0	-0.001423	0.0
	-22.000	-10.000	15.000	1.002	15.00	0.0	-0.001562	0.0
	-22.000	-8.000	15.000	1.026	15.00	0.0	-0.001675	0.0
	-22.000	-6.000	15.000	1.046	15.00	0.0	-0.001759	0.0
	-22.000	-4.000	15.000	1.062	15.00	0.0	-0.001831	0.0
	-22.000	-2.000	15.000	1.072	15.00	0.0	-0.001852	0.0
	-22.000	0.000	15.000	1.076	15.00	0.0	-0.001863	0.0
	-22.000	2.000	15.000	1.072	15.00	0.0	-0.001852	0.0
	-22.000	4.000	15.000	1.062	15.00	0.0	-0.001818	0.0
	-22.000	6.000	15.000	1.046	15.00	0.0	-0.001759	0.0
	-22.000	8.000	15.000	1.026	15.00	0.0	-0.001675	0.0
	-22.000	10.000	15.000	1.002	15.00	0.0	-0.001562	0.0
	-22.000	12.000	15.000	0.9758	15.00	0.0	-0.001423	0.0
	-22.000	14.000	15.000	0.9488	15.00	0.0	-0.001262	0.0
	-22.000	16.000	15.000	0.9196	15.00	0.0	-0.001092	0.0
	-22.000	18.000	15.000	0.8867	15.00	0.0	-925.9E-6	0.0
	-22.000	20.000	15.000	0.8492	15.00	0.0	-776.5E-6	0.0
	-22.000	22.000	15.000	0.8075	15.00	0.0	-648.6E-6	0.0
	-22.000	24.000	15.000	0.7632	15.00	0.0	-542.6E-6	0.0
	-22.000	26.000	15.000	0.7178	15.00	0.0	-455.9E-6	0.0
	-22.000	28.000	15.000	0.6726	15.00	0.0	-385.3E-6	0.0
	-22.000	30.000	15.000	0.6286	15.00	0.0	-327.7E-6	0.0
	-22.000	32.000	15.000	0.5864	15.00	0.0	-280.5E-6	0.0
	-22.000	34.000	15.000	0.5462	15.00	0.0	-241.6E-6	0.0
	-22.000	36.000	15.000	0.5084	15.00	0.0	-209.4E-6	0.0
	-22.000	38.000	15.000	0.4728	15.00	0.0	-182.4E-6	0.0
	-22.000	40.000	15.000	0.4396	15.00	0.0	-159.8E-6	0.0
	-20.000	-40.000	15.000	0.4573	15.00	0.0	-171.4E-6	0.0
	-20.000	-38.000	15.000	0.4929	15.00	0.0	-197.1E-6	0.0
	-20.000	-36.000	15.000	0.5311	15.00	0.0	-227.9E-6	0.0
	-20.000	-34.000	15.000	0.5719	15.00	0.0	-265.5E-6	0.0
	-20.000	-32.000	15.000	0.6153	15.00	0.0	-311.5E-6	0.0
	-20.000	-30.000	15.000	0.6611	15.00	0.0	-368.7E-6	0.0
	-20.000	-28.000	15.000	0.7087	15.00	0.0	-440.2E-6	0.0
	-20.000	-26.000	15.000	0.7573	15.00	0.0	-531.0E-6	0.0
	-20.000	-24.000	15.000	0.8052	15.00	0.0	-647.1E-6	0.0
	-20.000	-22.000	15.000	0.8498	15.00	0.0	-796.6E-6	0.0
	-20.000	-20.000	15.000	0.8874	15.00	0.0	-988.4E-6	0.0
	-20.000	-18.000	15.000	0.9143	15.00	0.0	-0.001228	0.0
	-20.000	-16.000	15.000	0.9294	15.00	0.0	-0.001511	0.0
	-20.000	-14.000	15.000	0.9374	15.00	0.0	-0.001808	0.0
	-20.000	-12.000	15.000	0.9462	15.00	0.0	-0.002084	0.0
	-20.000	-10.000	15.000	0.9603	15.00	0.0	-0.002313	0.0
	-20.000	-8.000	15.000	0.9787	15.00	0.0	-0.002487	0.0
	-20.000	-6.000	15.000	0.9978	15.00	0.0	-0.002611	0.0
	-20.000	-4.000	15.000	1.014	15.00	0.0	-0.002694	0.0
	-20.000	-2.000	15.000	1.024	15.00	0.0	-0.002741	0.0
	-20.000	0.000	15.000	1.028	15.00	0.0	-0.002756	0.0
	-20.000	2.000	15.000	1.024	15.00	0.0	-0.002741	0.0
	-20.000	4.000	15.000	1.014	15.00	0.0	-0.002694	0.0
	-20.000	6.000	15.000	0.9978	15.00	0.0	-0.002611	0.0
	-20.000	8.000	15.000	0.9787	15.00	0.0	-0.002487	0.0
	-20.000	10.000	15.000	0.9603	15.00	0.0	-0.002313	0.0
	-20.000	12.000	15.000	0.9462	15.00	0.0	-0.002084	0.0
	-20.000	14.000	15.000	0.9374	15.00	0.0	-0.001808	0.0
	-20.000	16.000	15.000	0.9294	15.00	0.0	-0.001510	0.0
	-20.000	18.000	15.000	0.9143	15.00	0.0	-0.001228	0.0
	-20.000	20.000	15.000	0.8874	15.00	0.0	-988.4E-6	0.0
	-20.000	22.000	15.000	0.8498	15.00	0.0	-796.6E-6	0.0
	-20.000	24.000	15.000	0.8052	15.00	0.0	-647.1E-6	0.0
	-20.000	26.000	15.000	0.7573	15.00	0.0	-531.0E-6	0.0
	-20.000	28.000	15.000	0.7087	15.00	0.0	-440.2E-6	0.0
	-20.000	30.000	15.000	0.6611	15.00	0.0	-368.7E-6	0.0
	-20.000	32.000	15.000	0.6153	15.00	0.0	-311.5E-6	0.0
	-20.000	34.000	15.000	0.5719	15.00	0.0	-265.5E-6	0.0
	-20.000	36.000	15.000	0.5311	15.00	0.0	-227.9E-6	0.0
	-20.000	38.000	15.000	0.4929	15.00	0.0	-197.1E-6	0.0
	-20.000	40.000	15.000	0.4573	15.00	0.0	-171.4E-6	0.0
	-18.000	-						



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-16.000	-36.000	15.000	0.5741	15.00	0.0	-266.4E-6	0.0
	-16.000	-34.000	15.000	0.6208	15.00	0.0	-315.9E-6	0.0
	-16.000	-32.000	15.000	0.6706	15.00	0.0	-378.7E-6	0.0
	-16.000	-30.000	15.000	0.7232	15.00	0.0	-460.0E-6	0.0
	-16.000	-28.000	15.000	0.7775	15.00	0.0	-567.4E-6	0.0
	-16.000	-26.000	15.000	0.8310	15.00	0.0	-713.6E-6	0.0
	-16.000	-24.000	15.000	0.8783	15.00	0.0	-919.5E-6	0.0
	-16.000	-22.000	15.000	0.9081	15.00	0.0	-0.001223	0.0
	-16.000	-20.000	15.000	0.8959	15.00	0.0	-0.001698	0.0
	-16.000	-18.000	15.000	0.7967	15.00	0.0	-0.002490	0.0
	-16.000	-16.000	15.000	0.5572	15.00	0.0	-0.003823	0.0
	-16.000	-14.000	15.000	0.2254	15.00	0.0	-0.005548	0.0
	-16.000	-12.000	15.000	-0.02140	15.00	0.0	-0.006875	0.0
	-16.000	-10.000	15.000	-0.1354	15.00	0.0	-0.007652	0.0
	-16.000	-8.000	15.000	-0.1696	15.00	0.0	-0.008104	0.0
	-16.000	-6.000	15.000	-0.1693	15.00	0.0	-0.008375	0.0
	-16.000	-4.000	15.000	-0.1587	15.00	0.0	-0.008536	0.0
	-16.000	-2.000	15.000	-0.1491	15.00	0.0	-0.008622	0.0
	-16.000	0.000	15.000	-0.1455	15.00	0.0	-0.008649	0.0
	-16.000	2.000	15.000	-0.1491	15.00	0.0	-0.008622	0.0
	-16.000	4.000	15.000	-0.1587	15.00	0.0	-0.008536	0.0
	-16.000	6.000	15.000	-0.1693	15.00	0.0	-0.008375	0.0
	-16.000	8.000	15.000	-0.1696	15.00	0.0	-0.008104	0.0
	-16.000	10.000	15.000	-0.1354	15.00	0.0	-0.007652	0.0
	-16.000	12.000	15.000	-0.02140	15.00	0.0	-0.006875	0.0
	-16.000	14.000	15.000	0.2254	15.00	0.0	-0.005548	0.0
	-16.000	16.000	15.000	0.5572	15.00	0.0	-0.003823	0.0
	-16.000	18.000	15.000	0.7967	15.00	0.0	-0.002490	0.0
	-16.000	20.000	15.000	0.8959	15.00	0.0	-0.001698	0.0
	-16.000	22.000	15.000	0.9081	15.00	0.0	-0.001223	0.0
	-16.000	24.000	15.000	0.8783	15.00	0.0	-919.5E-6	0.0
	-16.000	26.000	15.000	0.8310	15.00	0.0	-713.6E-6	0.0
	-16.000	28.000	15.000	0.7775	15.00	0.0	-567.4E-6	0.0
	-16.000	30.000	15.000	0.7232	15.00	0.0	-460.0E-6	0.0
	-16.000	32.000	15.000	0.6706	15.00	0.0	-378.7E-6	0.0
	-16.000	34.000	15.000	0.6208	15.00	0.0	-315.9E-6	0.0
	-16.000	36.000	15.000	0.5741	15.00	0.0	-266.4E-6	0.0
	-16.000	38.000	15.000	0.5308	15.00	0.0	-226.1E-6	0.0
	-16.000	40.000	15.000	0.4906	15.00	0.0	-194.8E-6	0.0
	-14.000	-40.000	15.000	0.5057	15.00	0.0	-206.0E-6	0.0
	-14.000	-38.000	15.000	0.5480	15.00	0.0	-241.3E-6	0.0
	-14.000	-36.000	15.000	0.5938	15.00	0.0	-285.4E-6	0.0
	-14.000	-34.000	15.000	0.6432	15.00	0.0	-341.1E-6	0.0
	-14.000	-32.000	15.000	0.6969	15.00	0.0	-413.0E-6	0.0
	-14.000	-30.000	15.000	0.7518	15.00	0.0	-507.7E-6	0.0
	-14.000	-28.000	15.000	0.8089	15.00	0.0	-636.1E-6	0.0
	-14.000	-26.000	15.000	0.8636	15.00	0.0	-816.2E-6	0.0
	-14.000	-24.000	15.000	0.9074	15.00	0.0	-0.001082	0.0
	-14.000	-22.000	15.000	0.9192	15.00	0.0	-0.001501	0.0
	-14.000	-20.000	15.000	0.8465	15.00	0.0	-0.002240	0.0
	-14.000	-18.000	15.000	0.5529	15.00	0.0	-0.003819	0.0
	-14.000	-16.000	15.000	-0.3234	15.00	0.0	-0.008782	0.0
	-14.000	-14.000	15.000	-1.968	15.00	0.0	-0.02226	0.0
	-14.000	-12.000	15.000	-2.852	15.00	0.0	-0.02722	0.0
	-14.000	-10.000	15.000	-3.161	15.00	0.0	-0.02878	0.0
	-14.000	-8.000	15.000	-3.258	15.00	0.0	-0.02949	0.0
	-14.000	-6.000	15.000	-3.277	15.00	0.0	-0.02987	0.0
	-14.000	-4.000	15.000	-3.272	15.00	0.0	-0.03009	0.0
	-14.000	-2.000	15.000	-3.264	15.00	0.0	-0.03020	0.0
	-14.000	0.000	15.000	-3.261	15.00	0.0	-0.03024	0.0
	-14.000	2.000	15.000	-3.264	15.00	0.0	-0.03020	0.0
	-14.000	4.000	15.000	-3.272	15.00	0.0	-0.03009	0.0
	-14.000	6.000	15.000	-3.277	15.00	0.0	-0.02987	0.0
	-14.000	8.000	15.000	-3.258	15.00	0.0	-0.02949	0.0
	-14.000	10.000	15.000	-3.161	15.00	0.0	-0.02878	0.0
	-14.000	12.000	15.000	-2.852	15.00	0.0	-0.02722	0.0
	-14.000	14.000	15.000	-1.968	15.00	0.0	-0.02226	0.0
	-14.000	16.000	15.000	-0.3234	15.00	0.0	-0.008782	0.0
	-14.000	18.000	15.000	0.5529	15.00	0.0	-0.003819	0.0
	-14.000	20.000	15.000	0.8465	15.00	0.0	-0.002240	0.0
	-14.000	22.000	15.000	0.9192	15.00	0.0	-0.001501	0.0
	-14.000	24.000	15.000	0.9074	15.00	0.0	-0.001082	0.0
	-14.000	26.000	15.000	0.8636	15.00	0.0	-816.2E-6	0.0
	-14.000	28.000	15.000	0.8089	15.00	0.0	-636.1E-6	0.0
	-14.000	30.000	15.000	0.7518	15.00	0.0	-507.7E-6	0.0
	-14.000	32.000	15.000	0.6969	15.00	0.0	-413.0E-6	0.0
	-14.000	34.000	15.000	0.6432	15.00	0.0	-341.1E-6	0.0
	-14.000	36.000	15.000	0.5938	15.00	0.0	-285.4E-6	0.0
	-14.000	38.000	15.000	0.5480	15.00	0.0	-241.3E-6	0.0
	-14.000	40.000	15.000	0.5057	15.00	0.0	-206.0E-6	0.0
	-12.000	-40.000	15.000	0.5194	15.00	0.0	-216.6E-6	0.0
	-12.000	-38.000	15.000	0.5636	15.00	0.0	-255.0E-6	0.0
	-12.000	-36.000	15.000	0.6117	15.00	0.0	-303.4E-6	0.0
	-12.000	-34.000	15.000	0.6637	15.00	0.0	-365.3E-6	0.0
	-12.000	-32.000	15.000	0.7193	15.00	0.0	-446.2E-6	0.0
	-12.000	-30.000	15.000	0.7780	15.00	0.0	-554.5E-6	0.0
	-12.000	-28.000	15.000	0.8376	15.00	0.0	-703.9E-6	0.0
	-12.000	-26.000	15.000	0.8931	15.00	0.0	-919.1E-6	0.0
	-12.000	-24.000	15.000	0.9322	15.00	0.0	-0.001247	0.0
	-12.000	-22.000	15.000	0.9225	15.00	0.0	-0.001794	0.0
	-12.000	-20.000	15.000	0.7757	15.00	0.0	-0.002844	0.0
	-12.000	-18.000	15.000	0.2161	15.00	0.0	-0.005538	0.0
	-12.000	-16.000	15.000	-1.973	15.00	0.0	-0.02225	0.0
	-12.000	-14.000	15.000	-12.72	15.00	-200.0	-599.9	-1.231E-6
	-12.000	-12.000	15.000	-14.91	15.00	-200.0	-600.0	0.0
	-12.000	-10.000	15.000	-15.49	15.00	-200.0	-600.0	0.0
	-12.000	-8.000	15.000	-15.66	15.00	-200.0	-600.0	0.0
	-12.000	-6.000	15.000	-15.70	15.00	-200.0	-600.0	0.0
	-12.000	-4.000	15.000	-15.71	15.0			



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Vert Strain [-]
	-10.000	0.000	15.000	-18.83	15.00	-200.0	-600.0	0.0
	-10.000	2.000	15.000	-18.83	15.00	-200.0	-600.0	0.0
	-10.000	4.000	15.000	-18.83	15.00	-200.0	-600.0	0.0
	-10.000	6.000	15.000	-18.82	15.00	-200.0	-600.0	0.0
	-10.000	8.000	15.000	-18.76	15.00	-200.0	-600.0	0.0
	-10.000	10.000	15.000	-18.53	15.00	-200.0	-600.0	0.0
	-10.000	12.000	15.000	-17.76	15.00	-200.0	-600.0	0.0
	-10.000	14.000	15.000	-14.92	15.00	-200.0	-600.0	0.0
	-10.000	16.000	15.000	-2.864	15.00	0.0	-0.02720	0.0
	-10.000	18.000	15.000	-0.03664	15.00	0.0	-0.00855	0.0
	-10.000	20.000	15.000	0.7178	15.00	0.0	-0.003377	0.0
	-10.000	22.000	15.000	0.9259	15.00	0.0	-0.002063	0.0
	-10.000	24.000	15.000	0.9542	15.00	0.0	-0.001402	0.0
	-10.000	26.000	15.000	0.9194	15.00	0.0	-0.001016	0.0
	-10.000	28.000	15.000	0.8632	15.00	0.0	-767.4E-6	0.0
	-10.000	30.000	15.000	0.8013	15.00	0.0	-598.0E-6	0.0
	-10.000	32.000	15.000	0.7401	15.00	0.0	-477.0E-6	0.0
	-10.000	34.000	15.000	0.6818	15.00	0.0	-387.6E-6	0.0
	-10.000	36.000	15.000	0.6276	15.00	0.0	-319.9E-6	0.0
	-10.000	38.000	15.000	0.5775	15.00	0.0	-267.5E-6	0.0
	-10.000	40.000	15.000	0.5314	15.00	0.0	-226.1E-6	0.0
	-8.000	-40.000	15.000	0.5416	15.00	0.0	-234.3E-6	0.0
	-8.000	-38.000	15.000	0.5892	15.00	0.0	-278.3E-6	0.0
	-8.000	-36.000	15.000	0.6411	15.00	0.0	-334.3E-6	0.0
	-8.000	-34.000	15.000	0.6973	15.00	0.0	-407.2E-6	0.0
	-8.000	-32.000	15.000	0.7577	15.00	0.0	-504.0E-6	0.0
	-8.000	-30.000	15.000	0.8213	15.00	0.0	-636.2E-6	0.0
	-8.000	-28.000	15.000	0.8852	15.00	0.0	-823.0E-6	0.0
	-8.000	-26.000	15.000	0.9423	15.00	0.0	-0.001099	0.0
	-8.000	-24.000	15.000	0.9744	15.00	0.0	-0.001534	0.0
	-8.000	-22.000	15.000	0.9340	15.00	0.0	-0.002282	0.0
	-8.000	-20.000	15.000	0.6898	15.00	0.0	-0.003769	0.0
	-8.000	-18.000	15.000	-0.1575	15.00	0.0	-0.007620	0.0
	-8.000	-16.000	15.000	-3.180	15.00	0.0	-0.02875	0.0
	-8.000	-14.000	15.000	-15.50	15.00	-200.0	-600.0	0.0
	-8.000	-12.000	15.000	-18.53	15.00	-200.0	-600.0	0.0
	-8.000	-10.000	15.000	-19.40	15.00	-200.0	-600.0	0.0
	-8.000	-8.000	15.000	-19.67	15.00	-200.0	-600.0	0.0
	-8.000	-6.000	15.000	-19.75	15.00	-200.0	-600.0	0.0
	-8.000	-4.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	-8.000	-2.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	-8.000	0.000	15.000	-19.75	15.00	-200.0	-600.0	0.0
	-8.000	2.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	-8.000	4.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	-8.000	6.000	15.000	-19.75	15.00	-200.0	-600.0	0.0
	-8.000	8.000	15.000	-19.67	15.00	-200.0	-600.0	0.0
	-8.000	10.000	15.000	-19.40	15.00	-200.0	-600.0	0.0
	-8.000	12.000	15.000	-18.53	15.00	-200.0	-600.0	0.0
	-8.000	14.000	15.000	-15.50	15.00	-200.0	-600.0	0.0
	-8.000	16.000	15.000	-3.180	15.00	0.0	-0.02875	0.0
	-8.000	18.000	15.000	-0.1575	15.00	0.0	-0.007620	0.0
	-8.000	20.000	15.000	0.6898	15.00	0.0	-0.003769	0.0
	-8.000	22.000	15.000	0.9340	15.00	0.0	-0.002282	0.0
	-8.000	24.000	15.000	0.9744	15.00	0.0	-0.001534	0.0
	-8.000	26.000	15.000	0.9423	15.00	0.0	-0.001099	0.0
	-8.000	28.000	15.000	0.8852	15.00	0.0	-823.0E-6	0.0
	-8.000	30.000	15.000	0.8213	15.00	0.0	-636.2E-6	0.0
	-8.000	32.000	15.000	0.7577	15.00	0.0	-504.0E-6	0.0
	-8.000	34.000	15.000	0.6973	15.00	0.0	-407.2E-6	0.0
	-8.000	36.000	15.000	0.6411	15.00	0.0	-334.3E-6	0.0
	-8.000	38.000	15.000	0.5892	15.00	0.0	-278.3E-6	0.0
	-8.000	40.000	15.000	0.5416	15.00	0.0	-234.3E-6	0.0
	-6.000	-40.000	15.000	0.5498	15.00	0.0	-241.1E-6	0.0
	-6.000	-38.000	15.000	0.5986	15.00	0.0	-287.1E-6	0.0
	-6.000	-36.000	15.000	0.6519	15.00	0.0	-346.1E-6	0.0
	-6.000	-34.000	15.000	0.7098	15.00	0.0	-423.2E-6	0.0
	-6.000	-32.000	15.000	0.7720	15.00	0.0	-526.1E-6	0.0
	-6.000	-30.000	15.000	0.8374	15.00	0.0	-667.4E-6	0.0
	-6.000	-28.000	15.000	0.9031	15.00	0.0	-868.2E-6	0.0
	-6.000	-26.000	15.000	0.9612	15.00	0.0	-0.001166	0.0
	-6.000	-24.000	15.000	0.9922	15.00	0.0	-0.001637	0.0
	-6.000	-22.000	15.000	0.9458	15.00	0.0	-0.002444	0.0
	-6.000	-20.000	15.000	0.6846	15.00	0.0	-0.004033	0.0
	-6.000	-18.000	15.000	0.1994	15.00	0.0	-0.008055	0.0
	-6.000	-16.000	15.000	-3.284	15.00	0.0	-0.02944	0.0
	-6.000	-14.000	15.000	-15.68	15.00	-200.0	-600.0	0.0
	-6.000	-12.000	15.000	-18.78	15.00	-200.0	-600.0	0.0
	-6.000	-10.000	15.000	-19.68	15.00	-200.0	-600.0	0.0
	-6.000	-8.000	15.000	-19.97	15.00	-200.0	-600.0	0.0
	-6.000	-6.000	15.000	-20.05	15.00	-200.0	-600.0	0.0
	-6.000	-4.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	-6.000	-2.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	-6.000	0.000	15.000	-20.06	15.00	-200.0	-600.0	0.0
	-6.000	2.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	-6.000	4.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	-6.000	6.000	15.000	-20.05	15.00	-200.0	-600.0	0.0
	-6.000	8.000	15.000	-19.97	15.00	-200.0	-600.0	0.0
	-6.000	10.000	15.000	-19.68	15.00	-200.0	-600.0	0.0
	-6.000	12.000	15.000	-18.78	15.00	-200.0	-600.0	0.0
	-6.000	14.000	15.000	-15.68	15.00	-200.0	-600.0	0.0
	-6.000	16.000	15.000	-3.284	15.00	0.0	-0.02944	0.0
	-6.000	18.000	15.000	-0.1994	15.00	0.0	-0.008055	0.0
	-6.000	20.000	15.000	0.6846	15.00	0.0	-0.004033	0.0
	-6.000	22.000	15.000	0.9458	15.00	0.0	-0.002444	0.0
	-6.000	24.000	15.000	0.9922	15.00	0.0	-0.001637	0.0
	-6.000	26.000	15.000	0.9612	15.00	0.0	-0.001166	0.0
	-6.000	28.000	15.000	0.9031	15.00	0.0	-868.2E-6	0.0
	-6.000	30.000	15.000	0.8374	15.00	0.0	-667.4E-6	0.0
	-6.000	32.000	15.000	0.7720	15.00	0.0	-526.1E-6	0.0
	-6.000	34.000	15.000	0.7098	15.00	0.0	-423.	



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Heave Calculation

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-4.000	36.000	15.000	0.6598	15.00	0.0	-354.8E-6	0.0
	-4.000	38.000	15.000	0.6055	15.00	0.0	-293.6E-6	0.0
	-4.000	40.000	15.000	0.5558	15.00	0.0	-246.0E-6	0.0
	-2.000	-40.000	15.000	0.5594	15.00	0.0	-249.1E-6	0.0
	-2.000	-38.000	15.000	0.6096	15.00	0.0	-297.6E-6	0.0
	-2.000	-36.000	15.000	0.6646	15.00	0.0	-360.2E-6	0.0
	-2.000	-34.000	15.000	0.7244	15.00	0.0	-442.3E-6	0.0
	-2.000	-32.000	15.000	0.7888	15.00	0.0	-552.5E-6	0.0
	-2.000	-30.000	15.000	0.8565	15.00	0.0	-704.6E-6	0.0
	-2.000	-28.000	15.000	0.9245	15.00	0.0	-921.4E-6	0.0
	-2.000	-26.000	15.000	0.9843	15.00	0.0	-0.001244	0.0
	-2.000	-24.000	15.000	1.016	15.00	0.0	-0.001751	0.0
	-2.000	-22.000	15.000	0.9662	15.00	0.0	-0.002615	0.0
	-2.000	-20.000	15.000	0.6961	15.00	0.0	-0.004289	0.0
	-2.000	-18.000	15.000	-0.2055	15.00	0.0	-0.008431	0.0
	-2.000	-16.000	15.000	0.9843	15.00	0.0	-0.02997	0.0
	-2.000	-14.000	15.000	-15.75	15.00	-200.0	-600.0	0.0
	-2.000	-12.000	15.000	-18.87	15.00	-200.0	-600.0	0.0
	-2.000	-10.000	15.000	-19.79	15.00	-200.0	-600.0	0.0
	-2.000	-8.000	15.000	-20.09	15.00	-200.0	-600.0	0.0
	-2.000	-6.000	15.000	-20.18	15.00	-200.0	-600.0	0.0
	-2.000	-4.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	-2.000	-2.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	-2.000	0.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	-2.000	2.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	-2.000	4.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	-2.000	6.000	15.000	-20.18	15.00	-200.0	-600.0	0.0
	-2.000	8.000	15.000	-20.09	15.00	-200.0	-600.0	0.0
	-2.000	10.000	15.000	-19.79	15.00	-200.0	-600.0	0.0
	-2.000	12.000	15.000	-18.87	15.00	-200.0	-600.0	0.0
	-2.000	14.000	15.000	-15.75	15.00	-200.0	-600.0	0.0
	-2.000	16.000	15.000	-3.317	15.00	0.0	-0.02997	0.0
	-2.000	18.000	15.000	-0.2055	15.00	0.0	-0.008431	0.0
	-2.000	20.000	15.000	0.6961	15.00	0.0	-0.004289	0.0
	-2.000	22.000	15.000	0.9662	15.00	0.0	-0.002615	0.0
	-2.000	24.000	15.000	1.016	15.00	0.0	-0.001751	0.0
	-2.000	26.000	15.000	0.9843	15.00	0.0	-0.001244	0.0
	-2.000	28.000	15.000	0.9245	15.00	0.0	-0.001254	0.0
	-2.000	30.000	15.000	0.8565	15.00	0.0	-0.001254	0.0
	-2.000	32.000	15.000	0.7888	15.00	0.0	-0.001254	0.0
	-2.000	34.000	15.000	0.7244	15.00	0.0	-0.001254	0.0
	-2.000	36.000	15.000	0.6646	15.00	0.0	-0.001254	0.0
	-2.000	38.000	15.000	0.6096	15.00	0.0	-0.001254	0.0
	-2.000	40.000	15.000	0.5594	15.00	0.0	-0.001254	0.0
	0.000	-40.000	15.000	0.5506	15.00	-250.0	-600.0	0.0
	0.000	-38.000	15.000	0.6110	15.00	0.0	-299.0E-6	0.0
	0.000	-36.000	15.000	0.6662	15.00	0.0	-362.0E-6	0.0
	0.000	-34.000	15.000	0.7263	15.00	0.0	-444.8E-6	0.0
	0.000	-32.000	15.000	0.7909	15.00	0.0	-555.9E-6	0.0
	0.000	-30.000	15.000	0.8590	15.00	0.0	-709.3E-6	0.0
	0.000	-28.000	15.000	0.9272	15.00	0.0	-928.1E-6	0.0
	0.000	-26.000	15.000	0.9873	15.00	0.0	-0.001254	0.0
	0.000	-24.000	15.000	1.019	15.00	0.0	-0.001765	0.0
	0.000	-22.000	15.000	0.9693	15.00	0.0	-0.002636	0.0
	0.000	-20.000	15.000	0.6987	15.00	0.0	-0.004311	0.0
	0.000	-18.000	15.000	-0.2039	15.00	0.0	-0.008471	0.0
	0.000	-16.000	15.000	-3.317	15.00	0.0	-0.03003	0.0
	0.000	-14.000	15.000	-15.75	15.00	-200.0	-600.0	0.0
	0.000	-12.000	15.000	-18.87	15.00	-200.0	-600.0	0.0
	0.000	-10.000	15.000	-19.79	15.00	-200.0	-600.0	0.0
	0.000	-8.000	15.000	-20.09	15.00	-200.0	-600.0	0.0
	0.000	-6.000	15.000	-20.18	15.00	-200.0	-600.0	0.0
	0.000	-4.000	15.000	-20.20	15.00	-200.0	-600.0	0.0
	0.000	-2.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	0.000	0.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	0.000	2.000	15.000	-20.19	15.00	-200.0	-600.0	0.0
	0.000	4.000	15.000	-20.20	15.00	-200.0	-600.0	0.0
	0.000	6.000	15.000	-20.18	15.00	-200.0	-600.0	0.0
	0.000	8.000	15.000	-20.09	15.00	-200.0	-600.0	0.0
	0.000	10.000	15.000	-19.79	15.00	-200.0	-600.0	0.0
	0.000	12.000	15.000	-18.87	15.00	-200.0	-600.0	0.0
	0.000	14.000	15.000	-15.75	15.00	-200.0	-600.0	0.0
	0.000	16.000	15.000	-3.317	15.00	0.0	-0.03003	0.0
	0.000	18.000	15.000	-0.2039	15.00	0.0	-0.008471	0.0
	0.000	20.000	15.000	0.6987	15.00	0.0	-0.004311	0.0
	0.000	22.000	15.000	0.9693	15.00	0.0	-0.002636	0.0
	0.000	24.000	15.000	1.019	15.00	0.0	-0.001765	0.0
	0.000	26.000	15.000	0.9873	15.00	0.0	-0.001254	0.0
	0.000	28.000	15.000	0.9272	15.00	0.0	-0.001254	0.0
	0.000	30.000	15.000	0.8590	15.00	0.0	-0.001254	0.0
	0.000	32.000	15.000	0.7909	15.00	0.0	-0.001254	0.0
	0.000	34.000	15.000	0.7263	15.00	0.0	-0.001254	0.0
	0.000	36.000	15.000	0.6662	15.00	0.0	-0.001254	0.0
	0.000	38.000	15.000	0.6110	15.00	0.0	-0.001254	0.0
	0.000	40.000	15.000	0.5506	15.00	0.0	-0.001254	0.0
	2.000	-40.000	15.000	0.5594	15.00	0.0	-249.1E-6	0.0
	2.000	-38.000	15.000	0.6096	15.00	0.0	-297.6E-6	0.0
	2.000	-36.000	15.000	0.6646	15.00	0.0	-360.2E-6	0.0
	2.000	-34.000	15.000	0.7244	15.00	0.0	-442.3E-6	0.0
	2.000	-32.000	15.000	0.7888	15.00	0.0	-552.5E-6	0.0
	2.000	-30.000	15.000	0.8565	15.00	0.0	-704.6E-6	0.0
	2.000	-28.000	15.000	0.9245	15.00	0.0	-921.4E-6	0.0
	2.000	-26.000	15.000	0.9843	15.00	0.0	-0.001244	0.0
	2.000	-24.000	15.000	1.016	15.00	0.0	-0.001751	0.0
	2.000	-22.000	15.000	0.9662	15.00	0.0	-0.002615	0.0
	2.000	-20.000	15.000	0.6961	15.00	0.0	-0.004289	0.0
	2.000	-18.000	15.000	-0.2055	15.00	0.0	-0.008431	0.0
	2.000	-16.000	15.000	-3.317	15.00	0.0	-0.02997	0.0
	2.000	-14.000	15.000	-15.75	15.00	-200.0	-600.0	0.0
	2.000	-12.000	15.000	-18.87	15.00	-200.0	-600.0	0.0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	4.000	-10.000	15.000	-19.77	15.00	-200.0	-600.0	0.0
	4.000	-8.000	15.000	-20.06	15.00	-200.0	-600.0	0.0
	4.000	-6.000	15.000	-20.15	15.00	-200.0	-600.0	0.0
	4.000	-4.000	15.000	-20.17	15.00	-200.0	-600.0	0.0
	4.000	-2.000	15.000	-20.16	15.00	-200.0	-600.0	0.0
	4.000	0.000	15.000	-20.16	15.00	-200.0	-600.0	0.0
	4.000	2.000	15.000	-20.16	15.00	-200.0	-600.0	0.0
	4.000	4.000	15.000	-20.17	15.00	-200.0	-600.0	0.0
	4.000	6.000	15.000	-20.15	15.00	-200.0	-600.0	0.0
	4.000	8.000	15.000	-20.06	15.00	-200.0	-600.0	0.0
	4.000	10.000	15.000	-19.77	15.00	-200.0	-600.0	0.0
	4.000	12.000	15.000	-18.85	15.00	-200.0	-600.0	0.0
	4.000	14.000	15.000	-15.74	15.00	-200.0	-600.0	0.0
	4.000	16.000	15.000	-3.313	15.00	0.0	-0.02980	0.0
	4.000	18.000	15.000	0.2075	15.00	0.0	-0.008382	0.0
	4.000	20.000	15.000	0.6898	15.00	0.0	-0.004198	0.0
	4.000	22.000	15.000	0.9577	15.00	0.0	-0.002553	0.0
	4.000	24.000	15.000	1.006	15.00	0.0	-0.001709	0.0
	4.000	26.000	15.000	0.9754	15.00	0.0	-0.001215	0.0
	4.000	28.000	15.000	0.9163	15.00	0.0	-0.0013E-6	0.0
	4.000	30.000	15.000	0.8493	15.00	0.0	-690.5E-6	0.0
	4.000	32.000	15.000	0.7824	15.00	0.0	-542.5E-6	0.0
	4.000	34.000	15.000	0.7189	15.00	0.0	-435.0E-6	0.0
	4.000	36.000	15.000	0.6598	15.00	0.0	-354.8E-6	0.0
	4.000	38.000	15.000	0.6055	15.00	0.0	-293.5E-6	0.0
	4.000	40.000	15.000	0.5558	15.00	0.0	-246.0E-6	0.0
	6.000	-40.000	15.000	0.5498	15.00	0.0	-241.1E-6	0.0
	6.000	-38.000	15.000	0.5986	15.00	0.0	-287.1E-6	0.0
	6.000	-36.000	15.000	0.6519	15.00	0.0	-346.1E-6	0.0
	6.000	-34.000	15.000	0.7098	15.00	0.0	-423.2E-6	0.0
	6.000	-32.000	15.000	0.7720	15.00	0.0	-526.1E-6	0.0
	6.000	-30.000	15.000	0.8374	15.00	0.0	-667.4E-6	0.0
	6.000	-28.000	15.000	0.9031	15.00	0.0	-868.2E-6	0.0
	6.000	-26.000	15.000	0.9612	15.00	0.0	-0.001166	0.0
	6.000	-24.000	15.000	0.9922	15.00	0.0	-0.00163E-6	0.0
	6.000	-22.000	15.000	0.9458	15.00	0.0	-0.002444	0.0
	6.000	-20.000	15.000	0.6846	15.00	0.0	-0.004033	0.0
	6.000	-18.000	15.000	-0.1994	15.00	0.0	-0.008055	0.0
	6.000	-16.000	15.000	-3.284	15.00	0.0	-0.02944	0.0
	6.000	-14.000	15.000	-15.68	15.00	-200.0	-600.0	0.0
	6.000	-12.000	15.000	-18.78	15.00	-200.0	-600.0	0.0
	6.000	-10.000	15.000	-19.68	15.00	-200.0	-600.0	0.0
	6.000	-8.000	15.000	-19.97	15.00	-200.0	-600.0	0.0
	6.000	-6.000	15.000	-20.05	15.00	-200.0	-600.0	0.0
	6.000	-4.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	6.000	-2.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	6.000	0.000	15.000	-20.06	15.00	-200.0	-600.0	0.0
	6.000	2.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	6.000	4.000	15.000	-20.07	15.00	-200.0	-600.0	0.0
	6.000	6.000	15.000	-20.05	15.00	-200.0	-600.0	0.0
	6.000	8.000	15.000	-19.97	15.00	-200.0	-600.0	0.0
	6.000	10.000	15.000	-19.68	15.00	-200.0	-600.0	0.0
	6.000	12.000	15.000	-18.78	15.00	-200.0	-600.0	0.0
	6.000	14.000	15.000	-15.68	15.00	-200.0	-600.0	0.0
	6.000	16.000	15.000	-3.284	15.00	0.0	-0.02944	0.0
	6.000	18.000	15.000	-0.1994	15.00	0.0	-0.008055	0.0
	6.000	20.000	15.000	0.6846	15.00	0.0	-0.004033	0.0
	6.000	22.000	15.000	0.9458	15.00	0.0	-0.002444	0.0
	6.000	24.000	15.000	0.9922	15.00	0.0	-0.001637	0.0
	6.000	26.000	15.000	0.9612	15.00	0.0	-0.001166	0.0
	6.000	28.000	15.000	0.9031	15.00	0.0	-868.2E-6	0.0
	6.000	30.000	15.000	0.8374	15.00	0.0	-667.4E-6	0.0
	6.000	32.000	15.000	0.7720	15.00	0.0	-526.1E-6	0.0
	6.000	34.000	15.000	0.7098	15.00	0.0	-423.2E-6	0.0
	6.000	36.000	15.000	0.6519	15.00	0.0	-346.1E-6	0.0
	6.000	38.000	15.000	0.5986	15.00	0.0	-287.1E-6	0.0
	6.000	40.000	15.000	0.5498	15.00	0.0	-241.1E-6	0.0
	8.000	-40.000	15.000	0.5416	15.00	0.0	-234.3E-6	0.0
	8.000	-38.000	15.000	0.5892	15.00	0.0	-278.3E-6	0.0
	8.000	-36.000	15.000	0.6411	15.00	0.0	-334.3E-6	0.0
	8.000	-34.000	15.000	0.6973	15.00	0.0	-407.2E-6	0.0
	8.000	-32.000	15.000	0.7577	15.00	0.0	-504.0E-6	0.0
	8.000	-30.000	15.000	0.8213	15.00	0.0	-636.2E-6	0.0
	8.000	-28.000	15.000	0.8852	15.00	0.0	-823.0E-6	0.0
	8.000	-26.000	15.000	0.9423	15.00	0.0	-0.001099	0.0
	8.000	-24.000	15.000	0.9744	15.00	0.0	-0.001534	0.0
	8.000	-22.000	15.000	0.9340	15.00	0.0	-0.002282	0.0
	8.000	-20.000	15.000	0.6898	15.00	0.0	-0.003769	0.0
	8.000	-18.000	15.000	-0.1575	15.00	0.0	-0.007620	0.0
	8.000	-16.000	15.000	-3.1180	15.00	0.0	-0.02275	0.0
	8.000	-14.000	15.000	-15.50	15.00	-200.0	-600.0	0.0
	8.000	-12.000	15.000	-18.53	15.00	-200.0	-600.0	0.0
	8.000	-10.000	15.000	-19.40	15.00	-200.0	-600.0	0.0
	8.000	-8.000	15.000	-19.67	15.00	-200.0	-600.0	0.0
	8.000	-6.000	15.000	-19.75	15.00	-200.0	-600.0	0.0
	8.000	-4.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	8.000	-2.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	8.000	0.000	15.000	-19.75	15.00	-200.0	-600.0	0.0
	8.000	2.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	8.000	4.000	15.000	-19.76	15.00	-200.0	-600.0	0.0
	8.000	6.000	15.000	-19.75	15.00	-200.0	-600.0	0.0
	8.000	8.000	15.000	-19.67	15.00	-200.0	-600.0	0.0
	8.000	10.000	15.000	-19.40	15.00	-200.0	-600.0	0.0
	8.000	12.000	15.000	-18.53	15.00	-200.0	-600.0	0.0
	8.000	14.000	15.000	-15.50	15.00	-200.0	-600.0	0.0
	8.000	16.000	15.000	-3.1180	15.00	0.0	-0.02275	0.0
	8.000	18.000	15.000	-0.1575	15.00	0.0	-0.007620	0.0
	8.000	20.000	15.000	0.6898	15.00	0.0	-0.003769	0.0
	8.000	22.000	15.000	0.9340	15.00	0.0	-0.002282	0.0
	8.000	24.000	15.000	0.9744	15.00	0.0	-0.001534	0.0
	8.000	26.000						



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	10.000	26.000	15.000	0.9194	15.00	0.0	-0.001016	0.0
	10.000	28.000	15.000	0.8632	15.00	0.0	-767.4E-6	0.0
	10.000	30.000	15.000	0.8013	15.00	0.0	-598.0E-6	0.0
	10.000	32.000	15.000	0.7401	15.00	0.0	-477.0E-6	0.0
	10.000	34.000	15.000	0.6818	15.00	0.0	-387.5E-6	0.0
	10.000	36.000	15.000	0.6276	15.00	0.0	-319.3E-6	0.0
	10.000	38.000	15.000	0.5775	15.00	0.0	-267.5E-6	0.0
	10.000	40.000	15.000	0.5314	15.00	0.0	-226.1E-6	0.0
	12.000	-40.000	15.000	0.5194	15.00	0.0	-216.6E-6	0.0
	12.000	-38.000	15.000	0.5636	15.00	0.0	-255.0E-6	0.0
	12.000	-36.000	15.000	0.6117	15.00	0.0	-303.4E-6	0.0
	12.000	-34.000	15.000	0.6637	15.00	0.0	-365.3E-6	0.0
	12.000	-32.000	15.000	0.7193	15.00	0.0	-446.2E-6	0.0
	12.000	-30.000	15.000	0.7789	15.00	0.0	-554.5E-6	0.0
	12.000	-28.000	15.000	0.8376	15.00	0.0	-703.9E-6	0.0
	12.000	-26.000	15.000	0.8931	15.00	0.0	-919.1E-6	0.0
	12.000	-24.000	15.000	0.9322	15.00	0.0	-0.001247	0.0
	12.000	-22.000	15.000	0.9225	15.00	0.0	-0.001794	0.0
	12.000	-20.000	15.000	0.7757	15.00	0.0	-0.002844	0.0
	12.000	-18.000	15.000	0.2161	15.00	0.0	-0.005538	0.0
	12.000	-16.000	15.00	-1.973	15.00	0.0	-0.02225	0.0
	12.000	-14.000	15.000	-12.72	15.00	-200.0	-599.9	-1.231E-6
	12.000	-12.000	15.000	-14.91	15.00	-200.0	-600.0	0.0
	12.000	-10.000	15.000	-15.49	15.00	-200.0	-600.0	0.0
	12.000	-8.000	15.000	-15.66	15.00	-200.0	-600.0	0.0
	12.000	-6.000	15.000	-15.70	15.00	-200.0	-600.0	0.0
	12.000	-4.000	15.000	-15.71	15.00	-200.0	-600.0	0.0
	12.000	-2.000	15.000	-15.70	15.00	-200.0	-600.0	0.0
	12.000	0.000	15.000	-15.70	15.00	-200.0	-600.0	0.0
	12.000	2.000	15.000	-15.70	15.00	-200.0	-600.0	0.0
	12.000	4.000	15.000	-15.71	15.00	-200.0	-600.0	0.0
	12.000	6.000	15.000	-15.70	15.00	-200.0	-600.0	0.0
	12.000	8.000	15.000	-15.66	15.00	-200.0	-600.0	0.0
	12.000	10.000	15.000	-15.49	15.00	-200.0	-600.0	0.0
	12.000	12.000	15.000	-14.91	15.00	-200.0	-600.0	0.0
	12.000	14.000	15.000	-12.72	15.00	-200.0	-599.9	-1.231E-6
	12.000	16.000	15.000	-1.973	15.00	0.0	-0.02225	0.0
	12.000	18.000	15.000	0.2161	15.00	0.0	-0.005538	0.0
	12.000	20.000	15.000	0.7757	15.00	0.0	-0.002844	0.0
	12.000	22.000	15.000	0.9225	15.00	0.0	-0.001794	0.0
	12.000	24.000	15.000	0.9322	15.00	0.0	-0.001247	0.0
	12.000	26.000	15.000	0.8931	15.00	0.0	-919.1E-6	0.0
	12.000	28.000	15.000	0.8376	15.00	0.0	-703.9E-6	0.0
	12.000	30.000	15.000	0.7789	15.00	0.0	-554.5E-6	0.0
	12.000	32.000	15.000	0.7193	15.00	0.0	-446.2E-6	0.0
	12.000	34.000	15.000	0.6637	15.00	0.0	-365.3E-6	0.0
	12.000	36.000	15.000	0.6117	15.00	0.0	-303.4E-6	0.0
	12.000	38.000	15.000	0.5636	15.00	0.0	-255.0E-6	0.0
	12.000	40.000	15.000	0.5194	15.00	0.0	-216.6E-6	0.0
	14.000	-40.000	15.000	0.5057	15.00	0.0	-206.0E-6	0.0
	14.000	-38.000	15.000	0.5480	15.00	0.0	-241.3E-6	0.0
	14.000	-36.000	15.000	0.5938	15.00	0.0	-285.4E-6	0.0
	14.000	-34.000	15.000	0.6432	15.00	0.0	-341.1E-6	0.0
	14.000	-32.000	15.000	0.6960	15.00	0.0	-413.0E-6	0.0
	14.000	-30.000	15.000	0.7518	15.00	0.0	-507.7E-6	0.0
	14.000	-28.000	15.000	0.8089	15.00	0.0	-636.1E-6	0.0
	14.000	-26.000	15.000	0.8636	15.00	0.0	-816.2E-6	0.0
	14.000	-24.000	15.000	0.9074	15.00	0.0	-0.001082	0.0
	14.000	-22.000	15.000	0.9192	15.00	0.0	-0.001501	0.0
	14.000	-20.000	15.000	0.8465	15.00	0.0	-0.002240	0.0
	14.000	-18.000	15.000	0.5529	15.00	0.0	-0.003819	0.0
	14.000	-16.000	15.000	-0.3234	15.00	0.0	-0.008782	0.0
	14.000	-14.000	15.000	-1.968	15.00	0.0	-0.02226	0.0
	14.000	-12.000	15.000	-2.852	15.00	0.0	-0.02722	0.0
	14.000	-10.000	15.000	-3.161	15.00	0.0	-0.02878	0.0
	14.000	-8.000	15.000	-3.258	15.00	0.0	-0.02949	0.0
	14.000	-6.000	15.000	-3.277	15.00	0.0	-0.02987	0.0
	14.000	-4.000	15.000	-3.272	15.00	0.0	-0.03009	0.0
	14.000	-2.000	15.000	-3.264	15.00	0.0	-0.03020	0.0
	14.000	0.000	15.000	-3.261	15.00	0.0	-0.03024	0.0
	14.000	2.000	15.000	-3.264	15.00	0.0	-0.03020	0.0
	14.000	4.000	15.000	-3.272	15.00	0.0	-0.03009	0.0
	14.000	6.000	15.000	-3.277	15.00	0.0	-0.02987	0.0
	14.000	8.000	15.000	-3.258	15.00	0.0	-0.02949	0.0
	14.000	10.000	15.000	-3.161	15.00	0.0	-0.02878	0.0
	14.000	12.000	15.000	-2.852	15.00	0.0	-0.02722	0.0
	14.000	14.000	15.000	-1.968	15.00	0.0	-0.02226	0.0
	14.000	16.000	15.000	-0.3234	15.00	0.0	-0.008782	0.0
	14.000	18.000	15.000	0.5529	15.00	0.0	-0.003819	0.0
	14.000	20.000	15.000	0.8465	15.00	0.0	-0.002240	0.0
	14.000	22.000	15.000	0.9192	15.00	0.0	-0.001501	0.0
	14.000	24.000	15.000	0.9074	15.00	0.0	-0.001082	0.0
	14.000	26.000	15.000	0.8636	15.00	0.0	-816.2E-6	0.0
	14.000	28.000	15.000	0.8089	15.00	0.0	-636.1E-6	0.0
	14.000	30.000	15.000	0.7518	15.00	0.0	-507.7E-6	0.0
	14.000	32.000	15.000	0.6960	15.00	0.0	-413.0E-6	0.0
	14.000	34.000	15.000	0.6432	15.00	0.0	-341.1E-6	0.0
	14.000	36.000	15.000	0.5938	15.00	0.0	-285.4E-6	0.0
	14.000	38.000	15.000	0.5480	15.00	0.0	-241.3E-6	0.0
	14.000	40.000	15.000	0.5057	15.00	0.0	-206.0E-6	0.0
	16.000	-40.000	15.000	0.4906	15.00	0.0	-194.8E-6	0.0
	16.000	-38.000	15.000	0.5308	15.00	0.0	-226.9E-6	0.0
	16.000	-36.000	15.000	0.5741	15.00	0.0	-266.4E-6	0.0
	16.000	-34.000	15.000	0.6208	15.00	0.0	-315.9E-6	0.0
	16.000	-32.000	15.000	0.6706	15.00	0.0	-378.7E-6	0.0
	16.000	-30.000	15.000	0.7232	15.00	0.0	-460.0E-6	0.0
	16.000	-28.000	15.000	0.7775	15.00	0.0	-567.4E-6	0.0
	16.000	-26.000	15.000	0.8310	15.00	0.0	-713.6E-6	0.0
	16.000	-24.000	15.000	0.8783	15.00	0.0	-919.5E-6	0.0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	18.000	-20.000	15.000	0.9072	15.00	0.0	-0.001285	0.0
	18.000	-18.000	15.000	0.8994	15.00	0.0	-0.001701	0.0
	18.000	-16.000	15.000	0.8541	15.00	0.0	-0.002248	0.0
	18.000	-14.000	15.000	0.7882	15.00	0.0	-0.002857	0.0
	18.000	-12.000	15.000	0.7360	15.00	0.0	-0.003398	0.0
	18.000	-10.000	15.000	0.7144	15.00	0.0	-0.003801	0.0
	18.000	-8.000	15.000	0.7165	15.00	0.0	-0.004079	0.0
	18.000	-6.000	15.000	0.7294	15.00	0.0	-0.004264	0.0
	18.000	-4.000	15.000	0.7439	15.00	0.0	-0.004381	0.0
	18.000	-2.000	15.000	0.7543	15.00	0.0	-0.004445	0.0
	18.000	0.000	15.000	0.7580	15.00	0.0	-0.004466	0.0
	18.000	2.000	15.000	0.7543	15.00	0.0	-0.004445	0.0
	18.000	4.000	15.000	0.7439	15.00	0.0	-0.004381	0.0
	18.000	6.000	15.000	0.7294	15.00	0.0	-0.004264	0.0
	18.000	8.000	15.000	0.7165	15.00	0.0	-0.004079	0.0
	18.000	10.000	15.000	0.7144	15.00	0.0	-0.003801	0.0
	18.000	12.000	15.000	0.7360	15.00	0.0	-0.003398	0.0
	18.000	14.000	15.000	0.7882	15.00	0.0	-0.002857	0.0
	18.000	16.000	15.000	0.8541	15.00	0.0	-0.002248	0.0
	18.000	18.000	15.000	0.8994	15.00	0.0	-0.001701	0.0
	18.000	20.000	15.000	0.9072	15.00	0.0	-0.001285	0.0
	18.000	22.000	15.000	0.8846	15.00	0.0	-986.2E-6	0.0
	18.000	24.000	15.000	0.8441	15.00	0.0	-772.8E-6	0.0
	18.000	26.000	15.000	0.7953	15.00	0.0	-617.3E-6	0.0
	18.000	28.000	15.000	0.7439	15.00	0.0	-501.4E-6	0.0
	18.000	30.000	15.000	0.6928	15.00	0.0	-413.1E-6	0.0
	18.000	32.000	15.000	0.6435	15.00	0.0	-344.5E-6	0.0
	18.000	34.000	15.000	0.5969	15.00	0.0	-290.4E-6	0.0
	18.000	36.000	15.000	0.5531	15.00	0.0	-247.1E-6	0.0
	18.000	38.000	15.000	0.5123	15.00	0.0	-212.9E-6	0.0
	18.000	40.000	15.000	0.4744	15.00	0.0	-183.2E-6	0.0
	20.000	-40.000	15.000	0.4573	15.00	0.0	-171.4E-6	0.0
	20.000	-38.000	15.000	0.4929	15.00	0.0	-197.1E-6	0.0
	20.000	-36.000	15.000	0.5311	15.00	0.0	-227.9E-6	0.0
	20.000	-34.000	15.000	0.5719	15.00	0.0	-265.5E-6	0.0
	20.000	-32.000	15.000	0.6153	15.00	0.0	-311.5E-6	0.0
	20.000	-30.000	15.000	0.6611	15.00	0.0	-368.7E-6	0.0
	20.000	-28.000	15.000	0.7087	15.00	0.0	-440.2E-6	0.0
	20.000	-26.000	15.000	0.7573	15.00	0.0	-531.9E-6	0.0
	20.000	-24.000	15.000	0.8052	15.00	0.0	-647.1E-6	0.0
	20.000	-22.000	15.000	0.8498	15.00	0.0	-796.6E-6	0.0
	20.000	-20.000	15.000	0.8874	15.00	0.0	-988.4E-6	0.0
	20.000	-18.000	15.000	0.9143	15.00	0.0	-0.001228	0.0
	20.000	-16.000	15.000	0.9294	15.00	0.0	-0.001510	0.0
	20.000	-14.000	15.000	0.9374	15.00	0.0	-0.001808	0.0
	20.000	-12.000	15.000	0.9462	15.00	0.0	-0.002084	0.0
	20.000	-10.000	15.000	0.9603	15.00	0.0	-0.002313	0.0
	20.000	-8.000	15.000	0.9787	15.00	0.0	-0.002487	0.0
	20.000	-6.000	15.000	0.9978	15.00	0.0	-0.002611	0.0
	20.000	-4.000	15.000	1.0114	15.00	0.0	-0.002694	0.0
	20.000	-2.000	15.000	1.024	15.00	0.0	-0.002741	0.0
	20.000	0.000	15.000	1.028	15.00	0.0	-0.002756	0.0
	20.000	2.000	15.000	1.024	15.00	0.0	-0.002741	0.0
	20.000	4.000	15.000	1.0114	15.00	0.0	-0.002694	0.0
	20.000	6.000	15.000	0.9978	15.00	0.0	-0.002611	0.0
	20.000	8.000	15.000	0.9787	15.00	0.0	-0.002487	0.0
	20.000	10.000	15.000	0.9603	15.00	0.0	-0.002313	0.0
	20.000	12.000	15.000	0.9462	15.00	0.0	-0.002084	0.0
	20.000	14.000	15.000	0.9374	15.00	0.0	-0.001808	0.0
	20.000	16.000	15.000	0.9294	15.00	0.0	-0.001510	0.0
	20.000	18.000	15.000	0.9143	15.00	0.0	-0.001228	0.0
	20.000	20.000	15.000	0.8874	15.00	0.0	-988.4E-6	0.0
	20.000	22.000	15.000	0.8498	15.00	0.0	-796.6E-6	0.0
	20.000	24.000	15.000	0.8052	15.00	0.0	-647.1E-6	0.0
	20.000	26.000	15.000	0.7573	15.00	0.0	-531.9E-6	0.0
	20.000	28.000	15.000	0.7087	15.00	0.0	-440.2E-6	0.0
	20.000	30.000	15.000	0.6611	15.00	0.0	-368.7E-6	0.0
	20.000	32.000	15.000	0.6153	15.00	0.0	-311.5E-6	0.0
	20.000	34.000	15.000	0.5719	15.00	0.0	-265.5E-6	0.0
	20.000	36.000	15.000	0.5311	15.00	0.0	-227.9E-6	0.0
	20.000	38.000	15.000	0.4929	15.00	0.0	-197.1E-6	0.0
	20.000	40.000	15.000	0.4573	15.00	0.0	-171.4E-6	0.0
	22.000	-40.000	15.000	0.4396	15.00	0.0	-159.8E-6	0.0
	22.000	-38.000	15.000	0.4728	15.00	0.0	-182.4E-6	0.0
	22.000	-36.000	15.000	0.5084	15.00	0.0	-209.4E-6	0.0
	22.000	-34.000	15.000	0.5462	15.00	0.0	-241.6E-6	0.0
	22.000	-32.000	15.000	0.5864	15.00	0.0	-280.5E-6	0.0
	22.000	-30.000	15.000	0.6286	15.00	0.0	-327.7E-6	0.0
	22.000	-28.000	15.000	0.6726	15.00	0.0	-385.3E-6	0.0
	22.000	-26.000	15.000	0.7178	15.00	0.0	-455.9E-6	0.0
	22.000	-24.000	15.000	0.7632	15.00	0.0	-542.6E-6	0.0
	22.000	-22.000	15.000	0.8075	15.00	0.0	-648.6E-6	0.0
	22.000	-20.000	15.000	0.8492	15.00	0.0	-776.5E-6	0.0
	22.000	-18.000	15.000	0.8867	15.00	0.0	-925.9E-6	0.0
	22.000	-16.000	15.000	0.9196	15.00	0.0	-0.001092	0.0
	22.000	-14.000	15.000	0.9488	15.00	0.0	-0.001262	0.0
	22.000	-12.000	15.000	0.9758	15.00	0.0	-0.001423	0.0
	22.000	-10.000	15.000	1.002	15.00	0.0	-0.001562	0.0
	22.000	-8.000	15.000	1.026	15.00	0.0	-0.001675	0.0
	22.000	-6.000	15.000	1.046	15.00	0.0	-0.001759	0.0
	22.000	-4.000	15.000	1.062	15.00	0.0	-0.001818	0.0
	22.000	-2.000	15.000	1.072	15.00	0.0	-0.001852	0.0
	22.000	0.000	15.000	1.076	15.00	0.0	-0.001863	0.0
	22.000	2.000	15.000	1.072	15.00	0.0	-0.001852	0.0
	22.000	4.000	15.000	1.062	15.00	0.0	-0.001818	0.0
	22.000	6.000	15.000	1.046	15.00	0.0	-0.001759	0.0
	22.000	8.000	15.000	1.026	15.00	0.0	-0.001675	0.0
	22.000	10.000	15.000	1.002	15.00	0.0	-0.001562	0.0
	22.000</							



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	24.000	16.000	15.000	0.8773	15.00	0.0	-826.5E-6	0.0
	24.000	18.000	15.000	0.8410	15.00	0.0	-720.7E-6	0.0
	24.000	20.000	15.000	0.8022	15.00	0.0	-621.9E-6	0.0
	24.000	22.000	15.000	0.7615	15.00	0.0	-533.6E-6	0.0
	24.000	24.000	15.000	0.7197	15.00	0.0	-457.9E-6	0.0
	24.000	26.000	15.000	0.6777	15.00	0.0	-391.8E-6	0.0
	24.000	28.000	15.000	0.6362	15.00	0.0	-336.8E-6	0.0
	24.000	30.000	15.000	0.5959	15.00	0.0	-290.6E-6	0.0
	24.000	32.000	15.000	0.5572	15.00	0.0	-251.8E-6	0.0
	24.000	34.000	15.000	0.5203	15.00	0.0	-219.2E-6	0.0
	24.000	36.000	15.000	0.4853	15.00	0.0	-191.6E-6	0.0
	24.000	38.000	15.000	0.4524	15.00	0.0	-168.3E-6	0.0
	24.000	40.000	15.000	0.4215	15.00	0.0	-148.4E-6	0.0
	26.000	-40.000	15.000	0.4831	15.00	0.0	-137.5E-6	0.0
	26.000	-38.000	15.000	0.4317	15.00	0.0	-154.8E-6	0.0
	26.000	-36.000	15.000	0.4621	15.00	0.0	-175.0E-6	0.0
	26.000	-34.000	15.000	0.4943	15.00	0.0	-198.4E-6	0.0
	26.000	-32.000	15.000	0.5281	15.00	0.0	-225.7E-6	0.0
	26.000	-30.000	15.000	0.5634	15.00	0.0	-257.5E-6	0.0
	26.000	-28.000	15.000	0.6001	15.00	0.0	-294.6E-6	0.0
	26.000	-26.000	15.000	0.6378	15.00	0.0	-337.6E-6	0.0
	26.000	-24.000	15.000	0.6761	15.00	0.0	-387.2E-6	0.0
	26.000	-22.000	15.000	0.7144	15.00	0.0	-443.5E-6	0.0
	26.000	-20.000	15.000	0.7522	15.00	0.0	-506.5E-6	0.0
	26.000	-18.000	15.000	0.7897	15.00	0.0	-574.8E-6	0.0
	26.000	-16.000	15.000	0.8235	15.00	0.0	-646.2E-6	0.0
	26.000	-14.000	15.000	0.8569	15.00	0.0	-717.6E-6	0.0
	26.000	-12.000	15.000	0.8858	15.00	0.0	-785.4E-6	0.0
	26.000	-10.000	15.000	0.9124	15.00	0.0	-846.3E-6	0.0
	26.000	-8.000	15.000	0.9353	15.00	0.0	-897.9E-6	0.0
	26.000	-6.000	15.000	0.9539	15.00	0.0	-938.7E-6	0.0
	26.000	-4.000	15.000	0.9676	15.00	0.0	-968.0E-6	0.0
	26.000	-2.000	15.000	0.9769	15.00	0.0	-985.6E-6	0.0
	26.000	0.000	15.000	0.9788	15.00	0.0	-991.5E-6	0.0
	26.000	2.000	15.000	0.9760	15.00	0.0	-985.0E-6	0.0
	26.000	4.000	15.000	0.9676	15.00	0.0	-968.0E-6	0.0
	26.000	6.000	15.000	0.9539	15.00	0.0	-938.7E-6	0.0
	26.000	8.000	15.000	0.9353	15.00	0.0	-897.9E-6	0.0
	26.000	10.000	15.000	0.9124	15.00	0.0	-846.3E-6	0.0
	26.000	12.000	15.000	0.8858	15.00	0.0	-785.4E-6	0.0
	26.000	14.000	15.000	0.8569	15.00	0.0	-717.6E-6	0.0
	26.000	16.000	15.000	0.8235	15.00	0.0	-646.2E-6	0.0
	26.000	18.000	15.000	0.7887	15.00	0.0	-574.8E-6	0.0
	26.000	20.000	15.000	0.7522	15.00	0.0	-506.5E-6	0.0
	26.000	22.000	15.000	0.7144	15.00	0.0	-443.5E-6	0.0
	26.000	24.000	15.000	0.6761	15.00	0.0	-387.2E-6	0.0
	26.000	26.000	15.000	0.6378	15.00	0.0	-337.6E-6	0.0
	26.000	28.000	15.000	0.6001	15.00	0.0	-294.6E-6	0.0
	26.000	30.000	15.000	0.5634	15.00	0.0	-257.5E-6	0.0
	26.000	32.000	15.000	0.5281	15.00	0.0	-225.7E-6	0.0
	26.000	34.000	15.000	0.4943	15.00	0.0	-198.4E-6	0.0
	26.000	36.000	15.000	0.4621	15.00	0.0	-175.0E-6	0.0
	26.000	38.000	15.000	0.4317	15.00	0.0	-154.8E-6	0.0
	26.000	40.000	15.000	0.4831	15.00	0.0	-137.5E-6	0.0
	28.000	-40.000	15.000	0.3847	15.00	0.0	-127.1E-6	0.0
	28.000	-38.000	15.000	0.4111	15.00	0.0	-142.2E-6	0.0
	28.000	-36.000	15.000	0.4391	15.00	0.0	-159.5E-6	0.0
	28.000	-34.000	15.000	0.4685	15.00	0.0	-179.4E-6	0.0
	28.000	-32.000	15.000	0.4994	15.00	0.0	-202.2E-6	0.0
	28.000	-30.000	15.000	0.5315	15.00	0.0	-228.3E-6	0.0
	28.000	-28.000	15.000	0.5648	15.00	0.0	-258.1E-6	0.0
	28.000	-26.000	15.000	0.5988	15.00	0.0	-292.0E-6	0.0
	28.000	-24.000	15.000	0.6333	15.00	0.0	-330.1E-6	0.0
	28.000	-22.000	15.000	0.6679	15.00	0.0	-372.4E-6	0.0
	28.000	-20.000	15.000	0.7021	15.00	0.0	-418.4E-6	0.0
	28.000	-18.000	15.000	0.7353	15.00	0.0	-467.3E-6	0.0
	28.000	-16.000	15.000	0.7670	15.00	0.0	-517.5E-6	0.0
	28.000	-14.000	15.000	0.7967	15.00	0.0	-567.2E-6	0.0
	28.000	-12.000	15.000	0.8238	15.00	0.0	-614.3E-6	0.0
	28.000	-10.000	15.000	0.8489	15.00	0.0	-656.9E-6	0.0
	28.000	-8.000	15.000	0.8686	15.00	0.0	-693.3E-6	0.0
	28.000	-6.000	15.000	0.8852	15.00	0.0	-722.4E-6	0.0
	28.000	-4.000	15.000	0.8974	15.00	0.0	-743.5E-6	0.0
	28.000	-2.000	15.000	0.9048	15.00	0.0	-756.3E-6	0.0
	28.000	0.000	15.000	0.9073	15.00	0.0	-760.6E-6	0.0
	28.000	2.000	15.000	0.9048	15.00	0.0	-756.3E-6	0.0
	28.000	4.000	15.000	0.8974	15.00	0.0	-743.5E-6	0.0
	28.000	6.000	15.000	0.8852	15.00	0.0	-722.4E-6	0.0
	28.000	8.000	15.000	0.8686	15.00	0.0	-693.3E-6	0.0
	28.000	10.000	15.000	0.8489	15.00	0.0	-656.9E-6	0.0
	28.000	12.000	15.000	0.8238	15.00	0.0	-614.3E-6	0.0
	28.000	14.000	15.000	0.7967	15.00	0.0	-567.2E-6	0.0
	28.000	16.000	15.000	0.7670	15.00	0.0	-517.5E-6	0.0
	28.000	18.000	15.000	0.7353	15.00	0.0	-467.3E-6	0.0
	28.000	20.000	15.000	0.7021	15.00	0.0	-418.4E-6	0.0
	28.000	22.000	15.000	0.6679	15.00	0.0	-372.4E-6	0.0
	28.000	24.000	15.000	0.6333	15.00	0.0	-330.1E-6	0.0
	28.000	26.000	15.000	0.5988	15.00	0.0	-292.0E-6	0.0
	28.000	28.000	15.000	0.5648	15.00	0.0	-258.1E-6	0.0
	28.000	30.000	15.000	0.5315	15.00	0.0	-228.3E-6	0.0
	28.000	32.000	15.000	0.4994	15.00	0.0	-202.2E-6	0.0
	28.000	34.000	15.000	0.4685	15.00	0.0	-179.4E-6	0.0
	28.000	36.000	15.000	0.4391	15.00	0.0	-159.5E-6	0.0
	28.000	38.000	15.000	0.4111	15.00	0.0	-142.2E-6	0.0
	28.000	40.000	15.000	0.3847	15.00	0.0	-127.1E-6	0.0
	30.000	-40.000	15.000	0.3665	15.00	0.0	-117.3E-6	0.0
	30.000	-38.000	15.000	0.3908	15.00	0.0	-130.4E-6	0.0
	30.000	-36.000	15.000	0.4164	15.00	0.0	-145.3E-6	



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
32.000	-30.000	15.000	0.4705	15.00	0.0	-180.2E-6	0.0	
32.000	-28.000	15.000	0.4975	15.00	0.0	-199.8E-6	0.0	
32.000	-26.000	15.000	0.5249	15.00	0.0	-221.3E-6	0.0	
32.000	-24.000	15.000	0.5526	15.00	0.0	-244.6E-6	0.0	
32.000	-22.000	15.000	0.5802	15.00	0.0	-269.5E-6	0.0	
32.000	-20.000	15.000	0.6073	15.00	0.0	-295.7E-6	0.0	
32.000	-18.000	15.000	0.6336	15.00	0.0	-322.7E-6	0.0	
32.000	-16.000	15.000	0.6586	15.00	0.0	-349.7E-6	0.0	
32.000	-14.000	15.000	0.6820	15.00	0.0	-376.1E-6	0.0	
32.000	-12.000	15.000	0.7033	15.00	0.0	-400.9E-6	0.0	
32.000	-10.000	15.000	0.7222	15.00	0.0	-423.3E-6	0.0	
32.000	-8.000	15.000	0.7382	15.00	0.0	-442.6E-6	0.0	
32.000	-6.000	15.000	0.7510	15.00	0.0	-458.2E-6	0.0	
32.000	-4.000	15.000	0.7603	15.00	0.0	-469.6E-6	0.0	
32.000	-2.000	15.000	0.7660	15.00	0.0	-476.5E-6	0.0	
32.000	0.000	15.000	0.7679	15.00	0.0	-478.9E-6	0.0	
32.000	2.000	15.000	0.7660	15.00	0.0	-476.5E-6	0.0	
32.000	4.000	15.000	0.7603	15.00	0.0	-469.6E-6	0.0	
32.000	6.000	15.000	0.7510	15.00	0.0	-458.2E-6	0.0	
32.000	8.000	15.000	0.7382	15.00	0.0	-442.6E-6	0.0	
32.000	10.000	15.000	0.7222	15.00	0.0	-423.3E-6	0.0	
32.000	12.000	15.000	0.7033	15.00	0.0	-400.9E-6	0.0	
32.000	14.000	15.000	0.6820	15.00	0.0	-376.1E-6	0.0	
32.000	16.000	15.000	0.6586	15.00	0.0	-349.7E-6	0.0	
32.000	18.000	15.000	0.6336	15.00	0.0	-322.7E-6	0.0	
32.000	20.000	15.000	0.6073	15.00	0.0	-295.7E-6	0.0	
32.000	22.000	15.000	0.5802	15.00	0.0	-269.5E-6	0.0	
32.000	24.000	15.000	0.5526	15.00	0.0	-244.6E-6	0.0	
32.000	26.000	15.000	0.5249	15.00	0.0	-221.3E-6	0.0	
32.000	28.000	15.000	0.4975	15.00	0.0	-199.8E-6	0.0	
32.000	30.000	15.000	0.4705	15.00	0.0	-180.2E-6	0.0	
32.000	32.000	15.000	0.4442	15.00	0.0	-162.5E-6	0.0	
32.000	34.000	15.000	0.4187	15.00	0.0	-146.6E-6	0.0	
32.000	36.000	15.000	0.3943	15.00	0.0	-132.3E-6	0.0	
32.000	38.000	15.000	0.3708	15.00	0.0	-119.5E-6	0.0	
32.000	40.000	15.000	0.3485	15.00	0.0	-108.1E-6	0.0	
34.000	-40.000	15.000	0.3310	15.00	0.0	-99.62E-6	0.0	
34.000	-38.000	15.000	0.3514	15.00	0.0	-109.5E-6	0.0	
34.000	-36.000	15.000	0.3728	15.00	0.0	-120.4E-6	0.0	
34.000	-34.000	15.000	0.3950	15.00	0.0	-132.6E-6	0.0	
34.000	-32.000	15.000	0.4181	15.00	0.0	-145.9E-6	0.0	
34.000	-30.000	15.000	0.4418	15.00	0.0	-160.6E-6	0.0	
34.000	-28.000	15.000	0.4660	15.00	0.0	-176.6E-6	0.0	
34.000	-26.000	15.000	0.4906	15.00	0.0	-193.9E-6	0.0	
34.000	-24.000	15.000	0.5152	15.00	0.0	-212.4E-6	0.0	
34.000	-22.000	15.000	0.5397	15.00	0.0	-231.9E-6	0.0	
34.000	-20.000	15.000	0.5638	15.00	0.0	-252.2E-6	0.0	
34.000	-18.000	15.000	0.5870	15.00	0.0	-272.8E-6	0.0	
34.000	-16.000	15.000	0.6090	15.00	0.0	-293.3E-6	0.0	
34.000	-14.000	15.000	0.6296	15.00	0.0	-313.2E-6	0.0	
34.000	-12.000	15.000	0.6483	15.00	0.0	-331.7E-6	0.0	
34.000	-10.000	15.000	0.6648	15.00	0.0	-348.5E-6	0.0	
34.000	-8.000	15.000	0.6788	15.00	0.0	-362.9E-6	0.0	
34.000	-6.000	15.000	0.6899	15.00	0.0	-374.6E-6	0.0	
34.000	-4.000	15.000	0.6981	15.00	0.0	-383.1E-6	0.0	
34.000	-2.000	15.000	0.7030	15.00	0.0	-388.4E-6	0.0	
34.000	0.000	15.000	0.7047	15.00	0.0	-390.1E-6	0.0	
34.000	2.000	15.000	0.7030	15.00	0.0	-388.4E-6	0.0	
34.000	4.000	15.000	0.6981	15.00	0.0	-383.1E-6	0.0	
34.000	6.000	15.000	0.6899	15.00	0.0	-374.6E-6	0.0	
34.000	8.000	15.000	0.6788	15.00	0.0	-362.9E-6	0.0	
34.000	10.000	15.000	0.6648	15.00	0.0	-348.5E-6	0.0	
34.000	12.000	15.000	0.6483	15.00	0.0	-331.7E-6	0.0	
34.000	14.000	15.000	0.6296	15.00	0.0	-313.2E-6	0.0	
34.000	16.000	15.000	0.6090	15.00	0.0	-293.3E-6	0.0	
34.000	18.000	15.000	0.5870	15.00	0.0	-272.8E-6	0.0	
34.000	20.000	15.000	0.5638	15.00	0.0	-252.2E-6	0.0	
34.000	22.000	15.000	0.5397	15.00	0.0	-231.9E-6	0.0	
34.000	24.000	15.000	0.5152	15.00	0.0	-212.4E-6	0.0	
34.000	26.000	15.000	0.4906	15.00	0.0	-193.9E-6	0.0	
34.000	28.000	15.000	0.4660	15.00	0.0	-176.6E-6	0.0	
34.000	30.000	15.000	0.4418	15.00	0.0	-160.6E-6	0.0	
34.000	32.000	15.000	0.4181	15.00	0.0	-145.9E-6	0.0	
34.000	34.000	15.000	0.3950	15.00	0.0	-132.6E-6	0.0	
34.000	36.000	15.000	0.3728	15.00	0.0	-120.4E-6	0.0	
34.000	38.000	15.000	0.3514	15.00	0.0	-109.5E-6	0.0	
34.000	40.000	15.000	0.3310	15.00	0.0	-99.62E-6	0.0	
36.000	-40.000	15.000	0.3139	15.00	0.0	-91.76E-6	0.0	
36.000	-38.000	15.000	0.3326	15.00	0.0	-100.3E-6	0.0	
36.000	-36.000	15.000	0.3520	15.00	0.0	-109.7E-6	0.0	
36.000	-34.000	15.000	0.3722	15.00	0.0	-120.0E-6	0.0	
36.000	-32.000	15.000	0.3930	15.00	0.0	-131.2E-6	0.0	
36.000	-30.000	15.000	0.4144	15.00	0.0	-143.4E-6	0.0	
36.000	-28.000	15.000	0.4361	15.00	0.0	-156.6E-6	0.0	
36.000	-26.000	15.000	0.4581	15.00	0.0	-170.6E-6	0.0	
36.000	-24.000	15.000	0.4800	15.00	0.0	-185.5E-6	0.0	
36.000	-22.000	15.000	0.5018	15.00	0.0	-200.9E-6	0.0	
36.000	-20.000	15.000	0.5230	15.00	0.0	-216.8E-6	0.0	
36.000	-18.000	15.000	0.5435	15.00	0.0	-232.9E-6	0.0	
36.000	-16.000	15.000	0.5629	15.00	0.0	-248.7E-6	0.0	
36.000	-14.000	15.000	0.5809	15.00	0.0	-263.8E-6	0.0	
36.000	-12.000	15.000	0.5973	15.00	0.0	-278.0E-6	0.0	
36.000	-10.000	15.000	0.6117	15.00	0.0	-290.7E-6	0.0	
36.000	-8.000	15.000	0.6239	15.00	0.0	-301.7E-6	0.0	
36.000	-6.000	15.000	0.6336	15.00	0.0	-310.5E-6	0.0	
36.000	-4.000	15.000	0.6407	15.00	0.0	-317.0E-6	0.0	
36.000	-2.000	15.000	0.6450	15.00	0.0	-321.0E-6	0.0	
36.000	0.000	15.000	0.6465	15.00	0.0	-322.3E-6	0.0	
36.000	2.000	15.000	0.6450	15.00	0.0	-321.0E-6	0.0	
36.000	4.000	15.000	0.6407	15.00	0.0	-317.0E-6	0.0	
36.000	6.000	15.000	0.6336	15.00	0.0	-310.5E-6	0.0	
36.000	8.000	15.000	0.6239	15.00	0.0	-301.7E-6	0.0	
36.000	10.000	15.000	0.6117	15.00	0.0			



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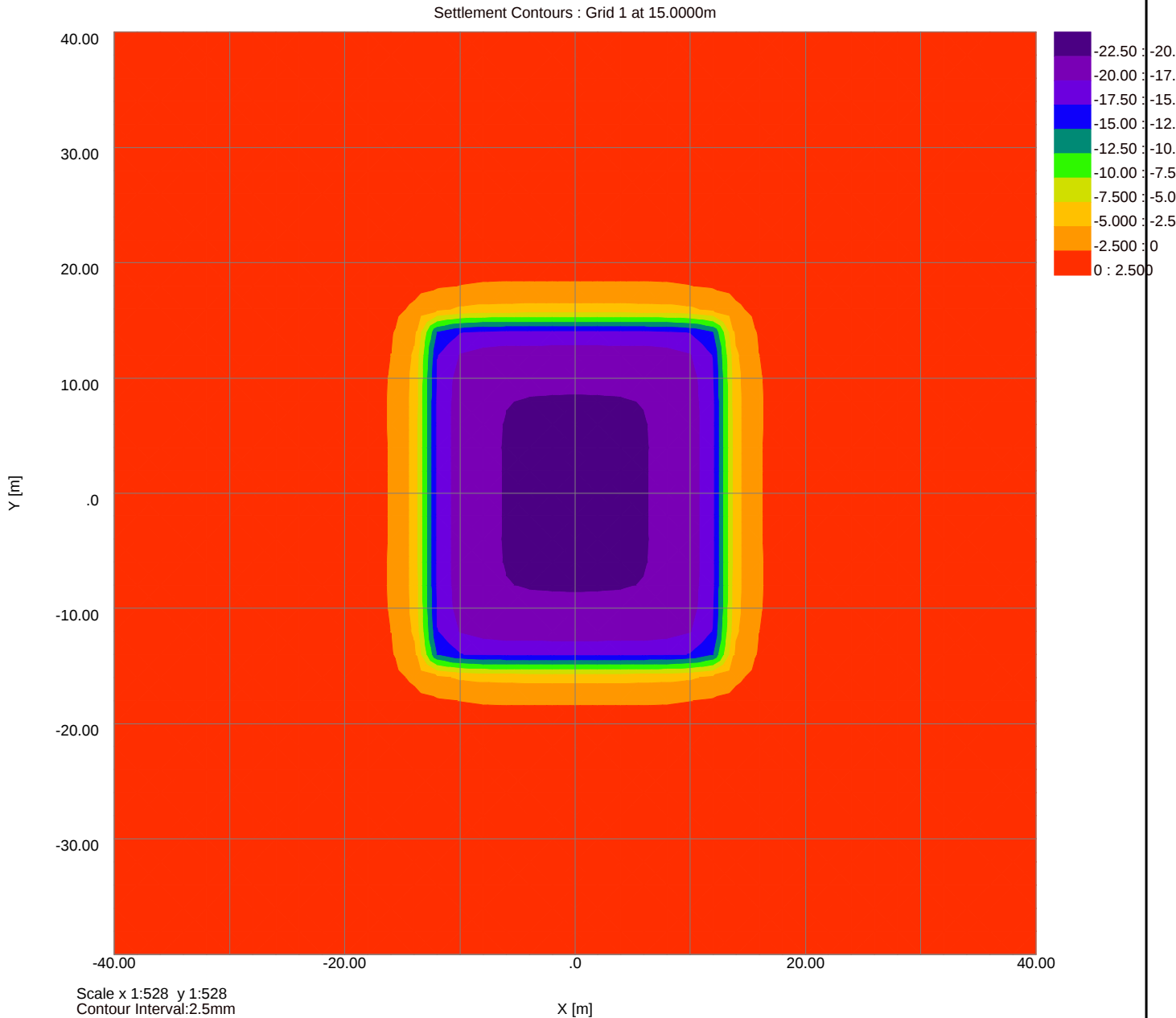
Heave Calculation

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Vert Strain [-]
	38.000	6.000	15.000	0.5820	15.00	0.0	-260.5E-6	0.0
	38.000	8.000	15.000	0.5735	15.00	0.0	-253.7E-6	0.0
	38.000	10.000	15.000	0.5629	15.00	0.0	-245.3E-6	0.0
	38.000	12.000	15.000	0.5503	15.00	0.0	-235.5E-6	0.0
	38.000	14.000	15.000	0.5360	15.00	0.0	-224.5E-6	0.0
	38.000	16.000	15.000	0.5202	15.00	0.0	-212.7E-6	0.0
	38.000	18.000	15.000	0.5031	15.00	0.0	-200.4E-6	0.0
	38.000	20.000	15.000	0.4851	15.00	0.0	-187.8E-6	0.0
	38.000	22.000	15.000	0.4663	15.00	0.0	-175.2E-6	0.0
	38.000	24.000	15.000	0.4470	15.00	0.0	-162.8E-6	0.0
	38.000	26.000	15.000	0.4275	15.00	0.0	-150.8E-6	0.0
	38.000	28.000	15.000	0.4079	15.00	0.0	-139.3E-6	0.0
	38.000	30.000	15.000	0.3884	15.00	0.0	-128.4E-6	0.0
	38.000	32.000	15.000	0.3692	15.00	0.0	-118.3E-6	0.0
	38.000	34.000	15.000	0.3504	15.00	0.0	-108.8E-6	0.0
	38.000	36.000	15.000	0.3321	15.00	0.0	-100.0E-6	0.0
	38.000	38.000	15.000	0.3144	15.00	0.0	-91.94E-6	0.0
	38.000	40.000	15.000	0.2974	15.00	0.0	-84.52E-6	0.0
	40.000	-40.000	15.000	0.2815	15.00	0.0	-77.87E-6	0.0
	40.000	-38.000	15.000	0.2970	15.00	0.0	-84.31E-6	0.0
	40.000	-36.000	15.000	0.3131	15.00	0.0	-91.26E-6	0.0
	40.000	-34.000	15.000	0.3297	15.00	0.0	-98.74E-6	0.0
	40.000	-32.000	15.000	0.3466	15.00	0.0	-106.8E-6	0.0
	40.000	-30.000	15.000	0.3639	15.00	0.0	-115.3E-6	0.0
	40.000	-28.000	15.000	0.3813	15.00	0.0	-124.3E-6	0.0
	40.000	-26.000	15.000	0.3988	15.00	0.0	-133.8E-6	0.0
	40.000	-24.000	15.000	0.4162	15.00	0.0	-143.5E-6	0.0
	40.000	-22.000	15.000	0.4332	15.00	0.0	-153.6E-6	0.0
	40.000	-20.000	15.000	0.4498	15.00	0.0	-163.7E-6	0.0
	40.000	-18.000	15.000	0.4657	15.00	0.0	-173.7E-6	0.0
	40.000	-16.000	15.000	0.4807	15.00	0.0	-183.5E-6	0.0
	40.000	-14.000	15.000	0.4946	15.00	0.0	-192.7E-6	0.0
	40.000	-12.000	15.000	0.5072	15.00	0.0	-201.3E-6	0.0
	40.000	-10.000	15.000	0.5181	15.00	0.0	-209.0E-6	0.0
	40.000	-8.000	15.000	0.5274	15.00	0.0	-215.5E-6	0.0
	40.000	-6.000	15.000	0.5348	15.00	0.0	-220.8E-6	0.0
	40.000	-4.000	15.000	0.5402	15.00	0.0	-224.7E-6	0.0
	40.000	-2.000	15.000	0.5435	15.00	0.0	-227.1E-6	0.0
	40.000	0.000	15.000	0.5446	15.00	0.0	-227.9E-6	0.0
	40.000	2.000	15.000	0.5435	15.00	0.0	-227.1E-6	0.0
	40.000	4.000	15.000	0.5402	15.00	0.0	-224.7E-6	0.0
	40.000	6.000	15.000	0.5348	15.00	0.0	-220.8E-6	0.0
	40.000	8.000	15.000	0.5274	15.00	0.0	-215.5E-6	0.0
	40.000	10.000	15.000	0.5181	15.00	0.0	-209.0E-6	0.0
	40.000	12.000	15.000	0.5072	15.00	0.0	-201.3E-6	0.0
	40.000	14.000	15.000	0.4946	15.00	0.0	-192.7E-6	0.0
	40.000	16.000	15.000	0.4807	15.00	0.0	-183.5E-6	0.0
	40.000	18.000	15.000	0.4657	15.00	0.0	-173.7E-6	0.0
	40.000	20.000	15.000	0.4498	15.00	0.0	-163.7E-6	0.0
	40.000	22.000	15.000	0.4332	15.00	0.0	-153.6E-6	0.0
	40.000	24.000	15.000	0.4162	15.00	0.0	-143.5E-6	0.0
	40.000	26.000	15.000	0.3988	15.00	0.0	-133.8E-6	0.0
	40.000	28.000	15.000	0.3813	15.00	0.0	-124.3E-6	0.0
	40.000	30.000	15.000	0.3639	15.00	0.0	-115.3E-6	0.0
	40.000	32.000	15.000	0.3466	15.00	0.0	-106.8E-6	0.0
	40.000	34.000	15.000	0.3297	15.00	0.0	-98.74E-6	0.0
	40.000	36.000	15.000	0.3131	15.00	0.0	-91.26E-6	0.0
	40.000	38.000	15.000	0.2970	15.00	0.0	-84.31E-6	0.0
	40.000	40.000	15.000	0.2815	15.00	0.0	-77.87E-6	0.0

Job No.	Sheet No.	Rev.
LO1254a		
Drg. Ref.		
Made by SS	Date	Checked

Heave Calculation





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Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Analysis Options

Analysis: Boussinesq
Global Poisson's ratio: 0.20
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: -21.00 [m OD]
Displacements at area centroids calculated.

Soil ProfilesSoil Profile 1

Layer	Level at top	Number of intermediate displacement levels	Youngs Modulus	Poissons ratio	Non-linear curve
	[mOD]		Top [kN/m ²]	Btm [kN/m ²]	
1	25.00	100	10000.	10000.	0.2000 None
2	21.50	100	50000.	50000.	0.2000 None
3	17.50	100	7500.	49600.	0.2000 None
4	7.500	100	80800.	325000.	0.2000 None
5	-11.00	100	333000.	423000.	0.2000 None

Soil Zones

Zone	Name	X coordinates min [m]	X coordinates max [m]	Y coordinates min [m]	Y coordinates max [m]	Profile
1	1	-60.00	60.00	-60.00	60.00	Soil Profile 1

Non-linear Curve Coordinates - Non-linear Curve 1

Point	Strain [%]	Factor
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Load Data

Load ref.	Name	Shape	Orientation of Plane	Centre of load (Global)		Load position	Width x or Radius	Length y	Polygon Coordinates	Number of Rectangle tolerance rectangles	Load value			
				X	Y	Angle of local x from Y					Normal (local z)	Tangential (local x)	Tangential (local y)	
[m]	[m]	[m]	[Degrees]	[m]	[m]	[m]	[kN/m ²]	[kN/m ²]	[kN/m ²]					
1 1	Rectangular	Horizontal	0.0	0.0	15.00	0.0	26.00	30.00	N/A	N/A	1	-200.0	0.0	0.0
2 2	Rectangular	Horizontal	0.0	0.0	-1.500	0.0	34.30	38.30	N/A	N/A	1	65.30	0.0	0.0

Displacement Data

			Direction of Extrusion	Line/Line for extrusion						No. of intrvl's across extrusion/line	Extrusion Depth	No. of intrvl's along extrusion	Calculate	Show Detailed results
Ref.	Type	Name		First point			Second point							
				X	Y	Z(level)	X	Y	Z(level)					
1	Grid	Grid 2	Global Y	[m] -40.00	[m] -40.00	[m] 15.00	[m] 40.00	[m] N/A	[m] 15.00	40	[m] 80.00	40	Yes	Yes

RESULTS FOR GRIDS

Analysis: Boussinesq
Global Poisson's ratio: 0.20
Horizontal rigid boundary level: -21.00 [m OD]

The maximum displacement difference between Boussinesq method (-2.000mm) and Mindlin method (1.166mm) occurs at point X=0.0m Y=0.0m Level -1.371mOD and is 3.246mm

Name	Location X [m]	Y [m]	Z[level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m ²]	Stresses Sum Princ [kN/m ²]	Vert Strain [-]
1	0.000	0.000	15.000	-50.29	15.00	-200.0	-480.0	-0.007989
2	0.000	0.000	15.000	-1.986	-1.500	-57.26	25.51	-369.8E-6
Grid 2	-40.000	-40.000	15.000	0.03558	15.00	0.0	-56.86E-6	0.0
	-40.000	-38.000	15.000	0.03299	15.00	0.0	-61.56E-6	0.0
	-40.000	-36.000	15.000	0.02977	15.00	0.0	-66.64E-6	0.0
	-40.000	-34.000	15.000	0.02586	15.00	0.0	-72.11E-6	0.0
	-40.000	-32.000	15.000	0.02124	15.00	0.0	-77.96E-6	0.0
	-40.000	-30.000	15.000	0.01587	15.00	0.0	-84.19E-6	0.0
	-40.000	-28.000	15.000	0.009765	15.00	0.0	-90.77E-6	0.0
	-40.000	-26.000	15.000	0.002945	15.00	0.0	-97.67E-6	0.0
	-40.000	-24.000	15.000	-0.004529	15.00	0.0	-104.8E-6	0.0
	-40.000	-22.000	15.000	-0.01256	15.00	0.0	-112.1E-6	0.0
	-40.000	-20.000	15.000	-0.02101	15.00	0.0	-119.5E-6	0.0
	-40.000	-18.000	15.000	-0.02970	15.00	0.0	-126.8E-6	0.0
	-40.000	-16.000	15.000	-0.03844	15.00	0.0	-134.0E-6	0.0
	-40.000	-14.000	15.000	-0.04697	15.00	0.0	-140.7E-6	0.0
	-40.000	-12.000	15.000	-0.05504	15.00	0.0	-147.0E-6	0.0
	-40.000	-10.000	15.000	-0.06240	15.00	0.0	-152.6E-6	0.0
	-40.000	-8.000	15.000	-0.06881	15.00	0.0	-157.4E-6	0.0
	-40.000	-6.000	15.000	-0.07404	15.00	0.0	-161.2E-6	0.0
	-40.000	-4.000	15.000	-0.07791	15.00	0.0	-164.1E-6	0.0
	-40.000	-2.000	15.000	-0.08029	15.00	0.0	-165.8E-6	0.0
	-40.000	0.000	15.000	-0.08109	15.00	0.0	-166.4E-6	0.0
	-40.000	2.000	15.000	-0.08029	15.00	0.0	-165.8E-6	0.0
	-40.000	4.000	15.000	-0.07791	15.00	0.0	-164.1E-6	0.0
	-40.000	6.000	15.000	-0.07404	15.00	0.0	-161.2E-6	0.0
	-40.000	8.000	15.000	-0.06881	15.00	0.0	-157.4E-6	0.0
	-40.000	10.000	15.000	-0.06240	15.00	0.0	-152.6E-6	0.0
	-40.000	12.000	15.000	-0.05504	15.00	0.0	-147.0E-6	0.0
	-40.000	14.000	15.000	-0.04697	15.00	0.0	-140.7E-6	0.0
	-40.000	16.000	15.000	-0.03844	15.00	0.0	-134.0E-6	0.0
	-40.000	18.000	15.000	-0.02970	15.00	0.0	-126.8E-6	0.0
	-40.000	20.000	15.000	-0.02101	15.00	0.0	-119.5E-6	0.0
	-40.000	22.000	15.000	-0.01256	15.00	0.0	-112.1E-6	0.0
	-40.000	24.000	15.000	-0.004529	15.00	0.0	-104.8E-6	0.0
	-40.000	26.000	15.000	0.002945	15.00	0.0	-97.67E-6	0.0
	-40.000	28.000	15.000	0.009765	15.00	0.0	-90.77E-6	0.0
	-40.000	30.000	15.000	0.01587	15.00	0.0	-84.19E-6	0.0
	-40.000	32.000	15.000	0.02124	15.00	0.0	-77.96E-6	0.0
	-40.000	34.000	15.000	0.02586	15.00	0.0	-72.11E-6	0.0
	-40.000	36.000	15.000	0.02977	15.00	0.0	-66.64E-6	0.0
	-40.000	38.000	15.000	0.03299	15.00	0.0	-61.56E-6	0.0
	-40.000	40.000	15.000	0.03558	15.00	0.0	-56.86E-6	0.0
	-38.000	-40.000	15.000	0.03231	15.00	0.0	-61.72E-6	0.0
	-38.000	-38.000	15.000	0.02932	15.00	0.0	-67.13E-6	0.0
	-38.000	-36.000	15.000	0.02502	15.00	0.0	-73.03E-6	0.0
	-38.000	-34.000	15.000	0.01984	15.00	0.0	-79.43E-6	0.0
	-38.000	-32.000	15.000	0.01372	15.00	0.0	-86.35E-6	0.0
	-38.000	-30.000	15.000	0.006623	15.00	0.0	-93.70E-6	0.0
	-38.000	-28.000	15.000	-0.001466	15.00	0.0	-101.7E-6	0.0
	-38.000	-26.000	15.000	-0.01052	15.00	0.0	-110.1E-6	0.0
	-38.000	-24.000	15.000	-0.02047	15.00	0.0	-118.9E-6	0.0
	-38.000	-22.000	15.000	-0.03121	15.00	0.0	-127.9E-6	0.0
	-38.000	-20.000	15.000	-0.04255	15.00	0.0	-137.1E-6	0.0
	-38.000	-18.000	15.000	-0.05427	15.00	0.0	-146.3E-6	0.0
	-38.000	-16.000	15.000	-0.06609	15.00	0.0	-155.3E-6	0.0
	-38.000	-14.000	15.000	-0.07767	15.00	0.0	-163.9E-6	0.0
	-38.000	-12.000	15.000	-0.08866	15.00	0.0	-171.9E-6	0.0
	-38.000	-10.000	15.000	-0.09870	15.00	0.0	-179.1E-6	0.0
	-38.000	-8.000	15.000	-0.1074	15.00	0.0	-185.3E-6	0.0
	-38.000	-6.000	15.000	-0.1146	15.00	0.0	-190.2E-6	0.0
	-38.000	-4.000	15.000	-0.1199	15.00	0.0	-193.9E-6	0.0
	-38.000	-2.000	15.000	-0.1231	15.00	0.0	-196.1E-6	0.0
	-38.000	0.000	15.000	-0.1242	15.00	0.0	-196.8E-6	0.0
	-38.000	2.000	15.000	-0.1231	15.00	0.0	-196.1E-6	0.0
	-38.000	4.000	15.000	-0.1199	15.00	0.0	-193.9E-6	0.0
	-38.000	6.000	15.000	-0.1146	15.00	0.0	-190.2E-6	0.0
	-38.000	8.000	15.000	-0.1074	15.00	0.0	-185.3E-6	0.0
	-38.000	10.000	15.000	-0.09870	15.00	0.0	-179.1E-6	0.0
	-38.000	12.000	15.000	-0.08866	15.00	0.0	-171.9E-6	0.0
	-38.000	14.000	15.000	-0.07767	15.00	0.0	-163.9E-6	0.0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-38.000	16.000	15.000	-0.06609	15.00	0.0	-155.3E-6	0.0
	-38.000	18.000	15.000	-0.05427	15.00	0.0	-146.3E-6	0.0
	-38.000	20.000	15.000	-0.04255	15.00	0.0	-137.1E-6	0.0
	-38.000	22.000	15.000	-0.03121	15.00	0.0	-127.9E-6	0.0
	-38.000	24.000	15.000	-0.02047	15.00	0.0	-118.9E-6	0.0
	-38.000	26.000	15.000	-0.01052	15.00	0.0	-110.1E-6	0.0
	-38.000	28.000	15.000	-0.001466	15.00	0.0	-101.7E-6	0.0
	-38.000	30.000	15.000	0.006623	15.00	0.0	-93.78E-6	0.0
	-38.000	32.000	15.000	0.01372	15.00	0.0	-86.35E-6	0.0
	-38.000	34.000	15.000	0.01904	15.00	0.0	-79.43E-6	0.0
	-38.000	36.000	15.000	0.02502	15.00	0.0	-73.03E-6	0.0
	-38.000	38.000	15.000	0.02932	15.00	0.0	-67.13E-6	0.0
	-38.000	40.000	15.000	0.03281	15.00	0.0	-61.72E-6	0.0
	-36.000	-40.000	15.000	0.02932	15.00	0.0	-67.00E-6	0.0
	-36.000	-38.000	15.000	0.02474	15.00	0.0	-73.25E-6	0.0
	-36.000	-36.000	15.000	0.01913	15.00	0.0	-80.11E-6	0.0
	-36.000	-34.000	15.000	0.01237	15.00	0.0	-87.63E-6	0.0
	-36.000	-32.000	15.000	0.004391	15.00	0.0	-95.84E-6	0.0
	-36.000	-30.000	15.000	-0.004882	15.00	0.0	-104.7E-6	0.0
	-36.000	-28.000	15.000	-0.01548	15.00	0.0	-114.3E-6	0.0
	-36.000	-26.000	15.000	-0.02739	15.00	0.0	-124.6E-6	0.0
	-36.000	-24.000	15.000	-0.04055	15.00	0.0	-135.4E-6	0.0
	-36.000	-22.000	15.000	-0.05482	15.00	0.0	-146.7E-6	0.0
	-36.000	-20.000	15.000	-0.06997	15.00	0.0	-158.3E-6	0.0
	-36.000	-18.000	15.000	-0.08572	15.00	0.0	-170.0E-6	0.0
	-36.000	-16.000	15.000	-0.1017	15.00	0.0	-181.6E-6	0.0
	-36.000	-14.000	15.000	-0.1174	15.00	0.0	-192.7E-6	0.0
	-36.000	-12.000	15.000	-0.1323	15.00	0.0	-203.0E-6	0.0
	-36.000	-10.000	15.000	-0.1460	15.00	0.0	-212.3E-6	0.0
	-36.000	-8.000	15.000	-0.1580	15.00	0.0	-220.3E-6	0.0
	-36.000	-6.000	15.000	-0.1678	15.00	0.0	-226.7E-6	0.0
	-36.000	-4.000	15.000	-0.1750	15.00	0.0	-231.5E-6	0.0
	-36.000	-2.000	15.000	-0.1795	15.00	0.0	-234.4E-6	0.0
	-36.000	0.000	15.000	-0.1810	15.00	0.0	-235.4E-6	0.0
	-36.000	2.000	15.000	-0.1795	15.00	0.0	-234.4E-6	0.0
	-36.000	4.000	15.000	-0.1750	15.00	0.0	-231.5E-6	0.0
	-36.000	6.000	15.000	-0.1678	15.00	0.0	-226.7E-6	0.0
	-36.000	8.000	15.000	-0.1580	15.00	0.0	-220.3E-6	0.0
	-36.000	10.000	15.000	-0.1460	15.00	0.0	-212.3E-6	0.0
	-36.000	12.000	15.000	-0.1323	15.00	0.0	-203.0E-6	0.0
	-36.000	14.000	15.000	-0.1174	15.00	0.0	-192.7E-6	0.0
	-36.000	16.000	15.000	-0.1017	15.00	0.0	-181.6E-6	0.0
	-36.000	18.000	15.000	-0.08572	15.00	0.0	-170.0E-6	0.0
	-36.000	20.000	15.000	-0.06997	15.00	0.0	-158.3E-6	0.0
	-36.000	22.000	15.000	-0.05482	15.00	0.0	-146.7E-6	0.0
	-36.000	24.000	15.000	-0.04055	15.00	0.0	-135.4E-6	0.0
	-36.000	26.000	15.000	-0.02739	15.00	0.0	-124.6E-6	0.0
	-36.000	28.000	15.000	-0.01548	15.00	0.0	-114.3E-6	0.0
	-36.000	30.000	15.000	-0.004882	15.00	0.0	-104.7E-6	0.0
	-36.000	32.000	15.000	0.004391	15.00	0.0	-95.84E-6	0.0
	-36.000	34.000	15.000	0.01237	15.00	0.0	-87.63E-6	0.0
	-36.000	36.000	15.000	0.01913	15.00	0.0	-80.11E-6	0.0
	-36.000	38.000	15.000	0.02474	15.00	0.0	-73.25E-6	0.0
	-36.000	40.000	15.000	0.02932	15.00	0.0	-67.00E-6	0.0
	-34.000	-40.000	15.000	0.02504	15.00	0.0	-72.75E-6	0.0
	-34.000	-38.000	15.000	0.01915	15.00	0.0	-79.95E-6	0.0
	-34.000	-36.000	15.000	0.01194	15.00	0.0	-87.95E-6	0.0
	-34.000	-34.000	15.000	0.003258	15.00	0.0	-96.79E-6	0.0
	-34.000	-32.000	15.000	-0.007018	15.00	0.0	-106.6E-6	0.0
	-34.000	-30.000	15.000	-0.01900	15.00	0.0	-117.3E-6	0.0
	-34.000	-28.000	15.000	-0.03276	15.00	0.0	-128.9E-6	0.0
	-34.000	-26.000	15.000	-0.04831	15.00	0.0	-141.6E-6	0.0
	-34.000	-24.000	15.000	-0.06560	15.00	0.0	-155.1E-6	0.0
	-34.000	-22.000	15.000	-0.08447	15.00	0.0	-169.4E-6	0.0
	-34.000	-20.000	15.000	-0.1047	15.00	0.0	-184.2E-6	0.0
	-34.000	-18.000	15.000	-0.1258	15.00	0.0	-199.2E-6	0.0
	-34.000	-16.000	15.000	-0.1474	15.00	0.0	-214.2E-6	0.0
	-34.000	-14.000	15.000	-0.1687	15.00	0.0	-228.7E-6	0.0
	-34.000	-12.000	15.000	-0.1891	15.00	0.0	-242.2E-6	0.0
	-34.000	-10.000	15.000	-0.2078	15.00	0.0	-254.5E-6	0.0
	-34.000	-8.000	15.000	-0.2242	15.00	0.0	-265.0E-6	0.0
	-34.000	-6.000	15.000	-0.2376	15.00	0.0	-273.5E-6	0.0
	-34.000	-4.000	15.000	-0.2475	15.00	0.0	-279.8E-6	0.0
	-34.000	-2.000	15.000	-0.2536	15.00	0.0	-283.6E-6	0.0
	-34.000	0.000	15.000	-0.2557	15.00	0.0	-284.9E-6	0.0
	-34.000	2.000	15.000	-0.2536	15.00	0.0	-283.6E-6	0.0
	-34.000	4.000	15.000	-0.2475	15.00	0.0	-279.8E-6	0.0
	-34.000	6.000	15.000	-0.2376	15.00	0.0	-273.5E-6	0.0
	-34.000	8.000	15.000	-0.2242	15.00	0.0	-265.0E-6	0.0
	-34.000	10.000	15.000	-0.2078	15.00	0.0	-254.5E-6	0.0
	-34.000	12.000	15.000	-0.1891	15.00	0.0	-242.2E-6	0.0
	-34.000	14.000	15.000	-0.1687	15.00	0.0	-228.7E-6	0.0
	-34.000	16.000	15.000	-0.1474	15.00	0.0	-214.2E-6	0.0
	-34.000	18.000	15.000	-0.1258	15.00	0.0	-199.2E-6	0.0
	-34.000	20.000	15.000	-0.1047	15.00	0.0	-184.2E-6	0.0
	-34.000	22.000	15.000	-0.08447	15.00	0.0	-169.4E-6	0.0
	-34.000	24.000	15.000	-0.06560	15.00	0.0	-155.1E-6	0.0
	-34.000	26.000	15.000	-0.04831	15.00	0.0	-141.6E-6	0.0
	-34.000	28.000	15.000	-0.03276	15.00	0.0	-128.9E-6	0.0
	-34.000	30.000	15.000	-0.01900	15.00	0.0	-117.3E-6	0.0
	-34.000	32.000	15.000	-0.007018	15.00	0.0	-106.6E-6	0.0
	-34.000	34.000	15.000	0.003258	15.00	0.0	-96.79E-6	0.0
	-34.000	36.000	15.000	0.01194	15.00	0.0	-87.95E-6	0.0
	-34.000	38.000	15.000	0.01915	15.00	0.0	-79.95E-6	0.0
	-34.000	40.000	15.000	0.02504	15.00	0.0	-72.75E-6	0.0
	-32.000	-40.000	15.000	0.01990	15.00	0.0	-78.96E-6	0.0
	-32.000	-38.000	15.000	0.01245	15.00	0.		



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-30.000	-30.000	15.000	-0.05660	15.00	0.0	-148.0E-6	0.0
	-30.000	-28.000	15.000	-0.07925	15.00	0.0	-165.6E-6	0.0
	-30.000	-26.000	15.000	-0.1052	15.00	0.0	-185.2E-6	0.0
	-30.000	-24.000	15.000	-0.1346	15.00	0.0	-206.8E-6	0.0
	-30.000	-22.000	15.000	-0.1674	15.00	0.0	-230.4E-6	0.0
	-30.000	-20.000	15.000	-0.2032	15.00	0.0	-255.5E-6	0.0
	-30.000	-18.000	15.000	-0.2414	15.00	0.0	-281.7E-6	0.0
	-30.000	-16.000	15.000	-0.2811	15.00	0.0	-308.3E-6	0.0
	-30.000	-14.000	15.000	-0.3211	15.00	0.0	-334.4E-6	0.0
	-30.000	-12.000	15.000	-0.3597	15.00	0.0	-359.1E-6	0.0
	-30.000	-10.000	15.000	-0.3953	15.00	0.0	-381.4E-6	0.0
	-30.000	-8.000	15.000	-0.4265	15.00	0.0	-400.5E-6	0.0
	-30.000	-6.000	15.000	-0.4529	15.00	0.0	-416.0E-6	0.0
	-30.000	-4.000	15.000	-0.4708	15.00	0.0	-427.2E-6	0.0
	-30.000	-2.000	15.000	-0.4824	15.00	0.0	-434.1E-6	0.0
	-30.000	0.000	15.000	-0.4862	15.00	0.0	-436.4E-6	0.0
	-30.000	2.000	15.000	-0.4824	15.00	0.0	-434.1E-6	0.0
	-30.000	4.000	15.000	-0.4708	15.00	0.0	-427.2E-6	0.0
	-30.000	6.000	15.000	-0.4529	15.00	0.0	-416.0E-6	0.0
	-30.000	8.000	15.000	-0.4265	15.00	0.0	-400.5E-6	0.0
	-30.000	10.000	15.000	-0.3953	15.00	0.0	-381.4E-6	0.0
	-30.000	12.000	15.000	-0.3597	15.00	0.0	-359.1E-6	0.0
	-30.000	14.000	15.000	-0.3211	15.00	0.0	-334.4E-6	0.0
	-30.000	16.000	15.000	-0.2811	15.00	0.0	-308.3E-6	0.0
	-30.000	18.000	15.000	-0.2414	15.00	0.0	-281.7E-6	0.0
	-30.000	20.000	15.000	-0.2032	15.00	0.0	-255.5E-6	0.0
	-30.000	22.000	15.000	-0.1674	15.00	0.0	-230.4E-6	0.0
	-30.000	24.000	15.000	-0.1346	15.00	0.0	-206.8E-6	0.0
	-30.000	26.000	15.000	-0.1052	15.00	0.0	-185.2E-6	0.0
	-30.000	28.000	15.000	-0.07925	15.00	0.0	-165.6E-6	0.0
	-30.000	30.000	15.000	-0.05660	15.00	0.0	-148.0E-6	0.0
	-30.000	32.000	15.000	-0.03715	15.00	0.0	-132.3E-6	0.0
	-30.000	34.000	15.000	-0.02065	15.00	0.0	-118.4E-6	0.0
	-30.000	36.000	15.000	-0.006834	15.00	0.0	-106.1E-6	0.0
	-30.000	38.000	15.000	0.004576	15.00	0.0	-95.23E-6	0.0
	-30.000	40.000	15.000	0.01387	15.00	0.0	-85.64E-6	0.0
	-28.000	-40.000	15.000	0.006911	15.00	0.0	-92.80E-6	0.0
	-28.000	-38.000	15.000	-0.004530	15.00	0.0	-103.8E-6	0.0
	-28.000	-36.000	15.000	-0.01862	15.00	0.0	-116.5E-6	0.0
	-28.000	-34.000	15.000	-0.03577	15.00	0.0	-131.9E-6	0.0
	-28.000	-32.000	15.000	-0.05637	15.00	0.0	-147.6E-6	0.0
	-28.000	-30.000	15.000	-0.08085	15.00	0.0	-166.7E-6	0.0
	-28.000	-28.000	15.000	-0.1096	15.00	0.0	-188.5E-6	0.0
	-28.000	-26.000	15.000	-0.1429	15.00	0.0	-213.2E-6	0.0
	-28.000	-24.000	15.000	-0.1810	15.00	0.0	-241.9E-6	0.0
	-28.000	-22.000	15.000	-0.2240	15.00	0.0	-271.9E-6	0.0
	-28.000	-20.000	15.000	-0.2716	15.00	0.0	-305.5E-6	0.0
	-28.000	-18.000	15.000	-0.3234	15.00	0.0	-341.2E-6	0.0
	-28.000	-16.000	15.000	-0.3780	15.00	0.0	-377.9E-6	0.0
	-28.000	-14.000	15.000	-0.4335	15.00	0.0	-414.2E-6	0.0
	-28.000	-12.000	15.000	-0.4875	15.00	0.0	-448.6E-6	0.0
	-28.000	-10.000	15.000	-0.5374	15.00	0.0	-479.7E-6	0.0
	-28.000	-8.000	15.000	-0.5811	15.00	0.0	-506.2E-6	0.0
	-28.000	-6.000	15.000	-0.6166	15.00	0.0	-527.5E-6	0.0
	-28.000	-4.000	15.000	-0.6427	15.00	0.0	-542.9E-6	0.0
	-28.000	-2.000	15.000	-0.6586	15.00	0.0	-552.3E-6	0.0
	-28.000	0.000	15.000	-0.6639	15.00	0.0	-555.4E-6	0.0
	-28.000	2.000	15.000	-0.6586	15.00	0.0	-552.3E-6	0.0
	-28.000	4.000	15.000	-0.6427	15.00	0.0	-542.9E-6	0.0
	-28.000	6.000	15.000	-0.6166	15.00	0.0	-527.5E-6	0.0
	-28.000	8.000	15.000	-0.5811	15.00	0.0	-506.2E-6	0.0
	-28.000	10.000	15.000	-0.5374	15.00	0.0	-479.7E-6	0.0
	-28.000	12.000	15.000	-0.4875	15.00	0.0	-448.6E-6	0.0
	-28.000	14.000	15.000	-0.4335	15.00	0.0	-414.2E-6	0.0
	-28.000	16.000	15.000	-0.3780	15.00	0.0	-377.9E-6	0.0
	-28.000	18.000	15.000	-0.3234	15.00	0.0	-341.2E-6	0.0
	-28.000	20.000	15.000	-0.2716	15.00	0.0	-305.5E-6	0.0
	-28.000	22.000	15.000	-0.2240	15.00	0.0	-271.9E-6	0.0
	-28.000	24.000	15.000	-0.1810	15.00	0.0	-241.9E-6	0.0
	-28.000	26.000	15.000	-0.1429	15.00	0.0	-213.2E-6	0.0
	-28.000	28.000	15.000	-0.1096	15.00	0.0	-188.5E-6	0.0
	-28.000	30.000	15.000	-0.08085	15.00	0.0	-166.7E-6	0.0
	-28.000	32.000	15.000	-0.05637	15.00	0.0	-147.6E-6	0.0
	-28.000	34.000	15.000	-0.03577	15.00	0.0	-131.9E-6	0.0
	-28.000	36.000	15.000	-0.01862	15.00	0.0	-116.5E-6	0.0
	-28.000	38.000	15.000	-0.004530	15.00	0.0	-103.8E-6	0.0
	-28.000	40.000	15.000	0.006911	15.00	0.0	-92.80E-6	0.0
	-26.000	-40.000	15.000	-974.7E-6	15.00	0.0	-100.4E-6	0.0
	-26.000	-38.000	15.000	-0.01488	15.00	0.0	-113.1E-6	0.0
	-26.000	-36.000	15.000	-0.03209	15.00	0.0	-127.8E-6	0.0
	-26.000	-34.000	15.000	-0.05315	15.00	0.0	-144.9E-6	0.0
	-26.000	-32.000	15.000	-0.07865	15.00	0.0	-164.8E-6	0.0
	-26.000	-30.000	15.000	-0.1092	15.00	0.0	-188.1E-6	0.0
	-26.000	-28.000	15.000	-0.1454	15.00	0.0	-215.1E-6	0.0
	-26.000	-26.000	15.000	-0.1878	15.00	0.0	-246.5E-6	0.0
	-26.000	-24.000	15.000	-0.2370	15.00	0.0	-282.7E-6	0.0
	-26.000	-22.000	15.000	-0.2933	15.00	0.0	-323.9E-6	0.0
	-26.000	-20.000	15.000	-0.3570	15.00	0.0	-369.8E-6	0.0
	-26.000	-18.000	15.000	-0.4276	15.00	0.0	-419.7E-6	0.0
	-26.000	-16.000	15.000	-0.5037	15.00	0.0	-471.9E-6	0.0
	-26.000	-14.000	15.000	-0.5822	15.00	0.0	-524.0E-6	0.0
	-26.000	-12.000	15.000	-0.6592	15.00	0.0	-573.5E-6	0.0
	-26.000	-10.000	15.000	-0.7304	15.00	0.0	-618.0E-6	0.0
	-26.000	-8.000	15.000	-0.7922	15.00	0.0	-655.6E-6	0.0
	-26.000	-6.000	15.000	-0.8421	15.00	0.0	-685.4E-6	0.0
	-26.000	-4.000	15.000	-0.8785	15.00	0.0	-706.9E-6	0.0
	-26.000	-2.000	15.000	-0.9006	15.00	0.0	-719.7E-6	0.0
	-26.000	0.000	15.000	-0.9080	15.00			



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-24.000	6.000	15.000	-1.160	15.00	0.0	-919.0E-6	0.0
	-24.000	8.000	15.000	-1.089	15.00	0.0	-876.4E-6	0.0
	-24.000	10.000	15.000	-1.000	15.00	0.0	-821.6E-6	0.0
	-24.000	12.000	15.000	-0.8961	15.00	0.0	-755.8E-6	0.0
	-24.000	14.000	15.000	-0.7832	15.00	0.0	-681.6E-6	0.0
	-24.000	16.000	15.000	-0.6689	15.00	0.0	-603.5E-6	0.0
	-24.000	18.000	15.000	-0.5606	15.00	0.0	-526.2E-6	0.0
	-24.000	20.000	15.000	-0.4631	15.00	0.0	-454.1E-6	0.0
	-24.000	22.000	15.000	-0.3777	15.00	0.0	-389.6E-6	0.0
	-24.000	24.000	15.000	-0.3040	15.00	0.0	-333.7E-6	0.0
	-24.000	26.000	15.000	-0.2409	15.00	0.0	-286.1E-6	0.0
	-24.000	28.000	15.000	-0.1872	15.00	0.0	-245.9E-6	0.0
	-24.000	30.000	15.000	-0.1419	15.00	0.0	-212.2E-6	0.0
	-24.000	32.000	15.000	-0.1041	15.00	0.0	-183.9E-6	0.0
	-24.000	34.000	15.000	-0.07284	15.00	0.0	-160.8E-6	0.0
	-24.000	36.000	15.000	-0.04723	15.00	0.0	-139.9E-6	0.0
	-24.000	38.000	15.000	-0.02645	15.00	0.0	-122.9E-6	0.0
	-24.000	40.000	15.000	-0.009747	15.00	0.0	-108.4E-6	0.0
	-22.000	-40.000	15.000	-0.01932	15.00	0.0	-116.7E-6	0.0
	-22.000	-38.000	15.000	-0.03914	15.00	0.0	-133.2E-6	0.0
	-22.000	-36.000	15.000	-0.06396	15.00	0.0	-152.9E-6	0.0
	-22.000	-34.000	15.000	-0.09478	15.00	0.0	-176.4E-6	0.0
	-22.000	-32.000	15.000	-0.1328	15.00	0.0	-204.8E-6	0.0
	-22.000	-30.000	15.000	-0.1792	15.00	0.0	-239.3E-6	0.0
	-22.000	-28.000	15.000	-0.2354	15.00	0.0	-281.3E-6	0.0
	-22.000	-26.000	15.000	-0.3031	15.00	0.0	-332.9E-6	0.0
	-22.000	-24.000	15.000	-0.3838	15.00	0.0	-396.2E-6	0.0
	-22.000	-22.000	15.000	-0.4797	15.00	0.0	-473.6E-6	0.0
	-22.000	-20.000	15.000	-0.5938	15.00	0.0	-567.0E-6	0.0
	-22.000	-18.000	15.000	-0.7303	15.00	0.0	-676.1E-6	0.0
	-22.000	-16.000	15.000	-0.8899	15.00	0.0	-797.1E-6	0.0
	-22.000	-14.000	15.000	-1.064	15.00	0.0	-921.6E-6	0.0
	-22.000	-12.000	15.000	-1.237	15.00	0.0	-0.001039	0.0
	-22.000	-10.000	15.000	-1.394	15.00	0.0	-0.001141	0.0
	-22.000	-8.000	15.000	-1.525	15.00	0.0	-0.001223	0.0
	-22.000	-6.000	15.000	-1.627	15.00	0.0	-0.001285	0.0
	-22.000	-4.000	15.000	-1.699	15.00	0.0	-0.001327	0.0
	-22.000	-2.000	15.000	-1.741	15.00	0.0	-0.001352	0.0
	-22.000	0.000	15.000	-1.755	15.00	0.0	-0.001360	0.0
	-22.000	2.000	15.000	-1.741	15.00	0.0	-0.001352	0.0
	-22.000	4.000	15.000	-1.699	15.00	0.0	-0.001327	0.0
	-22.000	6.000	15.000	-1.627	15.00	0.0	-0.001285	0.0
	-22.000	8.000	15.000	-1.525	15.00	0.0	-0.001223	0.0
	-22.000	10.000	15.000	-1.394	15.00	0.0	-0.001141	0.0
	-22.000	12.000	15.000	-1.237	15.00	0.0	-0.001039	0.0
	-22.000	14.000	15.000	-1.064	15.00	0.0	-921.6E-6	0.0
	-22.000	16.000	15.000	-0.8899	15.00	0.0	-797.1E-6	0.0
	-22.000	18.000	15.000	-0.7303	15.00	0.0	-676.1E-6	0.0
	-22.000	20.000	15.000	-0.5938	15.00	0.0	-567.0E-6	0.0
	-22.000	22.000	15.000	-0.4797	15.00	0.0	-473.6E-6	0.0
	-22.000	24.000	15.000	-0.3838	15.00	0.0	-396.2E-6	0.0
	-22.000	26.000	15.000	-0.3031	15.00	0.0	-332.9E-6	0.0
	-22.000	28.000	15.000	-0.2354	15.00	0.0	-281.3E-6	0.0
	-22.000	30.000	15.000	-0.1792	15.00	0.0	-239.3E-6	0.0
	-22.000	32.000	15.000	-0.1328	15.00	0.0	-204.8E-6	0.0
	-22.000	34.000	15.000	-0.09478	15.00	0.0	-176.4E-6	0.0
	-22.000	36.000	15.000	-0.06396	15.00	0.0	-152.9E-6	0.0
	-22.000	38.000	15.000	-0.03914	15.00	0.0	-133.2E-6	0.0
	-22.000	40.000	15.000	-0.01932	15.00	0.0	-116.7E-6	0.0
	-20.000	-40.000	15.000	-0.02957	15.00	0.0	-125.2E-6	0.0
	-20.000	-38.000	15.000	-0.05280	15.00	0.0	-143.9E-6	0.0
	-20.000	-36.000	15.000	-0.08210	15.00	0.0	-166.4E-6	0.0
	-20.000	-34.000	15.000	-0.1188	15.00	0.0	-193.9E-6	0.0
	-20.000	-32.000	15.000	-0.1645	15.00	0.0	-227.5E-6	0.0
	-20.000	-30.000	15.000	-0.2209	15.00	0.0	-269.2E-6	0.0
	-20.000	-28.000	15.000	-0.2904	15.00	0.0	-321.5E-6	0.0
	-20.000	-26.000	15.000	-0.3753	15.00	0.0	-387.7E-6	0.0
	-20.000	-24.000	15.000	-0.4782	15.00	0.0	-472.5E-6	0.0
	-20.000	-22.000	15.000	-0.6019	15.00	0.0	-581.7E-6	0.0
	-20.000	-20.000	15.000	-0.7515	15.00	0.0	-721.7E-6	0.0
	-20.000	-18.000	15.000	-0.9420	15.00	0.0	-896.9E-6	0.0
	-20.000	-16.000	15.000	-1.189	15.00	0.0	-0.001103	0.0
	-20.000	-14.000	15.000	-1.475	15.00	0.0	-0.001320	0.0
	-20.000	-12.000	15.000	-1.758	15.00	0.0	-0.001522	0.0
	-20.000	-10.000	15.000	-2.005	15.00	0.0	-0.001689	0.0
	-20.000	-8.000	15.000	-2.203	15.00	0.0	-0.001816	0.0
	-20.000	-6.000	15.000	-2.351	15.00	0.0	-0.001907	0.0
	-20.000	-4.000	15.000	-2.452	15.00	0.0	-0.001967	0.0
	-20.000	-2.000	15.000	-2.510	15.00	0.0	-0.002002	0.0
	-20.000	0.000	15.000	-2.529	15.00	0.0	-0.002013	0.0
	-20.000	2.000	15.000	-2.510	15.00	0.0	-0.002002	0.0
	-20.000	4.000	15.000	-2.452	15.00	0.0	-0.001967	0.0
	-20.000	6.000	15.000	-2.351	15.00	0.0	-0.001907	0.0
	-20.000	8.000	15.000	-2.203	15.00	0.0	-0.001816	0.0
	-20.000	10.000	15.000	-2.005	15.00	0.0	-0.001689	0.0
	-20.000	12.000	15.000	-1.758	15.00	0.0	-0.001522	0.0
	-20.000	14.000	15.000	-1.475	15.00	0.0	-0.001320	0.0
	-20.000	16.000	15.000	-1.189	15.00	0.0	-0.001103	0.0
	-20.000	18.000	15.000	-0.9420	15.00	0.0	-896.9E-6	0.0
	-20.000	20.000	15.000	-0.7515	15.00	0.0	-721.7E-6	0.0
	-20.000	22.000	15.000	-0.6019	15.00	0.0	-581.7E-6	0.0
	-20.000	24.000	15.000	-0.4782	15.00	0.0	-472.5E-6	0.0
	-20.000	26.000	15.000	-0.3753	15.00	0.0	-387.7E-6	0.0
	-20.000	28.000	15.000	-0.2904	15.00	0.0	-321.5E-6	0.0
	-20.000	30.000	15.000	-0.2209	15.00	0.0	-269.2E-6	0.0
	-20.000	32.000	15.000	-0.1645	15.00	0.0	-227.5E-6	0.0
	-20.000	34.000	15.000	-0.1188	15.00	0.0	-193.9E-6	0.0
	-20.000	36.000	15.000	-0.08210	15.00	0.0	-166.4E-6	0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-16.000	-40.000	15.000	-0.05123	15.00	0.0	-142.3E-6	0.0
	-16.000	-38.000	15.000	-0.08196	15.00	0.0	-165.7E-6	0.0
	-16.000	-36.000	15.000	-0.1213	15.00	0.0	-194.5E-6	0.0
	-16.000	-34.000	15.000	-0.1714	15.00	0.0	-230.7E-6	0.0
	-16.000	-32.000	15.000	-0.2353	15.00	0.0	-276.5E-6	0.0
	-16.000	-30.000	15.000	-0.3166	15.00	0.0	-335.9E-6	0.0
	-16.000	-28.000	15.000	-0.4204	15.00	0.0	-414.4E-6	0.0
	-16.000	-26.000	15.000	-0.5532	15.00	0.0	-521.1E-6	0.0
	-16.000	-24.000	15.000	-0.7233	15.00	0.0	-671.5E-6	0.0
	-16.000	-22.000	15.000	-0.9362	15.00	0.0	-893.2E-6	0.0
	-16.000	-20.000	15.000	-1.147	15.00	0.0	-0.001240	0.0
	-16.000	-18.000	15.000	-1.122	15.00	0.0	-0.001818	0.0
	-16.000	-16.000	15.000	-1.968	15.00	0.0	-0.002792	0.0
	-16.000	-14.000	15.000	-3.149	15.00	0.0	-0.004052	0.0
	-16.000	-12.000	15.000	-4.184	15.00	0.0	-0.005020	0.0
	-16.000	-10.000	15.000	-4.903	15.00	0.0	-0.005588	0.0
	-16.000	-8.000	15.000	-5.375	15.00	0.0	-0.005918	0.0
	-16.000	-6.000	15.000	-5.681	15.00	0.0	-0.006115	0.0
	-16.000	-4.000	15.000	-5.872	15.00	0.0	-0.006233	0.0
	-16.000	-2.000	15.000	-5.977	15.00	0.0	-0.006296	0.0
	-16.000	0.000	15.000	-6.010	15.00	0.0	-0.006316	0.0
	-16.000	2.000	15.000	-5.977	15.00	0.0	-0.006296	0.0
	-16.000	4.000	15.000	-5.872	15.00	0.0	-0.006233	0.0
	-16.000	6.000	15.000	-5.681	15.00	0.0	-0.006115	0.0
	-16.000	8.000	15.000	-5.375	15.00	0.0	-0.005918	0.0
	-16.000	10.000	15.000	-4.903	15.00	0.0	-0.005588	0.0
	-16.000	12.000	15.000	-4.184	15.00	0.0	-0.005020	0.0
	-16.000	14.000	15.000	-3.149	15.00	0.0	-0.004052	0.0
	-16.000	16.000	15.000	-1.968	15.00	0.0	-0.002792	0.0
	-16.000	18.000	15.000	-1.122	15.00	0.0	-0.001818	0.0
	-16.000	20.000	15.000	-1.147	15.00	0.0	-0.001240	0.0
	-16.000	22.000	15.000	-0.9362	15.00	0.0	-893.2E-6	0.0
	-16.000	24.000	15.000	-0.7233	15.00	0.0	-671.5E-6	0.0
	-16.000	26.000	15.000	-0.5532	15.00	0.0	-521.1E-6	0.0
	-16.000	28.000	15.000	-0.4204	15.00	0.0	-414.4E-6	0.0
	-16.000	30.000	15.000	-0.3166	15.00	0.0	-335.9E-6	0.0
	-16.000	32.000	15.000	-0.2353	15.00	0.0	-276.5E-6	0.0
	-16.000	34.000	15.000	-0.1714	15.00	0.0	-230.7E-6	0.0
	-16.000	36.000	15.000	-0.1213	15.00	0.0	-194.5E-6	0.0
	-16.000	38.000	15.000	-0.08196	15.00	0.0	-165.7E-6	0.0
	-16.000	40.000	15.000	-0.05123	15.00	0.0	-142.3E-6	0.0
	-14.000	-40.000	15.000	-0.06210	15.00	0.0	-150.5E-6	0.0
	-14.000	-38.000	15.000	-0.09672	15.00	0.0	-176.2E-6	0.0
	-14.000	-36.000	15.000	-0.1413	15.00	0.0	-208.4E-6	0.0
	-14.000	-34.000	15.000	-0.1988	15.00	0.0	-249.1E-6	0.0
	-14.000	-32.000	15.000	-0.2728	15.00	0.0	-301.6E-6	0.0
	-14.000	-30.000	15.000	-0.3685	15.00	0.0	-370.8E-6	0.0
	-14.000	-28.000	15.000	-0.4932	15.00	0.0	-464.5E-6	0.0
	-14.000	-26.000	15.000	-0.6577	15.00	0.0	-596.0E-6	0.0
	-14.000	-24.000	15.000	-0.8785	15.00	0.0	-789.8E-6	0.0
	-14.000	-22.000	15.000	-1.178	15.00	0.0	-0.001096	0.0
	-14.000	-20.000	15.000	-1.556	15.00	0.0	-0.001636	0.0
	-14.000	-18.000	15.000	-1.962	15.00	0.0	-0.002788	0.0
	-14.000	-16.000	15.000	-4.1155	15.00	0.0	-0.004044	0.0
	-14.000	-14.000	15.000	-7.949	15.00	0.0	-0.01625	0.0
	-14.000	-12.000	15.000	-10.39	15.00	0.0	-0.01987	0.0
	-14.000	-10.000	15.000	-11.64	15.00	0.0	-0.02101	0.0
	-14.000	-8.000	15.000	-12.35	15.00	0.0	-0.02154	0.0
	-14.000	-6.000	15.000	-12.77	15.00	0.0	-0.02182	0.0
	-14.000	-4.000	15.000	-13.02	15.00	0.0	-0.02197	0.0
	-14.000	-2.000	15.000	-13.16	15.00	0.0	-0.02205	0.0
	-14.000	0.000	15.000	-13.20	15.00	0.0	-0.02208	0.0
	-14.000	2.000	15.000	-13.16	15.00	0.0	-0.02205	0.0
	-14.000	4.000	15.000	-13.02	15.00	0.0	-0.02197	0.0
	-14.000	6.000	15.000	-12.77	15.00	0.0	-0.02182	0.0
	-14.000	8.000	15.000	-12.35	15.00	0.0	-0.02154	0.0
	-14.000	10.000	15.000	-11.64	15.00	0.0	-0.02101	0.0
	-14.000	12.000	15.000	-10.39	15.00	0.0	-0.01987	0.0
	-14.000	14.000	15.000	-7.958	15.00	0.0	-0.01626	0.0
	-14.000	16.000	15.000	-4.1155	15.00	0.0	-0.004044	0.0
	-14.000	18.000	15.000	-1.962	15.00	0.0	-0.002788	0.0
	-14.000	20.000	15.000	-1.556	15.00	0.0	-0.001636	0.0
	-14.000	22.000	15.000	-1.178	15.00	0.0	-0.001096	0.0
	-14.000	24.000	15.000	-0.8785	15.00	0.0	-789.8E-6	0.0
	-14.000	26.000	15.000	-0.6577	15.00	0.0	-596.0E-6	0.0
	-14.000	28.000	15.000	-0.4932	15.00	0.0	-464.5E-6	0.0
	-14.000	30.000	15.000	-0.3685	15.00	0.0	-370.8E-6	0.0
	-14.000	32.000	15.000	-0.2728	15.00	0.0	-301.6E-6	0.0
	-14.000	34.000	15.000	-0.1988	15.00	0.0	-249.1E-6	0.0
	-14.000	36.000	15.000	-0.1413	15.00	0.0	-208.4E-6	0.0
	-14.000	38.000	15.000	-0.09672	15.00	0.0	-176.2E-6	0.0
	-14.000	40.000	15.000	-0.06210	15.00	0.0	-150.5E-6	0.0
	-12.000	-40.000	15.000	-0.07255	15.00	0.0	-158.1E-6	0.0
	-12.000	-38.000	15.000	-0.1110	15.00	0.0	-186.2E-6	0.0
	-12.000	-36.000	15.000	-0.1609	15.00	0.0	-221.5E-6	0.0
	-12.000	-34.000	15.000	-0.2256	15.00	0.0	-266.8E-6	0.0
	-12.000	-32.000	15.000	-0.3099	15.00	0.0	-325.8E-6	0.0
	-12.000	-30.000	15.000	-0.4205	15.00	0.0	-404.9E-6	0.0
	-12.000	-28.000	15.000	-0.5675	15.00	0.0	-514.0E-6	0.0
	-12.000	-26.000	15.000	-0.7670	15.00	0.0	-671.2E-6	0.0
	-12.000	-24.000	15.000	-1.047	15.00	0.0	-910.9E-6	0.0
	-12.000	-22.000	15.000	-1.457	15.00	0.0	-0.001310	0.0
	-12.000	-20.000	15.000	-2.076	15.00	0.0	-0.002077	0.0
	-12.000	-18.000	15.000	-3.135	15.00	0.0	-0.004044	0.0
	-12.000	-16.000	15.000	-7.949	15.00	0.0	-0.01625	0.0
	-12.000	-14.000	15.000	-27.69	15.00	-200.0	-480.0	-0.007989
	-12.000	-12.000	15.000	-32.77	15.00	-200.0	-480.0	-0.007989
	-12.000	-10.000	15.000	-34.70	15.00	-200.0	-480.0	-0.0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-10.000	-4.000	15.000	-43.95	15.00	-200.0	-480.0	-0.007989
	-10.000	-2.000	15.000	-44.14	15.00	-200.0	-480.0	-0.007989
	-10.000	0.000	15.000	-44.20	15.00	-200.0	-480.0	-0.007989
	-10.000	2.000	15.000	-44.14	15.00	-200.0	-480.0	-0.007989
	-10.000	4.000	15.000	-43.95	15.00	-200.0	-480.0	-0.007989
	-10.000	6.000	15.000	-43.57	15.00	-200.0	-480.0	-0.007989
	-10.000	8.000	15.000	-42.91	15.00	-200.0	-480.0	-0.007989
	-10.000	10.000	15.000	-41.70	15.00	-200.0	-480.0	-0.007989
	-10.000	12.000	15.000	-39.23	15.00	-200.0	-480.0	-0.007989
	-10.000	14.000	15.000	-32.75	15.00	-200.0	-480.0	-0.007989
	-10.000	16.000	15.000	-10.37	15.00	0.0	-0.01986	0.0
	-10.000	18.000	15.000	-4.158	15.00	0.0	-0.005005	0.0
	-10.000	20.000	15.000	-2.574	15.00	0.0	-0.002466	0.0
	-10.000	22.000	15.000	-1.731	15.00	0.0	-0.001506	0.0
	-10.000	24.000	15.000	-1.212	15.00	0.0	-0.001024	0.0
	-10.000	26.000	15.000	-0.8734	15.00	0.0	-741.6E-6	0.0
	-10.000	28.000	15.000	-0.6391	15.00	0.0	-560.4E-6	0.0
	-10.000	30.000	15.000	-0.4702	15.00	0.0	-436.6E-6	0.0
	-10.000	32.000	15.000	-0.3450	15.00	0.0	-348.3E-6	0.0
	-10.000	34.000	15.000	-0.2508	15.00	0.0	-283.1E-6	0.0
	-10.000	36.000	15.000	-0.1791	15.00	0.0	-233.6E-6	0.0
	-10.000	38.000	15.000	-0.1242	15.00	0.0	-195.3E-6	0.0
	-10.000	40.000	15.000	-0.08222	15.00	0.0	-165.1E-6	0.0
	-8.000	-40.000	15.000	-0.09873	15.00	0.0	-171.1E-6	0.0
	-8.000	-38.000	15.000	-0.1360	15.00	0.0	-203.2E-6	0.0
	-8.000	-36.000	15.000	-0.1952	15.00	0.0	-244.1E-6	0.0
	-8.000	-34.000	15.000	-0.2732	15.00	0.0	-297.3E-6	0.0
	-8.000	-32.000	15.000	-0.3765	15.00	0.0	-368.0E-6	0.0
	-8.000	-30.000	15.000	-0.5148	15.00	0.0	-464.5E-6	0.0
	-8.000	-28.000	15.000	-0.7037	15.00	0.0	-601.0E-6	0.0
	-8.000	-26.000	15.000	-0.9691	15.00	0.0	-802.7E-6	0.0
	-8.000	-24.000	15.000	-1.359	15.00	0.0	-0.001120	0.0
	-8.000	-22.000	15.000	-1.966	15.00	0.0	-0.001667	0.0
	-8.000	-20.000	15.000	-2.971	15.00	0.0	-0.002752	0.0
	-8.000	-18.000	15.000	-4.860	15.00	0.0	-0.005564	0.0
	-8.000	-16.000	15.000	-11.60	15.00	0.0	-0.02099	0.0
	-8.000	-14.000	15.000	-34.67	15.00	-200.0	-480.0	-0.007989
	-8.000	-12.000	15.000	-41.68	15.00	-200.0	-480.0	-0.007989
	-8.000	-10.000	15.000	-44.47	15.00	-200.0	-480.0	-0.007989
	-8.000	-8.000	15.000	-45.84	15.00	-200.0	-480.0	-0.007989
	-8.000	-6.000	15.000	-46.60	15.00	-200.0	-480.0	-0.007989
	-8.000	-4.000	15.000	-47.02	15.00	-200.0	-480.0	-0.007989
	-8.000	-2.000	15.000	-47.24	15.00	-200.0	-480.0	-0.007989
	-8.000	0.000	15.000	-47.31	15.00	-200.0	-480.0	-0.007989
	-8.000	2.000	15.000	-47.24	15.00	-200.0	-480.0	-0.007989
	-8.000	4.000	15.000	-47.02	15.00	-200.0	-480.0	-0.007989
	-8.000	6.000	15.000	-46.60	15.00	-200.0	-480.0	-0.007989
	-8.000	8.000	15.000	-45.84	15.00	-200.0	-480.0	-0.007989
	-8.000	10.000	15.000	-44.47	15.00	-200.0	-480.0	-0.007989
	-8.000	12.000	15.000	-41.68	15.00	-200.0	-480.0	-0.007989
	-8.000	14.000	15.000	-34.67	15.00	-200.0	-480.0	-0.007989
	-8.000	16.000	15.000	-11.60	15.00	0.0	-0.02099	0.0
	-8.000	18.000	15.000	-4.860	15.00	0.0	-0.005564	0.0
	-8.000	20.000	15.000	-2.971	15.00	0.0	-0.002752	0.0
	-8.000	22.000	15.000	-1.966	15.00	0.0	-0.001667	0.0
	-8.000	24.000	15.000	-1.359	15.00	0.0	-0.001120	0.0
	-8.000	26.000	15.000	-0.9691	15.00	0.0	-802.7E-6	0.0
	-8.000	28.000	15.000	-0.7037	15.00	0.0	-601.0E-6	0.0
	-8.000	30.000	15.000	-0.5148	15.00	0.0	-464.5E-6	0.0
	-8.000	32.000	15.000	-0.3765	15.00	0.0	-368.0E-6	0.0
	-8.000	34.000	15.000	-0.2732	15.00	0.0	-297.3E-6	0.0
	-8.000	36.000	15.000	-0.1952	15.00	0.0	-244.1E-6	0.0
	-8.000	38.000	15.000	-0.1360	15.00	0.0	-203.2E-6	0.0
	-8.000	40.000	15.000	-0.09873	15.00	0.0	-171.1E-6	0.0
	-6.000	-40.000	15.000	-0.09776	15.00	0.0	-176.0E-6	0.0
	-6.000	-38.000	15.000	-0.1456	15.00	0.0	-209.6E-6	0.0
	-6.000	-36.000	15.000	-0.2086	15.00	0.0	-252.7E-6	0.0
	-6.000	-34.000	15.000	-0.2919	15.00	0.0	-309.0E-6	0.0
	-6.000	-32.000	15.000	-0.4027	15.00	0.0	-384.2E-6	0.0
	-6.000	-30.000	15.000	-0.5520	15.00	0.0	-487.4E-6	0.0
	-6.000	-28.000	15.000	-0.7573	15.00	0.0	-634.0E-6	0.0
	-6.000	-26.000	15.000	-1.048	15.00	0.0	-851.7E-6	0.0
	-6.000	-24.000	15.000	-1.477	15.00	0.0	-0.001195	0.0
	-6.000	-22.000	15.000	-2.148	15.00	0.0	-0.001785	0.0
	-6.000	-20.000	15.000	-3.257	15.00	0.0	-0.002945	0.0
	-6.000	-18.000	15.000	-5.309	15.00	0.0	-0.005882	0.0
	-6.000	-16.000	15.000	-12.28	15.00	0.0	-0.02150	0.0
	-6.000	-14.000	15.000	-35.62	15.00	-200.0	-480.0	-0.007989
	-6.000	-12.000	15.000	-42.86	15.00	-200.0	-480.0	-0.007989
	-6.000	-10.000	15.000	-45.81	15.00	-200.0	-480.0	-0.007989
	-6.000	-8.000	15.000	-47.29	15.00	-200.0	-480.0	-0.007989
	-6.000	-6.000	15.000	-48.11	15.00	-200.0	-480.0	-0.007989
	-6.000	-4.000	15.000	-48.57	15.00	-200.0	-480.0	-0.007989
	-6.000	-2.000	15.000	-48.81	15.00	-200.0	-480.0	-0.007989
	-6.000	0.000	15.000	-48.98	15.00	-200.0	-480.0	-0.007989
	-6.000	2.000	15.000	-48.81	15.00	-200.0	-480.0	-0.007989
	-6.000	4.000	15.000	-48.57	15.00	-200.0	-480.0	-0.007989
	-6.000	6.000	15.000	-48.11	15.00	-200.0	-480.0	-0.007989
	-6.000	8.000	15.000	-47.29	15.00	-200.0	-480.0	-0.007989
	-6.000	10.000	15.000	-45.81	15.00	-200.0	-480.0	-0.007989
	-6.000	12.000	15.000	-42.86	15.00	-200.0	-480.0	-0.007989
	-6.000	14.000	15.000	-35.62	15.00	-200.0	-480.0	-0.007989
	-6.000	16.000	15.000	-12.28	15.00	0.0	-0.02150	0.0
	-6.000	18.000	15.000	-5.309	15.00	0.0	-0.005882	0.0
	-6.000	20.000	15.000	-3.257	15.00	0.0	-0.002945	0.0
	-6.000	22.000	15.000	-2.148	15.00	0.0	-0.001785	0.0
	-6.000	24.000	15.000	-1.477	15.00	0.0	-0.001195	0.0
	-6.000	26.000	15.000	-1.048	15.00	0.0		



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	-4.000	32.000	15.000	-0.4223	15.00	0.0	-396.1E-6	0.0
	-4.000	34.000	15.000	-0.3058	15.00	0.0	-317.7E-6	0.0
	-4.000	36.000	15.000	-0.2187	15.00	0.0	-259.1E-6	0.0
	-4.000	38.000	15.000	-0.1529	15.00	0.0	-214.4E-6	0.0
	-4.000	40.000	15.000	-0.1030	15.00	0.0	-179.6E-6	0.0
	-2.000	40.000	15.000	0.1062	15.00	0.0	-181.9E-6	0.0
	-2.000	38.000	15.000	-0.1573	15.00	0.0	-217.3E-6	0.0
	-2.000	36.000	15.000	-0.2249	15.00	0.0	-263.0E-6	0.0
	-2.000	34.000	15.000	-0.3145	15.00	0.0	-323.0E-6	0.0
	-2.000	32.000	15.000	-0.4344	15.00	0.0	-403.5E-6	0.0
	-2.000	30.000	15.000	0.5970	15.00	0.0	-514.5E-6	0.0
	-2.000	28.000	15.000	-0.8218	15.00	0.0	-672.8E-6	0.0
	-2.000	26.000	15.000	-1.141	15.00	0.0	-908.3E-6	0.0
	-2.000	24.000	15.000	-1.614	15.00	0.0	-0.001279	0.0
	-2.000	22.000	15.000	-2.349	15.00	0.0	-0.001910	0.0
	-2.000	20.000	15.000	-3.551	15.00	0.0	-0.003132	0.0
	-2.000	18.000	15.000	-5.733	15.00	0.0	-0.006156	0.0
	-2.000	16.000	15.000	-12.87	15.00	0.0	-0.02189	0.0
	-2.000	14.000	15.000	-36.37	15.00	-200.0	-480.0	-0.007989
	-2.000	12.000	15.000	-43.78	15.00	-200.0	-480.0	-0.007989
	-2.000	10.000	15.000	-46.86	15.00	-200.0	-480.0	-0.007989
	-2.000	8.000	15.000	-48.43	15.00	-200.0	-480.0	-0.007989
	-2.000	6.000	15.000	-49.31	15.00	-200.0	-480.0	-0.007989
	-2.000	4.000	15.000	-49.81	15.00	-200.0	-480.0	-0.007989
	-2.000	2.000	15.000	-50.07	15.00	-200.0	-480.0	-0.007989
	-2.000	0.000	15.000	-50.15	15.00	-200.0	-480.0	-0.007989
	0.000	40.000	15.000	-0.1030	15.00	0.0	-179.6E-6	0.0
	0.000	38.000	15.000	-0.1573	15.00	0.0	-217.3E-6	0.0
	0.000	36.000	15.000	-0.2249	15.00	0.0	-263.0E-6	0.0
	0.000	34.000	15.000	-0.3145	15.00	0.0	-403.5E-6	0.0
	0.000	32.000	15.000	0.5970	15.00	0.0	-514.5E-6	0.0
	0.000	30.000	15.000	-0.8218	15.00	0.0	-672.8E-6	0.0
	0.000	28.000	15.000	-1.141	15.00	0.0	-908.3E-6	0.0
	0.000	26.000	15.000	-1.614	15.00	0.0	-0.001279	0.0
	0.000	24.000	15.000	-2.349	15.00	0.0	-0.001910	0.0
	0.000	22.000	15.000	-3.551	15.00	0.0	-0.003132	0.0
	0.000	20.000	15.000	-5.733	15.00	0.0	-0.006156	0.0
	0.000	18.000	15.000	-12.87	15.00	0.0	-0.02189	0.0
	0.000	16.000	15.000	-36.37	15.00	-200.0	-480.0	-0.007989
	0.000	14.000	15.000	-43.78	15.00	-200.0	-480.0	-0.007989
	0.000	12.000	15.000	-46.86	15.00	-200.0	-480.0	-0.007989
	0.000	10.000	15.000	-48.43	15.00	-200.0	-480.0	-0.007989
	0.000	8.000	15.000	-49.31	15.00	-200.0	-480.0	-0.007989
	0.000	6.000	15.000	-49.81	15.00	-200.0	-480.0	-0.007989
	0.000	4.000	15.000	-49.81	15.00	-200.0	-480.0	-0.007989
	0.000	2.000	15.000	-50.07	15.00	-200.0	-480.0	-0.007989
	0.000	0.000	15.000	-50.15	15.00	-200.0	-480.0	-0.007989
	2.000	40.000	15.000	-0.1062	15.00	0.0	-181.9E-6	0.0
	2.000	38.000	15.000	-0.1529	15.00	0.0	-214.4E-6	0.0
	2.000	36.000	15.000	-0.2187	15.00	0.0	-259.1E-6	0.0
	2.000	34.000	15.000	-0.3058	15.00	0.0	-317.7E-6	0.0
	2.000	32.000	15.000	-0.4223	15.00	0.0	-396.1E-6	0.0
	2.000	30.000	15.000	-0.5708	15.00	0.0	-504.2E-6	0.0
	2.000	28.000	15.000	-0.7972	15.00	0.0	-658.1E-6	0.0
	2.000	26.000	15.000	-1.106	15.00	0.0	-887.1E-6	0.0
	2.000	24.000	15.000	-1.562	15.00	0.0	-0.001248	0.0
	2.000	22.000	15.000	-2.275	15.00	0.0	-0.001864	0.0
	2.000	20.000	15.000	-3.445	15.00	0.0	-0.003000	0.0
	2.000	18.000	15.000	-5.584	15.00	0.0	-0.006062	0.0
	2.000	16.000	15.000	-12.67	15.00	0.0	-0.02176	0.0



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	4.000	-14.000	15.000	-36.12	15.00	-200.0	-480.0	-0.007989
	4.000	-12.000	15.000	-43.47	15.00	-200.0	-480.0	-0.007989
	4.000	-10.000	15.000	-46.51	15.00	-200.0	-480.0	-0.007989
	4.000	-8.000	15.000	-48.05	15.00	-200.0	-480.0	-0.007989
	4.000	-6.000	15.000	-48.91	15.00	-200.0	-480.0	-0.007989
	4.000	-4.000	15.000	-49.40	15.00	-200.0	-480.0	-0.007989
	4.000	-2.000	15.000	-49.65	15.00	-200.0	-480.0	-0.007989
	4.000	0.000	15.000	-49.73	15.00	-200.0	-480.0	-0.007989
	4.000	2.000	15.000	-49.65	15.00	-200.0	-480.0	-0.007989
	4.000	4.000	15.000	-49.40	15.00	-200.0	-480.0	-0.007989
	4.000	6.000	15.000	-48.91	15.00	-200.0	-480.0	-0.007989
	4.000	8.000	15.000	-48.05	15.00	-200.0	-480.0	-0.007989
	4.000	10.000	15.000	-46.51	15.00	-200.0	-480.0	-0.007989
	4.000	12.000	15.000	-43.47	15.00	-200.0	-480.0	-0.007989
	4.000	14.000	15.000	-36.12	15.00	-200.0	-480.0	-0.007989
	4.000	16.000	15.000	-12.67	15.00	0.0	-0.02176	0.0
	4.000	18.000	15.000	-5.584	15.00	0.0	-0.006062	0.0
	4.000	20.000	15.000	-3.445	15.00	0.0	-0.003066	0.0
	4.000	22.000	15.000	-2.275	15.00	0.0	-0.001864	0.0
	4.000	24.000	15.000	-1.562	15.00	0.0	-0.001248	0.0
	4.000	26.000	15.000	-1.106	15.00	0.0	-887.1E-6	0.0
	4.000	28.000	15.000	-0.7972	15.00	0.0	-658.1E-6	0.0
	4.000	30.000	15.000	-0.5798	15.00	0.0	-504.2E-6	0.0
	4.000	32.000	15.000	-0.4223	15.00	0.0	-396.1E-6	0.0
	4.000	34.000	15.000	-0.3058	15.00	0.0	-317.7E-6	0.0
	4.000	36.000	15.000	-0.2187	15.00	0.0	-259.1E-6	0.0
	4.000	38.000	15.000	-0.1529	15.00	0.0	-214.4E-6	0.0
	4.000	40.000	15.000	-0.1030	15.00	0.0	-179.6E-6	0.0
	6.000	-40.000	15.000	-0.09776	15.00	0.0	-176.9E-6	0.0
	6.000	-38.000	15.000	-0.1456	15.00	0.0	-209.6E-6	0.0
	6.000	-36.000	15.000	-0.2086	15.00	0.0	-252.7E-6	0.0
	6.000	-34.000	15.000	-0.2919	15.00	0.0	-309.0E-6	0.0
	6.000	-32.000	15.000	-0.4027	15.00	0.0	-384.2E-6	0.0
	6.000	-30.000	15.000	-0.5520	15.00	0.0	-487.4E-6	0.0
	6.000	-28.000	15.000	-0.7573	15.00	0.0	-634.0E-6	0.0
	6.000	-26.000	15.000	-1.048	15.00	0.0	-851.7E-6	0.0
	6.000	-24.000	15.000	-1.477	15.00	0.0	-0.001195	0.0
	6.000	-22.000	15.000	-2.148	15.00	0.0	-0.001785	0.0
	6.000	-20.000	15.000	-3.257	15.00	0.0	-0.002945	0.0
	6.000	-18.000	15.000	-5.309	15.00	0.0	-0.005882	0.0
	6.000	-16.000	15.000	-12.28	15.00	0.0	-0.02150	0.0
	6.000	-14.000	15.000	-35.62	15.00	-200.0	-480.0	-0.007989
	6.000	-12.000	15.000	-42.86	15.00	-200.0	-480.0	-0.007989
	6.000	-10.000	15.000	-45.81	15.00	-200.0	-480.0	-0.007989
	6.000	-8.000	15.000	-47.29	15.00	-200.0	-480.0	-0.007989
	6.000	-6.000	15.000	-48.11	15.00	-200.0	-480.0	-0.007989
	6.000	-4.000	15.000	-48.57	15.00	-200.0	-480.0	-0.007989
	6.000	-2.000	15.000	-48.81	15.00	-200.0	-480.0	-0.007989
	6.000	0.000	15.000	-48.88	15.00	-200.0	-480.0	-0.007989
	6.000	2.000	15.000	-48.81	15.00	-200.0	-480.0	-0.007989
	6.000	4.000	15.000	-48.57	15.00	-200.0	-480.0	-0.007989
	6.000	6.000	15.000	-48.11	15.00	-200.0	-480.0	-0.007989
	6.000	8.000	15.000	-47.29	15.00	-200.0	-480.0	-0.007989
	6.000	10.000	15.000	-45.81	15.00	-200.0	-480.0	-0.007989
	6.000	12.000	15.000	-42.86	15.00	-200.0	-480.0	-0.007989
	6.000	14.000	15.000	-35.62	15.00	-200.0	-480.0	-0.007989
	6.000	16.000	15.000	-12.28	15.00	0.0	-0.02150	0.0
	6.000	18.000	15.000	-5.309	15.00	0.0	-0.005882	0.0
	6.000	20.000	15.000	-3.257	15.00	0.0	-0.002945	0.0
	6.000	22.000	15.000	-2.148	15.00	0.0	-0.001785	0.0
	6.000	24.000	15.000	-1.477	15.00	0.0	-0.001195	0.0
	6.000	26.000	15.000	-1.048	15.00	0.0	-851.7E-6	0.0
	6.000	28.000	15.000	-0.7573	15.00	0.0	-634.0E-6	0.0
	6.000	30.000	15.000	-0.5520	15.00	0.0	-487.4E-6	0.0
	6.000	32.000	15.000	-0.4027	15.00	0.0	-384.2E-6	0.0
	6.000	34.000	15.000	-0.2919	15.00	0.0	-309.0E-6	0.0
	6.000	36.000	15.000	-0.2086	15.00	0.0	-252.7E-6	0.0
	6.000	38.000	15.000	-0.1456	15.00	0.0	-209.6E-6	0.0
	6.000	40.000	15.000	-0.09776	15.00	0.0	-176.9E-6	0.0
	8.000	-40.000	15.000	-0.09073	15.00	0.0	-171.1E-6	0.0
	8.000	-38.000	15.000	-0.1360	15.00	0.0	-203.2E-6	0.0
	8.000	-36.000	15.000	-0.1952	15.00	0.0	-244.1E-6	0.0
	8.000	-34.000	15.000	-0.2732	15.00	0.0	-297.3E-6	0.0
	8.000	-32.000	15.000	-0.3765	15.00	0.0	-368.0E-6	0.0
	8.000	-30.000	15.000	-0.5148	15.00	0.0	-464.5E-6	0.0
	8.000	-28.000	15.000	-0.7037	15.00	0.0	-601.0E-6	0.0
	8.000	-26.000	15.000	-0.9691	15.00	0.0	-802.7E-6	0.0
	8.000	-24.000	15.000	-1.359	15.00	0.0	-0.001120	0.0
	8.000	-22.000	15.000	-1.966	15.00	0.0	-0.001667	0.0
	8.000	-20.000	15.000	-2.971	15.00	0.0	-0.002752	0.0
	8.000	-18.000	15.000	-4.860	15.00	0.0	-0.005564	0.0
	8.000	-16.000	15.000	-11.60	15.00	0.0	-0.02099	0.0
	8.000	-14.000	15.000	-34.67	15.00	-200.0	-480.0	-0.007989
	8.000	-12.000	15.000	-41.68	15.00	-200.0	-480.0	-0.007989
	8.000	-10.000	15.000	-44.47	15.00	-200.0	-480.0	-0.007989
	8.000	-8.000	15.000	-45.84	15.00	-200.0	-480.0	-0.007989
	8.000	-6.000	15.000	-46.60	15.00	-200.0	-480.0	-0.007989
	8.000	-4.000	15.000	-47.02	15.00	-200.0	-480.0	-0.007989
	8.000	-2.000	15.000	-47.24	15.00	-200.0	-480.0	-0.007989
	8.000	0.000	15.000	-47.31	15.00	-200.0	-480.0	-0.007989
	8.000	2.000	15.000	-47.24	15.00	-200.0	-480.0	-0.007989
	8.000	4.000	15.000	-47.02	15.00	-200.0	-480.0	-0.007989
	8.000	6.000	15.000	-46.60	15.00	-200.0	-480.0	-0.007989
	8.000	8.000	15.000	-45.84	15.00	-200.0	-480.0	-0.007989
	8.000	10.000	15.000	-44.47	15.00	-200.0	-480.0	-0.007989
	8.000	12.000	15.000	-41.68	15.00	-200.0	-480.0	-0.007989
	8.000	14.000	15.000	-34.67	15.00	-200.0	-480.0	-0.007989
	8.000	16.000	15.000	-11.60	15.00			



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	10.000	22.000	15.000	-1.731	15.00	0.0	-0.001506	0.0
	10.000	24.000	15.000	-1.212	15.00	0.0	-0.001024	0.0
	10.000	26.000	15.000	-0.8734	15.00	0.0	-741.6E-6	0.0
	10.000	28.000	15.000	-0.6391	15.00	0.0	-560.4E-6	0.0
	10.000	30.000	15.000	-0.4702	15.00	0.0	-436.9E-6	0.0
	10.000	32.000	15.000	-0.3450	15.00	0.0	-348.3E-6	0.0
	10.000	34.000	15.000	-0.2508	15.00	0.0	-283.1E-6	0.0
	10.000	36.000	15.000	-0.1791	15.00	0.0	-233.6E-6	0.0
	10.000	38.000	15.000	-0.1242	15.00	0.0	-195.3E-6	0.0
	10.000	40.000	15.000	-0.08222	15.00	0.0	-165.1E-6	0.0
	12.000	-40.000	15.000	-0.07255	15.00	0.0	-158.1E-6	0.0
	12.000	-38.000	15.000	-0.1110	15.00	0.0	-186.2E-6	0.0
	12.000	-36.000	15.000	-0.1609	15.00	0.0	-221.5E-6	0.0
	12.000	-34.000	15.000	-0.2256	15.00	0.0	-266.8E-6	0.0
	12.000	-32.000	15.000	-0.3099	15.00	0.0	-325.8E-6	0.0
	12.000	-30.000	15.000	-0.4205	15.00	0.0	-404.9E-6	0.0
	12.000	-28.000	15.000	-0.5675	15.00	0.0	-514.0E-6	0.0
	12.000	-26.000	15.000	-0.7670	15.00	0.0	-671.2E-6	0.0
	12.000	-24.000	15.000	-1.047	15.00	0.0	-910.9E-6	0.0
	12.000	-22.000	15.000	-1.457	15.00	0.0	-0.001310	0.0
	12.000	-20.000	15.000	-2.076	15.00	0.0	-0.002077	0.0
	12.000	-18.000	15.000	-3.135	15.00	0.0	-0.004044	0.0
	12.000	-16.000	15.000	-7.949	15.00	0.0	-0.01625	0.0
	12.000	-14.000	15.000	-27.69	15.00	-200.0	-480.0	-0.007989
	12.000	-12.000	15.000	-32.77	15.00	-200.0	-480.0	-0.007989
	12.000	-10.000	15.000	-34.70	15.00	-200.0	-480.0	-0.007989
	12.000	-8.000	15.000	-35.68	15.00	-200.0	-480.0	-0.007989
	12.000	-6.000	15.000	-36.23	15.00	-200.0	-480.0	-0.007989
	12.000	-4.000	15.000	-36.54	15.00	-200.0	-480.0	-0.007989
	12.000	-2.000	15.000	-36.71	15.00	-200.0	-480.0	-0.007989
	12.000	0.000	15.000	-36.76	15.00	-200.0	-480.0	-0.007989
	12.000	2.000	15.000	-36.71	15.00	-200.0	-480.0	-0.007989
	12.000	4.000	15.000	-36.54	15.00	-200.0	-480.0	-0.007989
	12.000	6.000	15.000	-36.23	15.00	-200.0	-480.0	-0.007989
	12.000	8.000	15.000	-35.68	15.00	-200.0	-480.0	-0.007989
	12.000	10.000	15.000	-34.70	15.00	-200.0	-480.0	-0.007989
	12.000	12.000	15.000	-32.77	15.00	-200.0	-480.0	-0.007989
	12.000	14.000	15.000	-27.69	15.00	-200.0	-480.0	-0.007989
	12.000	16.000	15.000	-7.949	15.00	0.0	-0.01625	0.0
	12.000	18.000	15.000	-3.135	15.00	0.0	-0.004044	0.0
	12.000	20.000	15.000	-2.076	15.00	0.0	-0.002077	0.0
	12.000	22.000	15.000	-1.457	15.00	0.0	-0.001310	0.0
	12.000	24.000	15.000	-1.047	15.00	0.0	-910.9E-6	0.0
	12.000	26.000	15.000	-0.7670	15.00	0.0	-671.2E-6	0.0
	12.000	28.000	15.000	-0.5675	15.00	0.0	-514.0E-6	0.0
	12.000	30.000	15.000	-0.4205	15.00	0.0	-404.9E-6	0.0
	12.000	32.000	15.000	-0.3099	15.00	0.0	-325.8E-6	0.0
	12.000	34.000	15.000	-0.2256	15.00	0.0	-266.8E-6	0.0
	12.000	36.000	15.000	-0.1609	15.00	0.0	-221.5E-6	0.0
	12.000	38.000	15.000	-0.1110	15.00	0.0	-186.2E-6	0.0
	12.000	40.000	15.000	-0.07255	15.00	0.0	-158.1E-6	0.0
	14.000	-40.000	15.000	-0.06210	15.00	0.0	-150.5E-6	0.0
	14.000	-38.000	15.000	-0.09672	15.00	0.0	-176.2E-6	0.0
	14.000	-36.000	15.000	-0.1413	15.00	0.0	-208.4E-6	0.0
	14.000	-34.000	15.000	-0.1908	15.00	0.0	-249.1E-6	0.0
	14.000	-32.000	15.000	-0.2728	15.00	0.0	-301.6E-6	0.0
	14.000	-30.000	15.000	-0.3685	15.00	0.0	-370.8E-6	0.0
	14.000	-28.000	15.000	-0.4932	15.00	0.0	-464.5E-6	0.0
	14.000	-26.000	15.000	-0.6577	15.00	0.0	-596.9E-6	0.0
	14.000	-24.000	15.000	-0.8785	15.00	0.0	-789.9E-6	0.0
	14.000	-22.000	15.000	-1.178	15.00	0.0	-0.001096	0.0
	14.000	-20.000	15.000	-1.556	15.00	0.0	-0.001636	0.0
	14.000	-18.000	15.000	-1.962	15.00	0.0	-0.002788	0.0
	14.000	-16.000	15.000	-4.155	15.00	0.0	-0.006412	0.0
	14.000	-14.000	15.000	-7.958	15.00	0.0	-0.01625	0.0
	14.000	-12.000	15.000	-10.39	15.00	0.0	-0.01987	0.0
	14.000	-10.000	15.000	-11.64	15.00	0.0	-0.02101	0.0
	14.000	-8.000	15.000	-12.35	15.00	0.0	-0.02154	0.0
	14.000	-6.000	15.000	-12.77	15.00	0.0	-0.02182	0.0
	14.000	-4.000	15.000	-13.02	15.00	0.0	-0.02197	0.0
	14.000	-2.000	15.000	-13.16	15.00	0.0	-0.02205	0.0
	14.000	0.000	15.000	-13.20	15.00	0.0	-0.02208	0.0
	14.000	2.000	15.000	-13.16	15.00	0.0	-0.02205	0.0
	14.000	4.000	15.000	-13.02	15.00	0.0	-0.02197	0.0
	14.000	6.000	15.000	-12.77	15.00	0.0	-0.02182	0.0
	14.000	8.000	15.000	-12.35	15.00	0.0	-0.02154	0.0
	14.000	10.000	15.000	-11.64	15.00	0.0	-0.02101	0.0
	14.000	12.000	15.000	-10.39	15.00	0.0	-0.01987	0.0
	14.000	14.000	15.000	-7.958	15.00	0.0	-0.01625	0.0
	14.000	16.000	15.000	-4.155	15.00	0.0	-0.006412	0.0
	14.000	18.000	15.000	-1.962	15.00	0.0	-0.002788	0.0
	14.000	20.000	15.000	-1.556	15.00	0.0	-0.001636	0.0
	14.000	22.000	15.000	-1.178	15.00	0.0	-0.001096	0.0
	14.000	24.000	15.000	-0.8785	15.00	0.0	-789.9E-6	0.0
	14.000	26.000	15.000	-0.6577	15.00	0.0	-596.9E-6	0.0
	14.000	28.000	15.000	-0.4932	15.00	0.0	-464.5E-6	0.0
	14.000	30.000	15.000	-0.3685	15.00	0.0	-370.8E-6	0.0
	14.000	32.000	15.000	-0.2728	15.00	0.0	-301.6E-6	0.0
	14.000	34.000	15.000	-0.1908	15.00	0.0	-249.1E-6	0.0
	14.000	36.000	15.000	-0.1413	15.00	0.0	-208.4E-6	0.0
	14.000	38.000	15.000	-0.09672	15.00	0.0	-176.2E-6	0.0
	14.000	40.000	15.000	-0.06210	15.00	0.0	-150.5E-6	0.0
	16.000	-40.000	15.000	-0.05123	15.00	0.0	-142.3E-6	0.0
	16.000	-38.000	15.000	-0.08196	15.00	0.0	-165.7E-6	0.0
	16.000	-36.000	15.000	-0.1213	15.00	0.0	-194.5E-6	0.0
	16.000	-34.000	15.000	-0.1714	15.00	0.0	-230.7E-6	0.0
	16.000	-32.000	15.000	-0.2353	15.00	0.0	-276.5E-6	0.0
	16.000	-30.000	15.000	-0.3166	15.00	0.0	-	



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	18.000	-24.000	15.000	-0.5900	15.00	0.0	-564.3E-6	0.0
	18.000	-22.000	15.000	-0.7491	15.00	0.0	-720.2E-6	0.0
	18.000	-20.000	15.000	-0.9272	15.00	0.0	-938.0E-6	0.0
	18.000	-18.000	15.000	-1.150	15.00	0.0	-0.001242	0.0
	18.000	-16.000	15.000	-1.565	15.00	0.0	-0.001641	0.0
	18.000	-14.000	15.000	-2.093	15.00	0.0	-0.002087	0.0
	18.000	-12.000	15.000	-2.601	15.00	0.0	-0.002481	0.0
	18.000	-10.000	15.000	-3.013	15.00	0.0	-0.002776	0.0
	18.000	-8.000	15.000	-3.318	15.00	0.0	-0.002979	0.0
	18.000	-6.000	15.000	-3.532	15.00	0.0	-0.003114	0.0
	18.000	-4.000	15.000	-3.672	15.00	0.0	-0.003199	0.0
	18.000	-2.000	15.000	-3.751	15.00	0.0	-0.003246	0.0
	18.000	0.000	15.000	-3.777	15.00	0.0	-0.003261	0.0
	18.000	2.000	15.000	-3.751	15.00	0.0	-0.003246	0.0
	18.000	4.000	15.000	-3.672	15.00	0.0	-0.003199	0.0
	18.000	6.000	15.000	-3.532	15.00	0.0	-0.003114	0.0
	18.000	8.000	15.000	-3.318	15.00	0.0	-0.002979	0.0
	18.000	10.000	15.000	-3.013	15.00	0.0	-0.002776	0.0
	18.000	12.000	15.000	-2.601	15.00	0.0	-0.002481	0.0
	18.000	14.000	15.000	-2.093	15.00	0.0	-0.002087	0.0
	18.000	16.000	15.000	-1.565	15.00	0.0	-0.001641	0.0
	18.000	18.000	15.000	-1.150	15.00	0.0	-0.001242	0.0
	18.000	20.000	15.000	-0.9272	15.00	0.0	-938.0E-6	0.0
	18.000	22.000	15.000	-0.7491	15.00	0.0	-720.2E-6	0.0
	18.000	24.000	15.000	-0.5900	15.00	0.0	-564.3E-6	0.0
	18.000	26.000	15.000	-0.4585	15.00	0.0	-450.8E-6	0.0
	18.000	28.000	15.000	-0.3523	15.00	0.0	-366.1E-6	0.0
	18.000	30.000	15.000	-0.2670	15.00	0.0	-301.6E-6	0.0
	18.000	32.000	15.000	-0.1989	15.00	0.0	-251.6E-6	0.0
	18.000	34.000	15.000	-0.1445	15.00	0.0	-212.1E-6	0.0
	18.000	36.000	15.000	-0.1014	15.00	0.0	-180.4E-6	0.0
	18.000	38.000	15.000	-0.06719	15.00	0.0	-154.8E-6	0.0
	18.000	40.000	15.000	-0.04029	15.00	0.0	-133.8E-6	0.0
	20.000	-40.000	15.000	-0.02957	15.00	0.0	-125.2E-6	0.0
	20.000	-38.000	15.000	-0.05280	15.00	0.0	-143.9E-6	0.0
	20.000	-36.000	15.000	-0.08210	15.00	0.0	-166.4E-6	0.0
	20.000	-34.000	15.000	-0.1188	15.00	0.0	-193.9E-6	0.0
	20.000	-32.000	15.000	-0.1645	15.00	0.0	-227.5E-6	0.0
	20.000	-30.000	15.000	-0.2209	15.00	0.0	-269.2E-6	0.0
	20.000	-28.000	15.000	-0.2904	15.00	0.0	-321.5E-6	0.0
	20.000	-26.000	15.000	-0.3753	15.00	0.0	-387.7E-6	0.0
	20.000	-24.000	15.000	-0.4782	15.00	0.0	-472.5E-6	0.0
	20.000	-22.000	15.000	-0.6019	15.00	0.0	-581.7E-6	0.0
	20.000	-20.000	15.000	-0.7515	15.00	0.0	-721.7E-6	0.0
	20.000	-18.000	15.000	-0.9420	15.00	0.0	-896.9E-6	0.0
	20.000	-16.000	15.000	-1.189	15.00	0.0	-0.001103	0.0
	20.000	-14.000	15.000	-1.475	15.00	0.0	-0.001320	0.0
	20.000	-12.000	15.000	-1.758	15.00	0.0	-0.001522	0.0
	20.000	-10.000	15.000	-2.005	15.00	0.0	-0.001689	0.0
	20.000	-8.000	15.000	-2.203	15.00	0.0	-0.001816	0.0
	20.000	-6.000	15.000	-2.351	15.00	0.0	-0.001907	0.0
	20.000	-4.000	15.000	-2.452	15.00	0.0	-0.001967	0.0
	20.000	-2.000	15.000	-2.510	15.00	0.0	-0.002002	0.0
	20.000	0.000	15.000	-2.529	15.00	0.0	-0.002033	0.0
	20.000	2.000	15.000	-2.510	15.00	0.0	-0.002002	0.0
	20.000	4.000	15.000	-2.452	15.00	0.0	-0.001967	0.0
	20.000	6.000	15.000	-2.351	15.00	0.0	-0.001907	0.0
	20.000	8.000	15.000	-2.203	15.00	0.0	-0.001816	0.0
	20.000	10.000	15.000	-2.005	15.00	0.0	-0.001689	0.0
	20.000	12.000	15.000	-1.758	15.00	0.0	-0.001522	0.0
	20.000	14.000	15.000	-1.475	15.00	0.0	-0.001320	0.0
	20.000	16.000	15.000	-1.189	15.00	0.0	-0.001103	0.0
	20.000	18.000	15.000	-0.9420	15.00	0.0	-896.9E-6	0.0
	20.000	20.000	15.000	-0.7515	15.00	0.0	-721.7E-6	0.0
	20.000	22.000	15.000	-0.6019	15.00	0.0	-581.7E-6	0.0
	20.000	24.000	15.000	-0.4782	15.00	0.0	-472.5E-6	0.0
	20.000	26.000	15.000	-0.3753	15.00	0.0	-387.7E-6	0.0
	20.000	28.000	15.000	-0.2904	15.00	0.0	-321.5E-6	0.0
	20.000	30.000	15.000	-0.2209	15.00	0.0	-269.2E-6	0.0
	20.000	32.000	15.000	-0.1645	15.00	0.0	-227.5E-6	0.0
	20.000	34.000	15.000	-0.1188	15.00	0.0	-193.9E-6	0.0
	20.000	36.000	15.000	-0.08210	15.00	0.0	-166.4E-6	0.0
	20.000	38.000	15.000	-0.05280	15.00	0.0	-143.9E-6	0.0
	20.000	40.000	15.000	-0.02957	15.00	0.0	-125.2E-6	0.0
	22.000	-40.000	15.000	-0.01932	15.00	0.0	-116.7E-6	0.0
	22.000	-38.000	15.000	-0.03914	15.00	0.0	-133.2E-6	0.0
	22.000	-36.000	15.000	-0.06396	15.00	0.0	-152.9E-6	0.0
	22.000	-34.000	15.000	-0.09478	15.00	0.0	-176.4E-6	0.0
	22.000	-32.000	15.000	-0.1328	15.00	0.0	-204.8E-6	0.0
	22.000	-30.000	15.000	-0.1792	15.00	0.0	-239.3E-6	0.0
	22.000	-28.000	15.000	-0.2354	15.00	0.0	-281.3E-6	0.0
	22.000	-26.000	15.000	-0.3031	15.00	0.0	-332.9E-6	0.0
	22.000	-24.000	15.000	-0.3838	15.00	0.0	-396.2E-6	0.0
	22.000	-22.000	15.000	-0.4797	15.00	0.0	-473.6E-6	0.0
	22.000	-20.000	15.000	-0.5938	15.00	0.0	-567.9E-6	0.0
	22.000	-18.000	15.000	-0.7303	15.00	0.0	-676.1E-6	0.0
	22.000	-16.000	15.000	-0.8899	15.00	0.0	-797.1E-6	0.0
	22.000	-14.000	15.000	-1.064	15.00	0.0	-921.6E-6	0.0
	22.000	-12.000	15.000	-1.237	15.00	0.0	-0.001039	0.0
	22.000	-10.000	15.000	-1.394	15.00	0.0	-0.001141	0.0
	22.000	-8.000	15.000	-1.525	15.00	0.0	-0.001223	0.0
	22.000	-6.000	15.000	-1.627	15.00	0.0	-0.001285	0.0
	22.000	-4.000	15.000	-1.699	15.00	0.0	-0.001327	0.0
	22.000	-2.000	15.000	-1.741	15.00	0.0	-0.001352	0.0
	22.000	0.000	15.000	-1.755	15.00	0.0	-0.001360	0.0
	22.000	2.000	15.000	-1.741	15.00	0.0	-0.001352	0.0
	22.000	4.000	15.000	-1.699	15.00	0.0	-0.001327	0.0
	22.000	6.000	15.000	-1.627	15.00	0.0	-0.001285	0.0
	22.000	8.000	15.000					



UCL Student Centre

GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
24.000	12.000	15.000	-0.8961	15.00	0.0	-755.8E-6	0.0	
24.000	14.000	15.000	-0.7832	15.00	0.0	-681.6E-6	0.0	
24.000	16.000	15.000	-0.6689	15.00	0.0	-603.5E-6	0.0	
24.000	18.000	15.000	-0.5606	15.00	0.0	-526.2E-6	0.0	
24.000	20.000	15.000	-0.4631	15.00	0.0	-454.1E-6	0.0	
24.000	22.000	15.000	-0.3777	15.00	0.0	-389.6E-6	0.0	
24.000	24.000	15.000	-0.3040	15.00	0.0	-333.7E-6	0.0	
24.000	26.000	15.000	-0.2409	15.00	0.0	-286.1E-6	0.0	
24.000	28.000	15.000	-0.1872	15.00	0.0	-245.9E-6	0.0	
24.000	30.000	15.000	-0.1419	15.00	0.0	-212.2E-6	0.0	
24.000	32.000	15.000	-0.1041	15.00	0.0	-183.9E-6	0.0	
24.000	34.000	15.000	-0.07284	15.00	0.0	-160.0E-6	0.0	
24.000	36.000	15.000	-0.04723	15.00	0.0	-139.9E-6	0.0	
24.000	38.000	15.000	-0.02645	15.00	0.0	-122.9E-6	0.0	
24.000	40.000	15.000	-0.009747	15.00	0.0	-108.4E-6	0.0	
26.000	-40.000	15.000	-974.7E-6	15.00	0.0	-108.4E-6	0.0	
26.000	-38.000	15.000	-0.01488	15.00	0.0	-113.1E-6	0.0	
26.000	-36.000	15.000	-0.03209	15.00	0.0	-127.8E-6	0.0	
26.000	-34.000	15.000	-0.05315	15.00	0.0	-144.9E-6	0.0	
26.000	-32.000	15.000	-0.07865	15.00	0.0	-164.8E-6	0.0	
26.000	-30.000	15.000	-0.1092	15.00	0.0	-188.1E-6	0.0	
26.000	-28.000	15.000	-0.1454	15.00	0.0	-215.1E-6	0.0	
26.000	-26.000	15.000	-0.1878	15.00	0.0	-246.5E-6	0.0	
26.000	-24.000	15.000	-0.2370	15.00	0.0	-282.7E-6	0.0	
26.000	-22.000	15.000	-0.2933	15.00	0.0	-323.9E-6	0.0	
26.000	-20.000	15.000	-0.3570	15.00	0.0	-369.8E-6	0.0	
26.000	-18.000	15.000	-0.4276	15.00	0.0	-419.7E-6	0.0	
26.000	-16.000	15.000	-0.5037	15.00	0.0	-471.9E-6	0.0	
26.000	-14.000	15.000	-0.5822	15.00	0.0	-524.0E-6	0.0	
26.000	-12.000	15.000	-0.6592	15.00	0.0	-573.5E-6	0.0	
26.000	-10.000	15.000	-0.7304	15.00	0.0	-618.0E-6	0.0	
26.000	-8.000	15.000	-0.7922	15.00	0.0	-655.6E-6	0.0	
26.000	-6.000	15.000	-0.8421	15.00	0.0	-685.4E-6	0.0	
26.000	-4.000	15.000	-0.8785	15.00	0.0	-706.9E-6	0.0	
26.000	-2.000	15.000	-0.9006	15.00	0.0	-719.7E-6	0.0	
26.000	0.000	15.000	-0.9080	15.00	0.0	-724.0E-6	0.0	
26.000	2.000	15.000	-0.9006	15.00	0.0	-719.7E-6	0.0	
26.000	4.000	15.000	-0.8785	15.00	0.0	-706.9E-6	0.0	
26.000	6.000	15.000	-0.8421	15.00	0.0	-685.4E-6	0.0	
26.000	8.000	15.000	-0.7922	15.00	0.0	-655.6E-6	0.0	
26.000	10.000	15.000	-0.7304	15.00	0.0	-618.0E-6	0.0	
26.000	12.000	15.000	-0.6592	15.00	0.0	-573.5E-6	0.0	
26.000	14.000	15.000	-0.5822	15.00	0.0	-524.0E-6	0.0	
26.000	16.000	15.000	-0.5037	15.00	0.0	-471.9E-6	0.0	
26.000	18.000	15.000	-0.4276	15.00	0.0	-419.7E-6	0.0	
26.000	20.000	15.000	-0.3570	15.00	0.0	-369.8E-6	0.0	
26.000	22.000	15.000	-0.2933	15.00	0.0	-323.9E-6	0.0	
26.000	24.000	15.000	-0.2370	15.00	0.0	-282.7E-6	0.0	
26.000	26.000	15.000	-0.1878	15.00	0.0	-246.5E-6	0.0	
26.000	28.000	15.000	-0.1454	15.00	0.0	-215.1E-6	0.0	
26.000	30.000	15.000	-0.1092	15.00	0.0	-188.1E-6	0.0	
26.000	32.000	15.000	-0.07865	15.00	0.0	-164.8E-6	0.0	
26.000	34.000	15.000	-0.05315	15.00	0.0	-144.9E-6	0.0	
26.000	36.000	15.000	-0.03209	15.00	0.0	-127.8E-6	0.0	
26.000	38.000	15.000	-0.01488	15.00	0.0	-113.1E-6	0.0	
26.000	40.000	15.000	-974.7E-6	15.00	0.0	-108.4E-6	0.0	
28.000	-40.000	15.000	0.006911	15.00	0.0	-92.80E-6	0.0	
28.000	-38.000	15.000	-0.004530	15.00	0.0	-103.8E-6	0.0	
28.000	-36.000	15.000	-0.01862	15.00	0.0	-116.5E-6	0.0	
28.000	-34.000	15.000	-0.03577	15.00	0.0	-131.9E-6	0.0	
28.000	-32.000	15.000	-0.05637	15.00	0.0	-147.6E-6	0.0	
28.000	-30.000	15.000	-0.08085	15.00	0.0	-166.7E-6	0.0	
28.000	-28.000	15.000	-0.1096	15.00	0.0	-188.5E-6	0.0	
28.000	-26.000	15.000	-0.1429	15.00	0.0	-213.2E-6	0.0	
28.000	-24.000	15.000	-0.1810	15.00	0.0	-241.9E-6	0.0	
28.000	-22.000	15.000	-0.2240	15.00	0.0	-271.9E-6	0.0	
28.000	-20.000	15.000	-0.2716	15.00	0.0	-305.5E-6	0.0	
28.000	-18.000	15.000	-0.3234	15.00	0.0	-341.2E-6	0.0	
28.000	-16.000	15.000	-0.3780	15.00	0.0	-377.9E-6	0.0	
28.000	-14.000	15.000	-0.4335	15.00	0.0	-414.2E-6	0.0	
28.000	-12.000	15.000	-0.4875	15.00	0.0	-448.6E-6	0.0	
28.000	-10.000	15.000	-0.5374	15.00	0.0	-479.7E-6	0.0	
28.000	-8.000	15.000	-0.5811	15.00	0.0	-506.2E-6	0.0	
28.000	-6.000	15.000	-0.6166	15.00	0.0	-527.5E-6	0.0	
28.000	-4.000	15.000	-0.6427	15.00	0.0	-542.9E-6	0.0	
28.000	-2.000	15.000	-0.6586	15.00	0.0	-552.3E-6	0.0	
28.000	0.000	15.000	-0.6639	15.00	0.0	-555.4E-6	0.0	
28.000	2.000	15.000	-0.6586	15.00	0.0	-552.3E-6	0.0	
28.000	4.000	15.000	-0.6427	15.00	0.0	-542.9E-6	0.0	
28.000	6.000	15.000	-0.6166	15.00	0.0	-527.5E-6	0.0	
28.000	8.000	15.000	-0.5811	15.00	0.0	-506.2E-6	0.0	
28.000	10.000	15.000	-0.5374	15.00	0.0	-479.7E-6	0.0	
28.000	12.000	15.000	-0.4875	15.00	0.0	-448.6E-6	0.0	
28.000	14.000	15.000	-0.4335	15.00	0.0	-414.2E-6	0.0	
28.000	16.000	15.000	-0.3780	15.00	0.0	-377.9E-6	0.0	
28.000	18.000	15.000	-0.3234	15.00	0.0	-341.2E-6	0.0	
28.000	20.000	15.000	-0.2716	15.00	0.0	-305.5E-6	0.0	
28.000	22.000	15.000	-0.2240	15.00	0.0	-271.9E-6	0.0	
28.000	24.000	15.000	-0.1810	15.00	0.0	-241.9E-6	0.0	
28.000	26.000	15.000	-0.1429	15.00	0.0	-213.2E-6	0.0	
28.000	28.000	15.000	-0.1096	15.00	0.0	-188.5E-6	0.0	
28.000	30.000	15.000	-0.08085	15.00	0.0	-166.7E-6	0.0	
28.000	32.000	15.000	-0.05637	15.00	0.0	-147.6E-6	0.0	
28.000	34.000	15.000	-0.03577	15.00	0.0	-131.9E-6	0.0	
28.000	36.000	15.000	-0.01862	15.00	0.0	-116.5E-6	0.0	
28.000	38.000	15.000	-0.004530	15.00	0.0	-103.8E-6	0.0	
28.000	40.000	15.000	0.006911	15.00	0.0	-92.80E-6	0.0	
30.000	-40.000	15.000	0.01387	15.00	0.0	-85.64E-6	0.0	
30.000	-38.000	15.000	0.004576	15.00	0.0	-95.23E-6	0.0	
30.000	-36.000	15.000	-0.006834	15.00	0.0	-106.1E-6	0.0	
30.000	-34.000	15.000	-0.02065	15.00	0.0	-118.4E-6	0.0	
30.000	-32.000	15.000	-0.03715	15.00				



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Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
32.000	-34.000	15.000	-0.007689	15.00	0.0	-107.0E-6	0.0	
32.000	-32.000	15.000	-0.02078	15.00	0.0	-118.7E-6	0.0	
32.000	-30.000	15.000	-0.03611	15.00	0.0	-131.6E-6	0.0	
32.000	-28.000	15.000	-0.05383	15.00	0.0	-145.9E-6	0.0	
32.000	-26.000	15.000	-0.07400	15.00	0.0	-161.6E-6	0.0	
32.000	-24.000	15.000	-0.09659	15.00	0.0	-178.8E-6	0.0	
32.000	-22.000	15.000	-0.1215	15.00	0.0	-196.8E-6	0.0	
32.000	-20.000	15.000	-0.1484	15.00	0.0	-215.9E-6	0.0	
32.000	-18.000	15.000	-0.1767	15.00	0.0	-235.6E-6	0.0	
32.000	-16.000	15.000	-0.2059	15.00	0.0	-255.4E-6	0.0	
32.000	-14.000	15.000	-0.2358	15.00	0.0	-274.8E-6	0.0	
32.000	-12.000	15.000	-0.2630	15.00	0.0	-292.7E-6	0.0	
32.000	-10.000	15.000	-0.2887	15.00	0.0	-309.1E-6	0.0	
32.000	-8.000	15.000	-0.3112	15.00	0.0	-323.2E-6	0.0	
32.000	-6.000	15.000	-0.3297	15.00	0.0	-334.6E-6	0.0	
32.000	-4.000	15.000	-0.3433	15.00	0.0	-342.9E-6	0.0	
32.000	-2.000	15.000	-0.3517	15.00	0.0	-348.0E-6	0.0	
32.000	0.000	15.000	-0.3545	15.00	0.0	-349.7E-6	0.0	
32.000	2.000	15.000	-0.3517	15.00	0.0	-348.0E-6	0.0	
32.000	4.000	15.000	-0.3433	15.00	0.0	-342.9E-6	0.0	
32.000	6.000	15.000	-0.3297	15.00	0.0	-334.6E-6	0.0	
32.000	8.000	15.000	-0.3112	15.00	0.0	-323.2E-6	0.0	
32.000	10.000	15.000	-0.2887	15.00	0.0	-309.1E-6	0.0	
32.000	12.000	15.000	-0.2630	15.00	0.0	-292.7E-6	0.0	
32.000	14.000	15.000	-0.2358	15.00	0.0	-274.8E-6	0.0	
32.000	16.000	15.000	-0.2059	15.00	0.0	-255.4E-6	0.0	
32.000	18.000	15.000	-0.1767	15.00	0.0	-235.6E-6	0.0	
32.000	20.000	15.000	-0.1484	15.00	0.0	-215.9E-6	0.0	
32.000	22.000	15.000	-0.1215	15.00	0.0	-196.8E-6	0.0	
32.000	24.000	15.000	-0.09659	15.00	0.0	-178.8E-6	0.0	
32.000	26.000	15.000	-0.07400	15.00	0.0	-161.6E-6	0.0	
32.000	28.000	15.000	-0.05383	15.00	0.0	-145.9E-6	0.0	
32.000	30.000	15.000	-0.03611	15.00	0.0	-131.6E-6	0.0	
32.000	32.000	15.000	-0.02078	15.00	0.0	-118.7E-6	0.0	
32.000	34.000	15.000	-0.007689	15.00	0.0	-107.0E-6	0.0	
32.000	36.000	15.000	0.003322	15.00	0.0	-96.59E-6	0.0	
32.000	38.000	15.000	0.01245	15.00	0.0	-87.27E-6	0.0	
32.000	40.000	15.000	0.01990	15.00	0.0	-78.96E-6	0.0	
34.000	-40.000	15.000	0.02504	15.00	0.0	-72.75E-6	0.0	
34.000	-38.000	15.000	0.01915	15.00	0.0	-79.95E-6	0.0	
34.000	-36.000	15.000	0.01194	15.00	0.0	-87.95E-6	0.0	
34.000	-34.000	15.000	0.003258	15.00	0.0	-96.79E-6	0.0	
34.000	-32.000	15.000	-0.007018	15.00	0.0	-106.6E-6	0.0	
34.000	-30.000	15.000	-0.01990	15.00	0.0	-117.3E-6	0.0	
34.000	-28.000	15.000	-0.03276	15.00	0.0	-128.9E-6	0.0	
34.000	-26.000	15.000	-0.04831	15.00	0.0	-141.6E-6	0.0	
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34.000	-20.000	15.000	-0.1047	15.00	0.0	-184.2E-6	0.0	
34.000	-18.000	15.000	-0.1258	15.00	0.0	-199.2E-6	0.0	
34.000	-16.000	15.000	-0.1474	15.00	0.0	-214.2E-6	0.0	
34.000	-14.000	15.000	-0.1687	15.00	0.0	-228.7E-6	0.0	
34.000	-12.000	15.000	-0.1891	15.00	0.0	-242.2E-6	0.0	
34.000	-10.000	15.000	-0.2078	15.00	0.0	-254.5E-6	0.0	
34.000	-8.000	15.000	-0.2242	15.00	0.0	-265.0E-6	0.0	
34.000	-6.000	15.000	-0.2376	15.00	0.0	-273.5E-6	0.0	
34.000	-4.000	15.000	-0.2475	15.00	0.0	-279.8E-6	0.0	
34.000	-2.000	15.000	-0.2536	15.00	0.0	-283.6E-6	0.0	
34.000	0.000	15.000	-0.2557	15.00	0.0	-284.9E-6	0.0	
34.000	2.000	15.000	-0.2536	15.00	0.0	-283.6E-6	0.0	
34.000	4.000	15.000	-0.2475	15.00	0.0	-279.8E-6	0.0	
34.000	6.000	15.000	-0.2376	15.00	0.0	-273.5E-6	0.0	
34.000	8.000	15.000	-0.2242	15.00	0.0	-265.0E-6	0.0	
34.000	10.000	15.000	-0.2078	15.00	0.0	-254.5E-6	0.0	
34.000	12.000	15.000	-0.1891	15.00	0.0	-242.2E-6	0.0	
34.000	14.000	15.000	-0.1687	15.00	0.0	-228.7E-6	0.0	
34.000	16.000	15.000	-0.1474	15.00	0.0	-214.2E-6	0.0	
34.000	18.000	15.000	-0.1258	15.00	0.0	-199.2E-6	0.0	
34.000	20.000	15.000	-0.1047	15.00	0.0	-184.2E-6	0.0	
34.000	22.000	15.000	-0.08447	15.00	0.0	-169.4E-6	0.0	
34.000	24.000	15.000	-0.06560	15.00	0.0	-155.1E-6	0.0	
34.000	26.000	15.000	-0.04831	15.00	0.0	-141.6E-6	0.0	
34.000	28.000	15.000	-0.03276	15.00	0.0	-128.9E-6	0.0	
34.000	30.000	15.000	-0.01990	15.00	0.0	-117.3E-6	0.0	
34.000	32.000	15.000	-0.007018	15.00	0.0	-106.6E-6	0.0	
34.000	34.000	15.000	0.003258	15.00	0.0	-96.79E-6	0.0	
34.000	36.000	15.000	0.01194	15.00	0.0	-87.95E-6	0.0	
34.000	38.000	15.000	0.01915	15.00	0.0	-79.95E-6	0.0	
34.000	40.000	15.000	0.02504	15.00	0.0	-72.75E-6	0.0	
36.000	-38.000	15.000	0.02932	15.00	0.0	-67.00E-6	0.0	
36.000	-36.000	15.000	0.02474	15.00	0.0	-73.25E-6	0.0	
36.000	-34.000	15.000	0.01913	15.00	0.0	-80.11E-6	0.0	
36.000	-32.000	15.000	0.01237	15.00	0.0	-87.63E-6	0.0	
36.000	-30.000	15.000	0.004391	15.00	0.0	-95.84E-6	0.0	
36.000	-28.000	15.000	-0.004892	15.00	0.0	-104.7E-6	0.0	
36.000	-26.000	15.000	-0.01548	15.00	0.0	-114.3E-6	0.0	
36.000	-24.000	15.000	-0.02739	15.00	0.0	-124.6E-6	0.0	
36.000	-22.000	15.000	-0.04055	15.00	0.0	-135.4E-6	0.0	
36.000	-20.000	15.000	-0.05482	15.00	0.0	-146.7E-6	0.0	
36.000	-18.000	15.000	-0.06997	15.00	0.0	-158.3E-6	0.0	
36.000	-16.000	15.000	-0.08572	15.00	0.0	-170.0E-6	0.0	
36.000	-14.000	15.000	-0.1017	15.00	0.0	-181.6E-6	0.0	
36.000	-12.000	15.000	-0.1174	15.00	0.0	-192.7E-6	0.0	
36.000	-10.000	15.000	-0.1323	15.00	0.0	-203.9E-6	0.0	
36.000	-8.000	15.000	-0.1460	15.00	0.0	-212.3E-6	0.0	
36.000	-6.000	15.000	-0.1580	15.00	0.0	-220.3E-6	0.0	
36.000	-4.000	15.000	-0.1678	15.00	0.0	-226.7E-6	0.0	
36.000	-2.000	15.000	-0.1750	15.00	0.0	-231.5E-6	0.0	
36.000	0.000	15.000	-0.1795	15.00	0.0	-234.4E-6	0.0	
36.000	2.000	15.000	-0.1810	15.00	0.0	-235.4E-6	0.0	
36.000	4.000	15.000	-0.1795	15.00	0.0	-234.4E-6	0.0	



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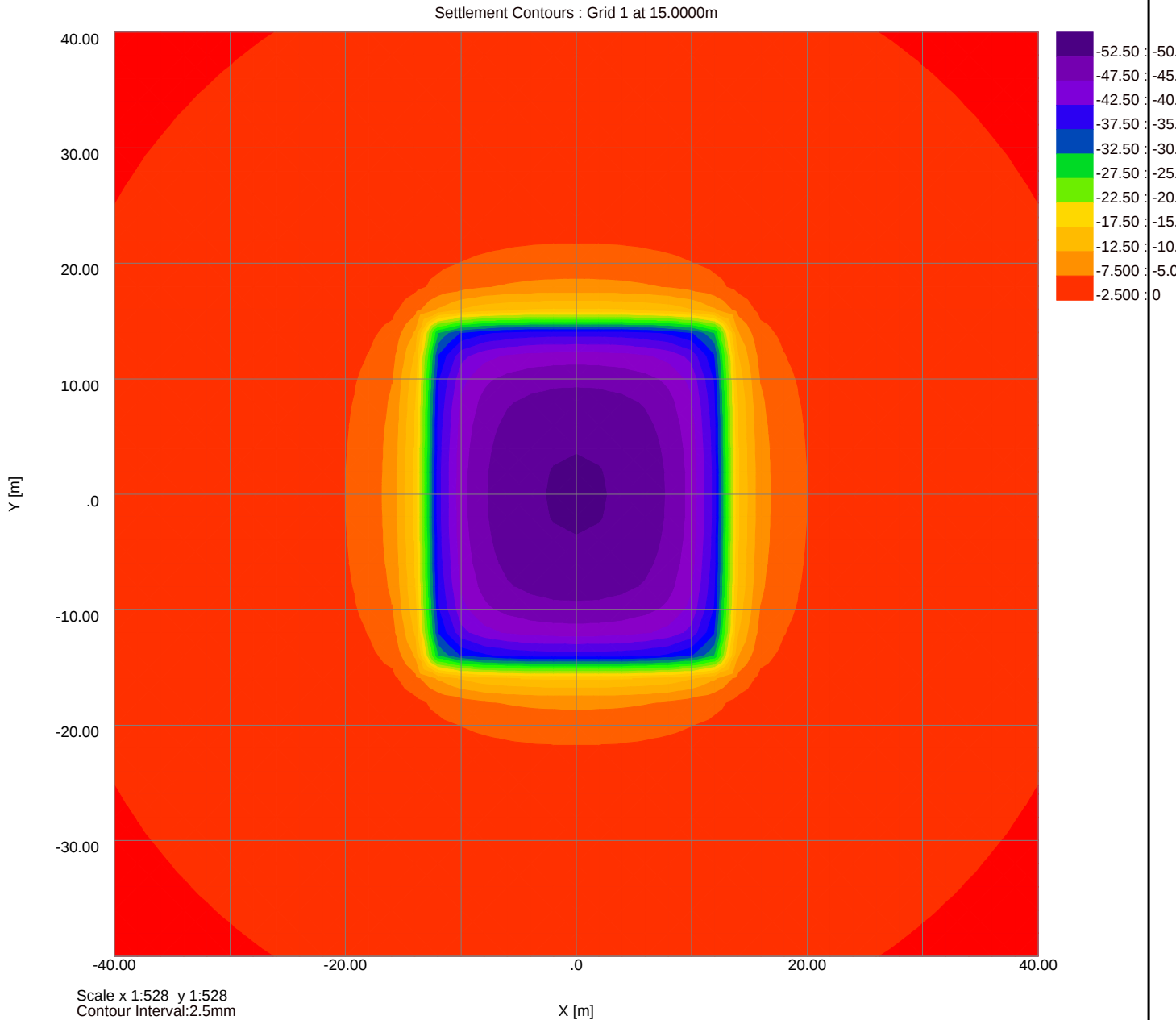
GEOTECHNICAL CONSULTING GROUP

Heave Calculation

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by BO	Date	Checked

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Vert Strain [-]
	38.000	2.000	15.000	-0.1231	15.00	0.0	-196.1E-6	0.0
	38.000	4.000	15.000	-0.1199	15.00	0.0	-193.9E-6	0.0
	38.000	6.000	15.000	-0.1146	15.00	0.0	-190.2E-6	0.0
	38.000	8.000	15.000	-0.1074	15.00	0.0	-185.3E-6	0.0
	38.000	10.000	15.000	-0.99070	15.00	0.0	-179.1E-6	0.0
	38.000	12.000	15.000	-0.98866	15.00	0.0	-171.9E-6	0.0
	38.000	14.000	15.000	-0.97767	15.00	0.0	-163.9E-6	0.0
	38.000	16.000	15.000	-0.96609	15.00	0.0	-155.3E-6	0.0
	38.000	18.000	15.000	-0.95427	15.00	0.0	-146.3E-6	0.0
	38.000	20.000	15.000	-0.94255	15.00	0.0	-137.1E-6	0.0
	38.000	22.000	15.000	-0.93121	15.00	0.0	-127.9E-6	0.0
	38.000	24.000	15.000	-0.92047	15.00	0.0	-118.9E-6	0.0
	38.000	26.000	15.000	-0.91052	15.00	0.0	-110.1E-6	0.0
	38.000	28.000	15.000	-0.901466	15.00	0.0	-101.7E-6	0.0
	38.000	30.000	15.000	0.906623	15.00	0.0	-93.78E-6	0.0
	38.000	32.000	15.000	0.91372	15.00	0.0	-86.35E-6	0.0
	38.000	34.000	15.000	0.91984	15.00	0.0	-79.43E-6	0.0
	38.000	36.000	15.000	0.92502	15.00	0.0	-73.03E-6	0.0
	38.000	38.000	15.000	0.92932	15.00	0.0	-67.13E-6	0.0
	40.000	40.000	15.000	0.93281	15.00	0.0	-61.72E-6	0.0
	40.000	-40.000	15.000	0.93558	15.00	0.0	-56.86E-6	0.0
	40.000	-38.000	15.000	0.93299	15.00	0.0	-61.56E-6	0.0
	40.000	-36.000	15.000	0.92977	15.00	0.0	-66.64E-6	0.0
	40.000	-34.000	15.000	0.92586	15.00	0.0	-72.11E-6	0.0
	40.000	-32.000	15.000	0.92124	15.00	0.0	-77.96E-6	0.0
	40.000	-30.000	15.000	0.91587	15.00	0.0	-84.19E-6	0.0
	40.000	-28.000	15.000	0.909765	15.00	0.0	-90.77E-6	0.0
	40.000	-26.000	15.000	0.902945	15.00	0.0	-97.67E-6	0.0
	40.000	-24.000	15.000	-0.904529	15.00	0.0	-104.8E-6	0.0
	40.000	-22.000	15.000	-0.91256	15.00	0.0	-112.1E-6	0.0
	40.000	-20.000	15.000	-0.92101	15.00	0.0	-119.5E-6	0.0
	40.000	-18.000	15.000	-0.92970	15.00	0.0	-126.8E-6	0.0
	40.000	-16.000	15.000	-0.93844	15.00	0.0	-134.0E-6	0.0
	40.000	-14.000	15.000	-0.94697	15.00	0.0	-140.7E-6	0.0
	40.000	-12.000	15.000	-0.95504	15.00	0.0	-147.0E-6	0.0
	40.000	-10.000	15.000	-0.96240	15.00	0.0	-152.6E-6	0.0
	40.000	-8.000	15.000	-0.96881	15.00	0.0	-157.4E-6	0.0
	40.000	-6.000	15.000	-0.97404	15.00	0.0	-161.2E-6	0.0
	40.000	-4.000	15.000	-0.97791	15.00	0.0	-164.1E-6	0.0
	40.000	-2.000	15.000	-0.98029	15.00	0.0	-165.8E-6	0.0
	40.000	0.000	15.000	-0.98109	15.00	0.0	-166.4E-6	0.0
	40.000	2.000	15.000	-0.98029	15.00	0.0	-165.8E-6	0.0
	40.000	4.000	15.000	-0.97791	15.00	0.0	-164.1E-6	0.0
	40.000	6.000	15.000	-0.97404	15.00	0.0	-161.2E-6	0.0
	40.000	8.000	15.000	-0.96881	15.00	0.0	-157.4E-6	0.0
	40.000	10.000	15.000	-0.96240	15.00	0.0	-152.6E-6	0.0
	40.000	12.000	15.000	-0.95504	15.00	0.0	-147.0E-6	0.0
	40.000	14.000	15.000	-0.94697	15.00	0.0	-140.7E-6	0.0
	40.000	16.000	15.000	-0.93844	15.00	0.0	-134.0E-6	0.0
	40.000	18.000	15.000	-0.92970	15.00	0.0	-126.8E-6	0.0
	40.000	20.000	15.000	-0.92101	15.00	0.0	-119.5E-6	0.0
	40.000	22.000	15.000	-0.91256	15.00	0.0	-112.1E-6	0.0
	40.000	24.000	15.000	-0.904529	15.00	0.0	-104.8E-6	0.0
	40.000	26.000	15.000	0.902945	15.00	0.0	-97.67E-6	0.0
	40.000	28.000	15.000	0.909765	15.00	0.0	-90.77E-6	0.0
	40.000	30.000	15.000	0.91587	15.00	0.0	-84.19E-6	0.0
	40.000	32.000	15.000	0.92124	15.00	0.0	-77.96E-6	0.0
	40.000	34.000	15.000	0.92586	15.00	0.0	-72.11E-6	0.0
	40.000	36.000	15.000	0.92977	15.00	0.0	-66.64E-6	0.0
	40.000	38.000	15.000	0.93299	15.00	0.0	-61.56E-6	0.0
	40.000	40.000	15.000	0.93558	15.00	0.0	-56.86E-6	0.0

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by	Date	Checked
BO		

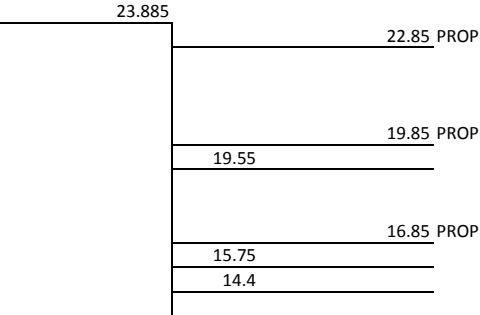


APPENDIX B

Design Calculations for Building Damage Assessment

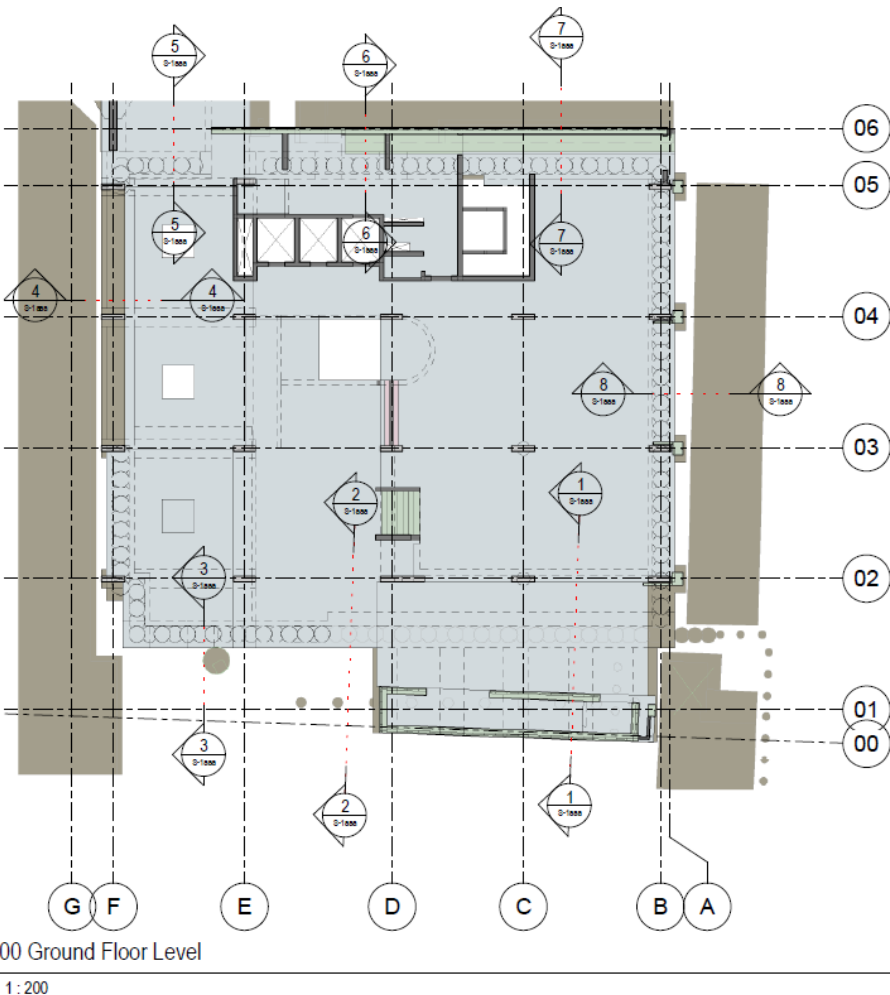
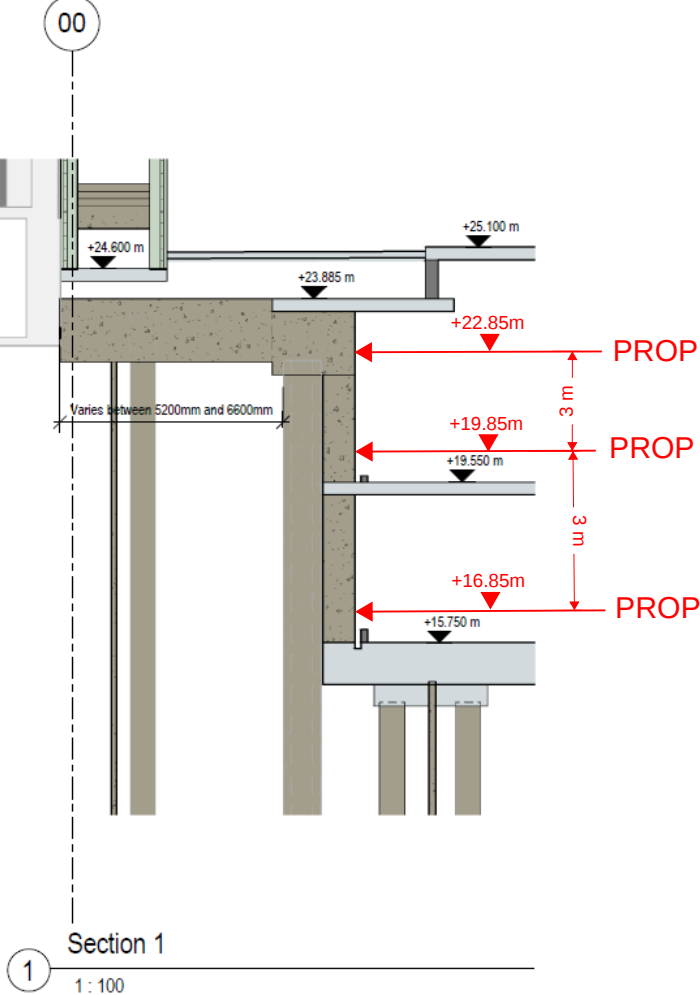
SECTION 1

Properties



SECANT PILING			
Excavation depth	=	9.485 m	
Pile Length	=	14.2275 m	= 1.5 x excavation depth
Pile diameter	=	880 mm	
EI	=	565600 kN.m ² /m	
h	=	3 m	= average depth between props

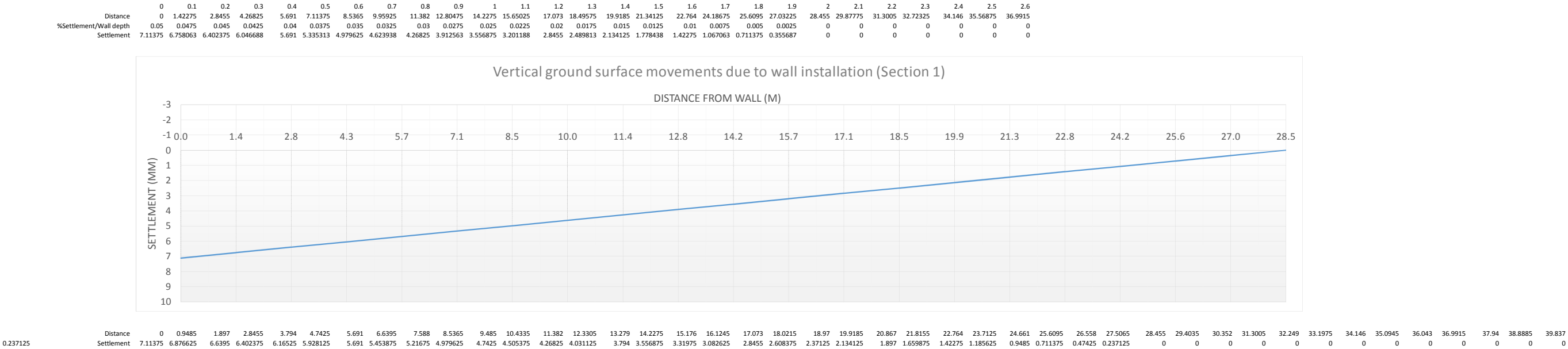
Damage Category 2 Wall



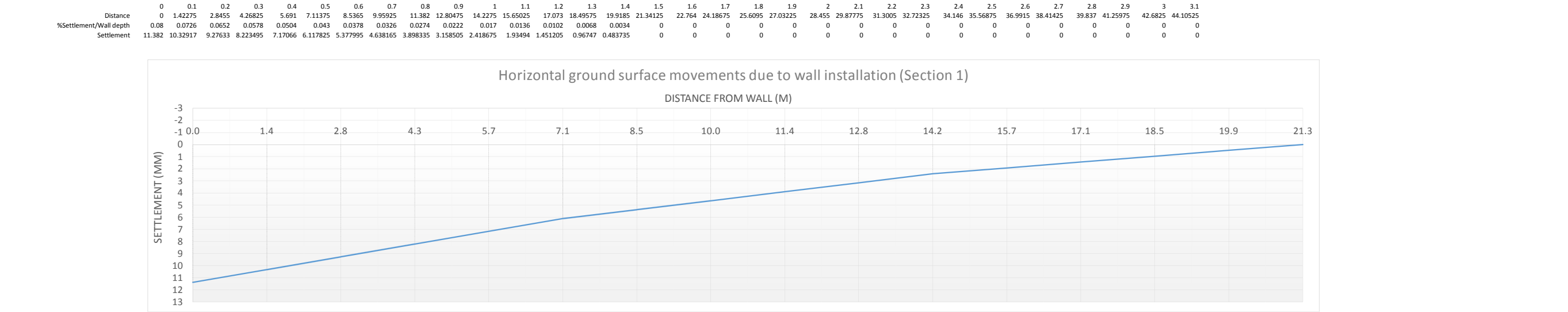
Settlement due to wall installation (SECTION 1)

Excavation depth	=	9.485 m
Pile Length	=	14.2275 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL



HORIZONTAL

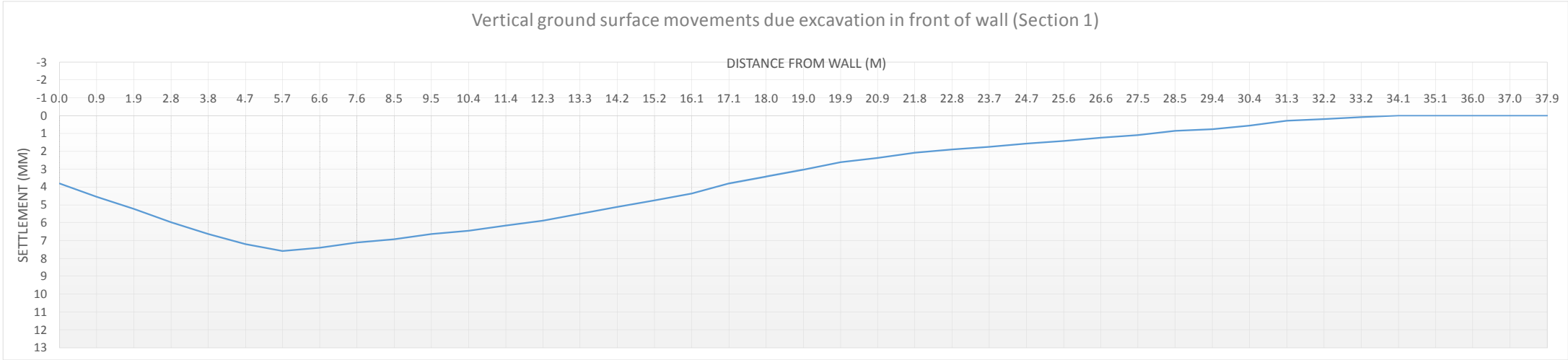


Settlement due to excavation in front of wall (SECTION 1)

Excavation depth	=	9.485 m
Pile Length	=	14.2275 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

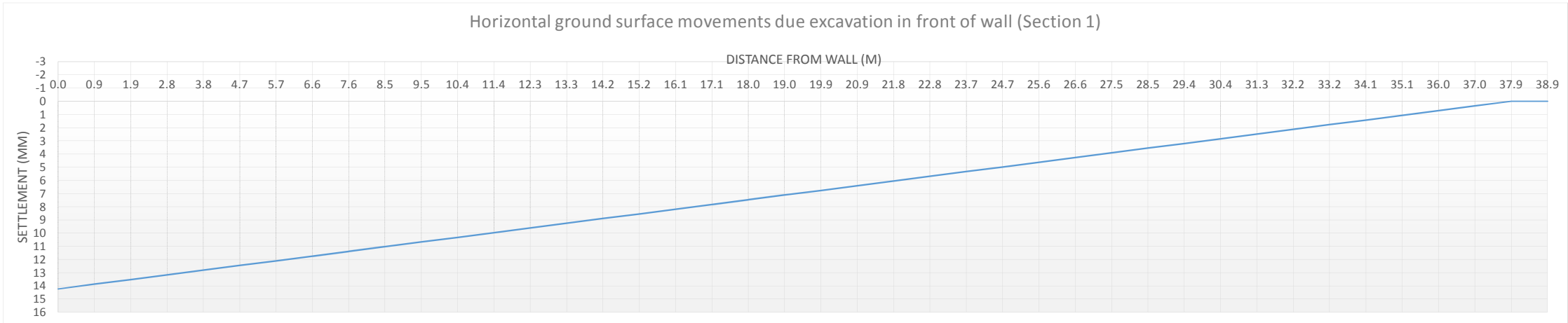
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	0.9485	1.897	2.8455	3.794	4.7425	5.691	6.6395	7.588	8.5365	9.485	10.4335	11.382	12.3305	13.279	14.2275	15.176	16.1245	17.073	18.0215	18.97	19.9185	20.867	21.8155	22.764	23.7125	24.661	25.6095	26.558	27.5065	28.455	29.4035	30.352	31.3005	32.249	33.1975	34.146	35.0945	36.043	36.9915	37.94	38.8885	39.837	40.7855	41.734
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	3.794	4.5528	5.21675	5.97555	6.6395	7.2086	7.588	7.3983	7.11375	6.92405	6.6395	6.4498	6.16525	5.8807	5.5013	5.1219	4.7425	4.3631	3.794	3.4146	3.0352	2.608375	2.37125	2.0867	1.897	1.754725	1.565025	1.42275	1.23305	1.090775	0.85365	0.7588	0.5691	0.28455	0.1897	0.09485	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	0.9485	1.897	2.8455	3.794	4.7425	5.691	6.6395	7.588	8.5365	9.485	10.4335	11.382	12.3305	13.279	14.2275	15.176	16.1245	17.073	18.0215	18.97	19.9185	20.867	21.8155	22.764	23.7125	24.661	25.6095	26.558	27.5065	28.455	29.4035	30.352	31.3005	32.249	33.1975	34.146	35.0945	36.043	36.9915	37.94	38.8885
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	14.2275	13.87181	13.51613	13.16044	12.80475	12.44906	12.09338	11.73769	11.382	11.02631	10.67063	10.31494	9.95925	9.603563	9.247875	8.892188	8.5365	8.180812	7.825125	7.469437	7.11375	6.758062	6.402375	6.046687	5.691	5.335312	4.979625	4.623937	4.26825	3.912562	3.556875	3.201187	2.8455	2.489812	2.134125	1.778437	1.42275	1.067062	0.711375	0.355687	0	0



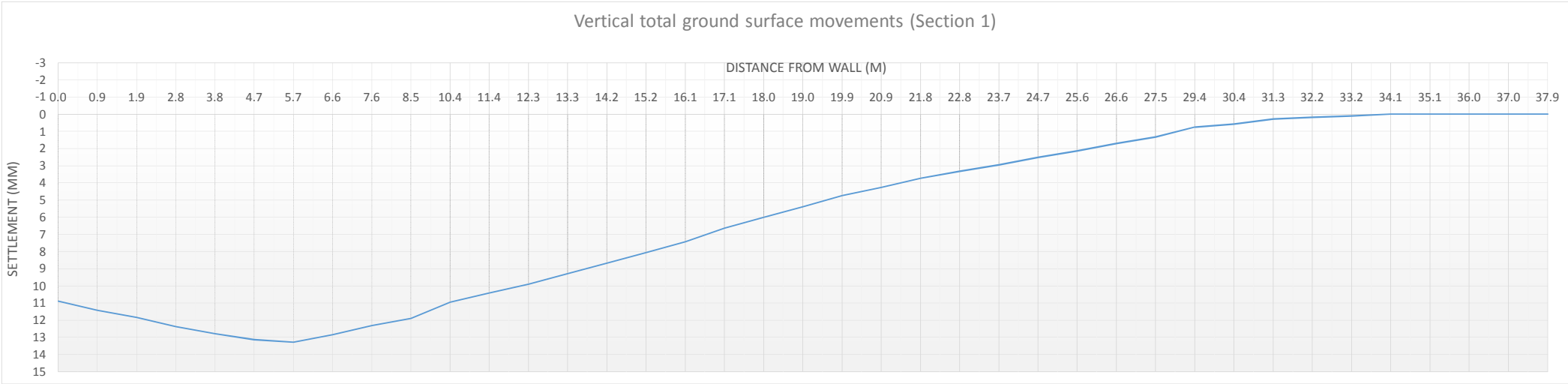
Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Settlement	14.2275	13.69397	13.16044	12.62691	12.09338	11.55984	11.02631	10.49278	9.95925	9.425719	8.892187	8.358656	7.825125	7.291594	6.758062	6.224531	5.691	5.157469	4.623937	4.090406	3.556875	3.023344	2.489812	1.956281	1.42275	0.889219	0.355687	0	39.837	41.25975	42.6825	44.10525

Settlement due to wall installation and deflection (SECTION 1)

Excavation depth = 9.485 m
Pile Length = 14.2275 m
Pile diameter = 880 mm
EI = 565600 kN.m²/m

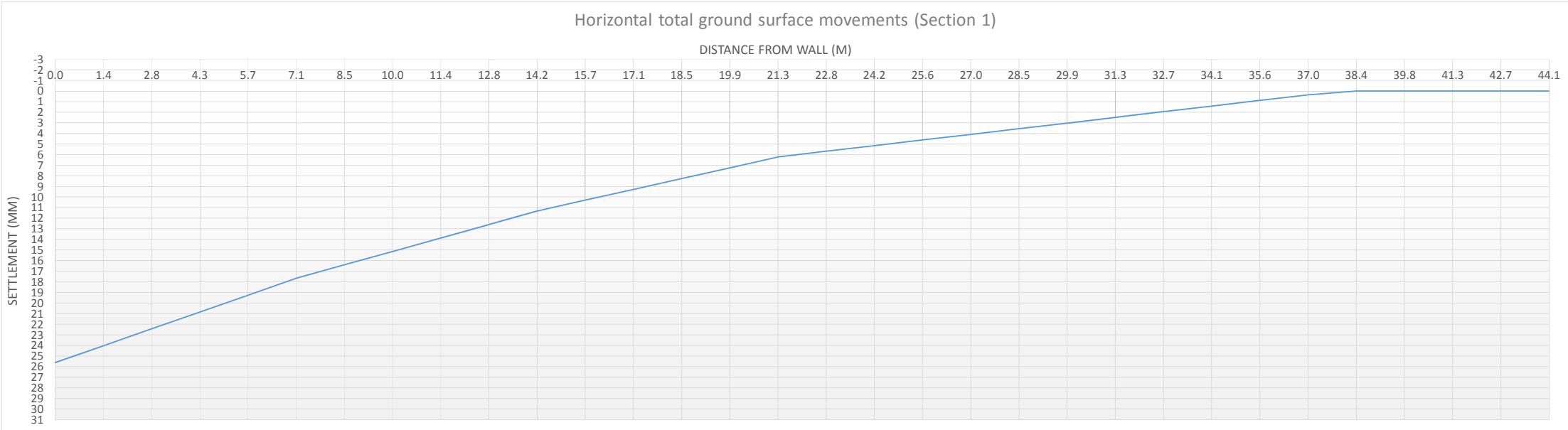
VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4
Distance	0	0.9485	1.897	2.8455	3.794	4.7425	5.691	6.6395	7.588	8.5365	9.485	10.4335	11.382	12.3305	13.279	14.2275	15.176	16.1245	17.073	18.0215	18.97	19.9185	20.867	21.8155	22.764	23.7125	24.661	25.6095	26.558	27.5065	28.455	29.4035	30.352	31.3005	32.249	33.1975	34.146	35.0945	36.043	36.9915	37.94
Settlement due to wall installation	7.11375	6.876625	6.6395	6.402375	6.16525	5.928125	5.691	5.453875	5.21675	4.979625	4.7425	4.505375	4.26825	4.031125	3.794	3.556875	3.31975	3.082625	2.8455	2.608375	2.37125	2.134125	1.897	1.659875	1.42275	1.185625	0.9485	0.711375	0.47425	0.237125	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	3.794	4.5528	5.21675	5.97555	6.6395	7.2086	7.588	7.3983	7.11375	6.92405	6.6395	6.4498	6.16525	5.8807	5.5013	5.1219	4.7425	4.3631	3.794	3.4146	3.0352	2.608375	2.37125	2.0867	1.897	1.754725	1.565025	1.42275	1.23305	1.090775	0.85365	0.7588	0.5691	0.28455	0.1897	0.09485	0	0	0	0	0
Total Settlement	10.90775	11.42943	11.85625	12.37793	12.80475	13.13673	13.279	12.85218	12.3305	11.90368	11.382	10.95518	10.4335	9.911825	9.2953	8.678775	8.06225	7.445725	6.6395	6.022975	5.40645	4.7425	4.26825	3.746575	3.31975	2.94035	2.513525	2.134125	1.7073	1.3279	0.85365	0.7588	0.5691	0.28455	0.1897	0.09485	0	0	0	0	0



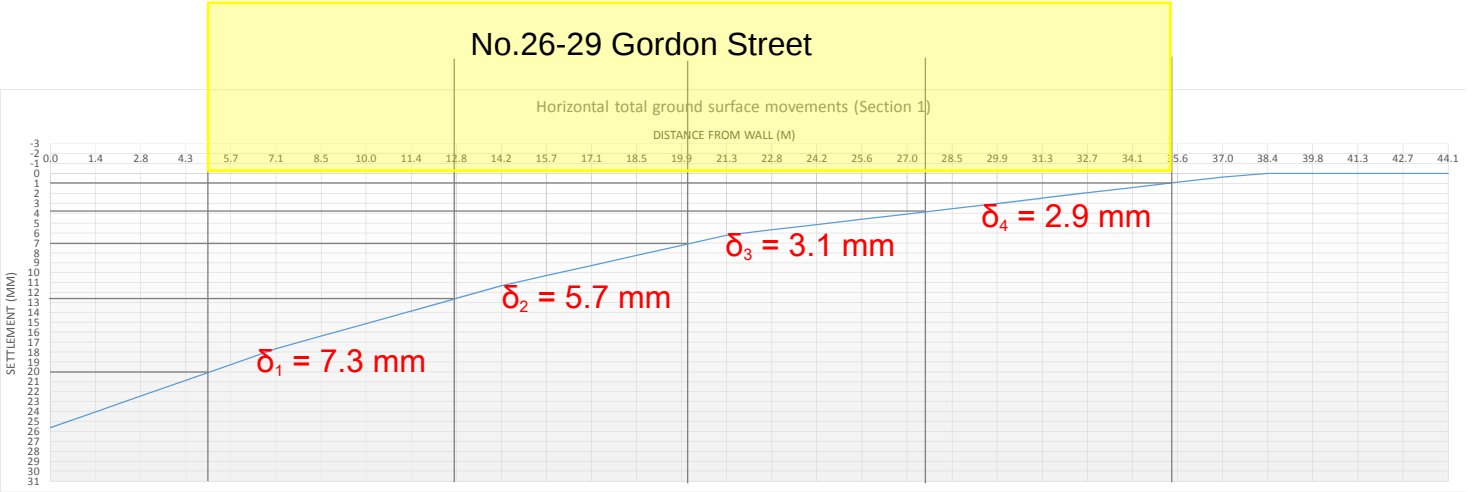
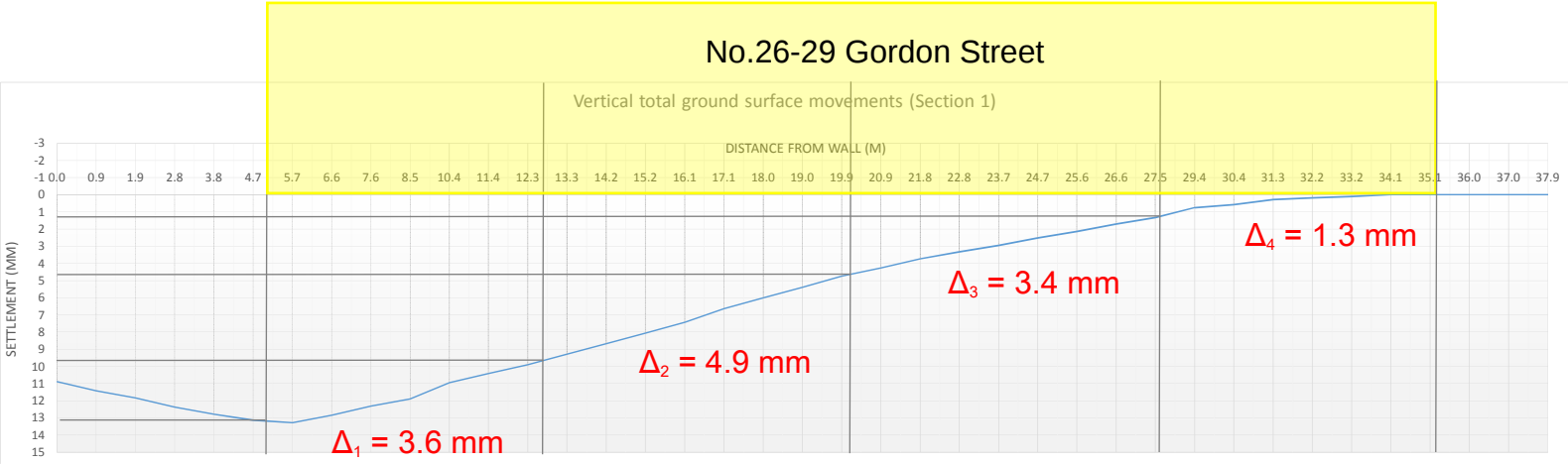
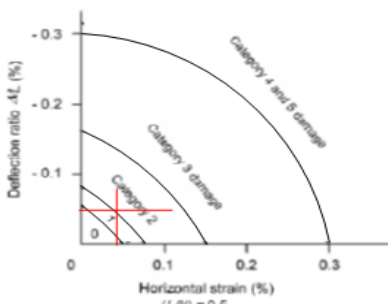
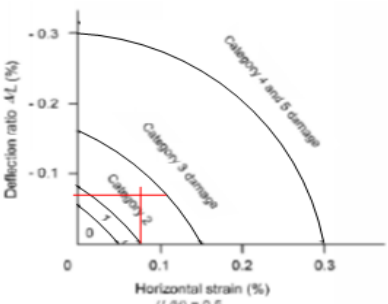
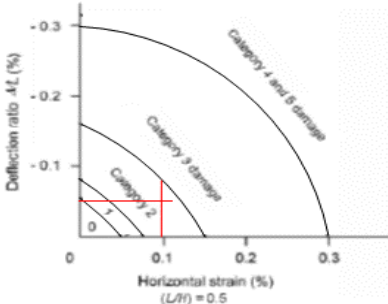
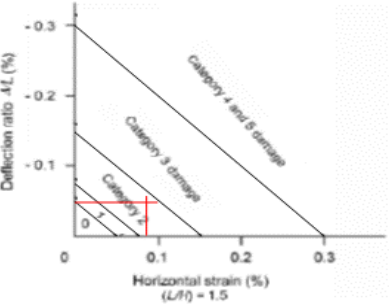
HORIZONTAL

	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Distance	0	1.42275	2.845	4.26825	5.691	7.11375	8.5365	9.95925	11.382	12.80475	14.2275	15.65025	17.073	18.49575	19.9185	21.34125	22.764	24.18675	25.6095	27.03225	28.455	29.87775	31.3005	32.72325	34.146	35.56875	36.9915	38.41425	39.837	41.25975	42.6825	44.10525
Settlement due to wall installation	11.382	10.32917	9.27633	8.223495	7.17066	6.117825	5.377995	4.638165	3.898335	3.158505	2.418675	1.93494	1.451205	0.96747	0.483735	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	14.2275	13.69397	13.16044	12.62691	12.09338	11.55984	11.02631	10.49278	9.95925	9.425719	8.892187	8.358656	7.825125	7.291594	6.758062	6.224531	5.691	5.157469	4.623937	4.090406	3.556875	3.023344	2.489812	1.956281	1.42275	0.889219	0.355687	0	0	0	0	0	0
Total Settlement	25.6095	24.02313	22.43677	20.8504	19.26404	17.67767	16.40431	15.13095	13.85759	12.58422	11.31086	10.2936	9.27633	8.259064	7.241797	6.224531	5.691	5.157469	4.623937	4.090406	3.556875	3.023344	2.489812	1.956281	1.42275	0.889219	0.355687	0	0	0	0	0	0

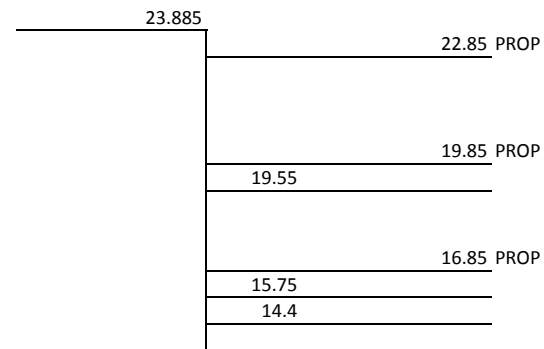


Category Assessment (SECTION 1)

L	=	30 m	L ₁	=	7.5 m	L ₂	=	7.5 m	L ₃	=	7.5 m	L ₄	=	7.5 m	L ₁₊₂	=	15 m	L ₁₊₂₊₃	=	22.5 m
H	=	20 m	H ₁	=	20 m	H ₂	=	20 m	H ₃	=	20 m	H ₄	=	20 m	H ₁₊₂	=	20 m	H ₁₊₂₊₃	=	20 m
Δ	=	0.013279 m	Δ ₁	=	0.0036 m	Δ ₂	=	0.0049 m	Δ ₃	=	0.0034 m	Δ ₄	=	0.0013 m	Δ ₁₊₂	=	0.0085 m	Δ ₁₊₂₊₃	=	0.0119 m
δ	=	0.02561 m	δ ₁	=	0.0073 m	δ ₂	=	0.0057 m	δ ₃	=	0.0031 m	δ ₄	=	0.0029 m	δ ₁₊₂	=	0.013 m	δ ₁₊₂₊₃	=	0.0161 m
L/H	=	1.5	L ₁ /H ₁	=	0.375	L ₂ /H ₂	=	0.375	L ₃ /H ₃	=	0.375	L ₄ /H ₄	=	0.375	L ₁₊₂ /H ₁₊₂	=	0.75	L ₁₊₂₊₃ /H ₁₊₂₊₃	=	1.125
Δ/L	=	0.044263 %	Δ ₁ /L ₁	=	0.048 %	Δ ₂ /L ₂	=	0.065333 %	Δ ₃ /L ₃	=	0.045333 %	Δ ₄ /L ₄	=	0.017333 %	Δ ₁₊₂ /L ₁₊₂	=	0.056667 %	Δ ₁₊₂₊₃ /L ₁₊₂₊₃	=	0.052889 %
δ/L	=	0.085365 %	δ ₁ /L ₁	=	0.097333 %	δ ₂ /L ₂	=	0.076 %	δ ₃ /L ₃	=	0.041333 %	δ ₄ /L ₄	=	0.038667 %	δ ₁₊₂ /L ₁₊₂	=	0.086667 %	δ ₁₊₂₊₃ /L ₁₊₂₊₃	=	0.071556 %
From CIRIA C580 Figure 2.18:			From CIRIA C580 Figure 2.18:			From CIRIA C580 Figure 2.18:			From CIRIA C580 Figure 2.18:			From CIRIA C580 Figure 2.18:			From CIRIA C580 Figure 2.18:			From CIRIA C580 Figure 2.18:		
CATEGORY 2			CATEGORY 2			CATEGORY 2			CATEGORY 2			CATEGORY 1			CATEGORY 2			CATEGORY 2		

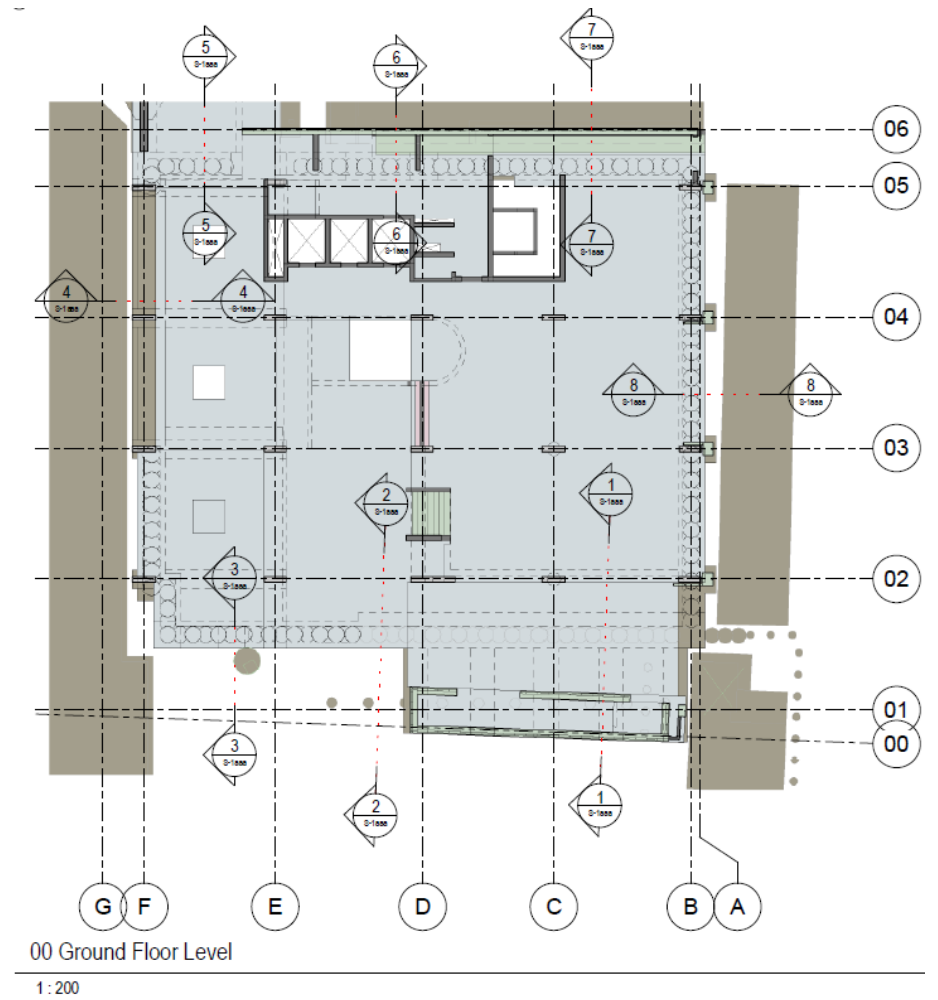
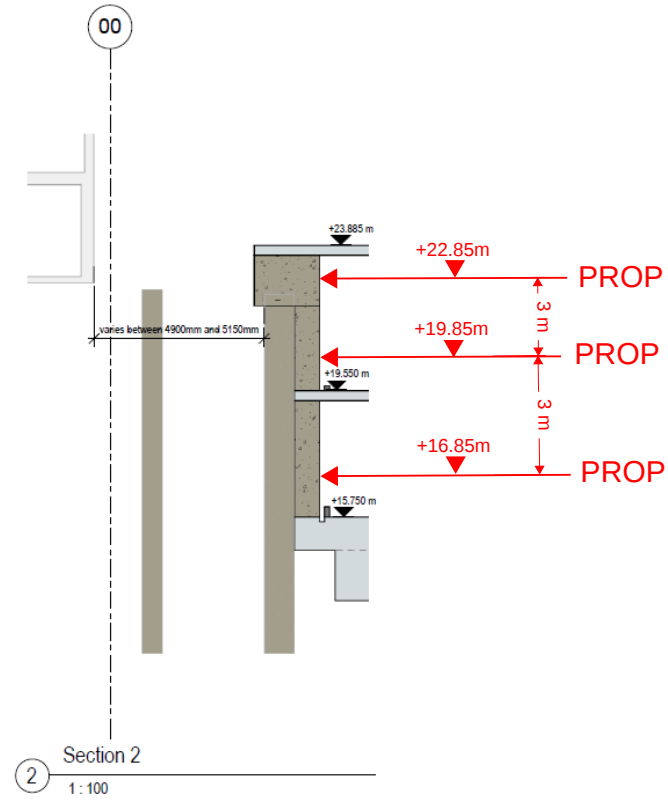


Properties



SECANT PILING			
Excavation depth	=	9.485 m	
Pile Length	=	14.2275 m	= 1.5 x excavation depth
Pile diameter	=	880 mm	
EI	=	565600 kN.m ² /m	
h	=	3 m	= average depth between props

Damage Category 2 Wall

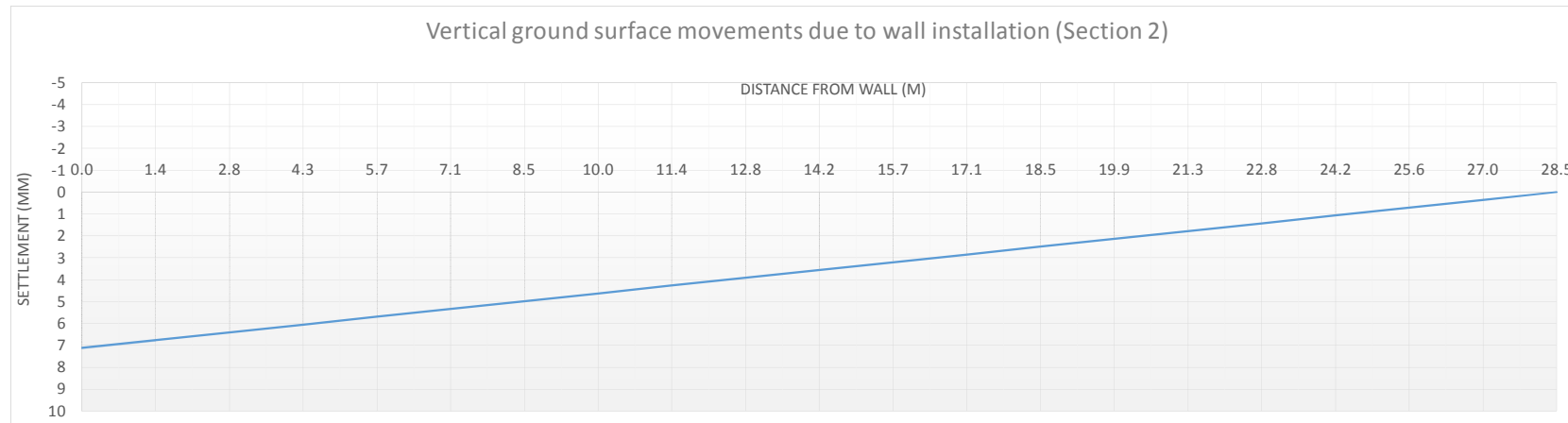


Settlement due to wall installation (SECTION 2)

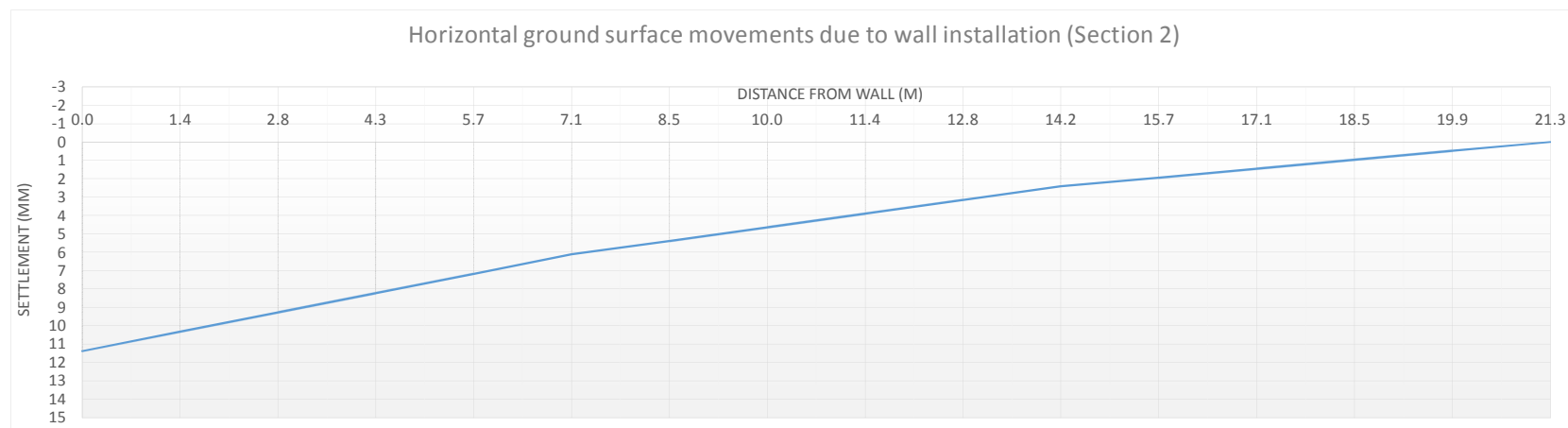
Excavation depth	=	9.485 m
Pile Length	=	14.2275 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6
Distance	0	1.42275	2.8455	4.26825	5.691	7.11375	8.5365	9.95925	11.382	12.80475	14.2275	15.65025	17.073	18.49575	19.9185	21.34125	22.764	24.18675	25.6095	27.03225	28.455	29.87775	31.3005	32.72325	34.146	35.56875	36.9915
%Settlement/Wall depth	0.05	0.0475	0.045	0.0425	0.04	0.0375	0.035	0.0325	0.03	0.0275	0.025	0.0225	0.02	0.0175	0.015	0.0125	0.01	0.0075	0.005	0.0025	0	0	0	0	0	0	0
Settlement	7.11375	6.758063	6.402375	6.046688	5.691	5.335313	4.979625	4.623938	4.26825	3.912563	3.556875	3.201188	2.8455	2.489813	2.134125	1.778438	1.42275	1.067063	0.711375	0.355688	0	0	0	0	0	0	0

[illegible]

HORIZONTAL

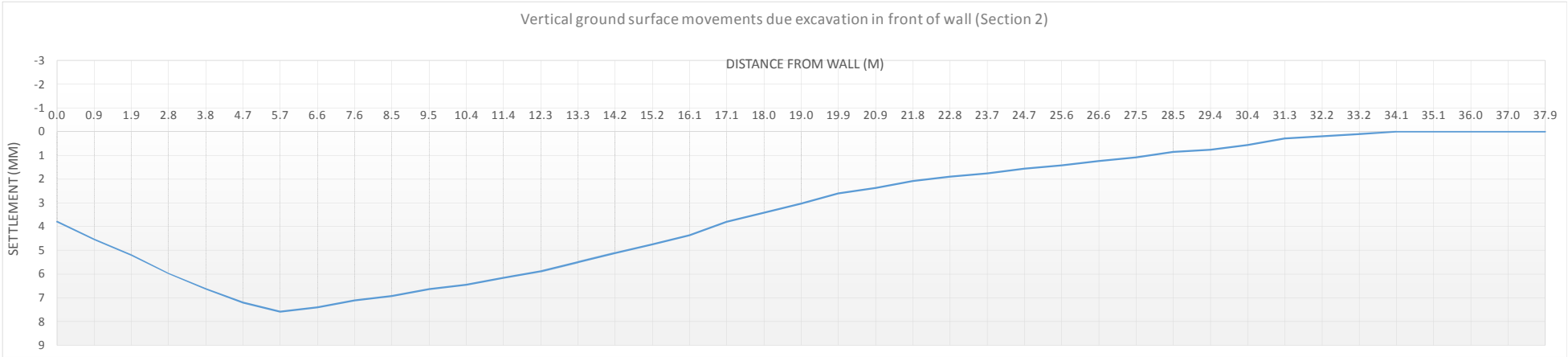
[illegible]

Settlement due to excavation in front of wall (SECTION 2)

Excavation depth	=	9.485 m
Pile Length	=	14.2275 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

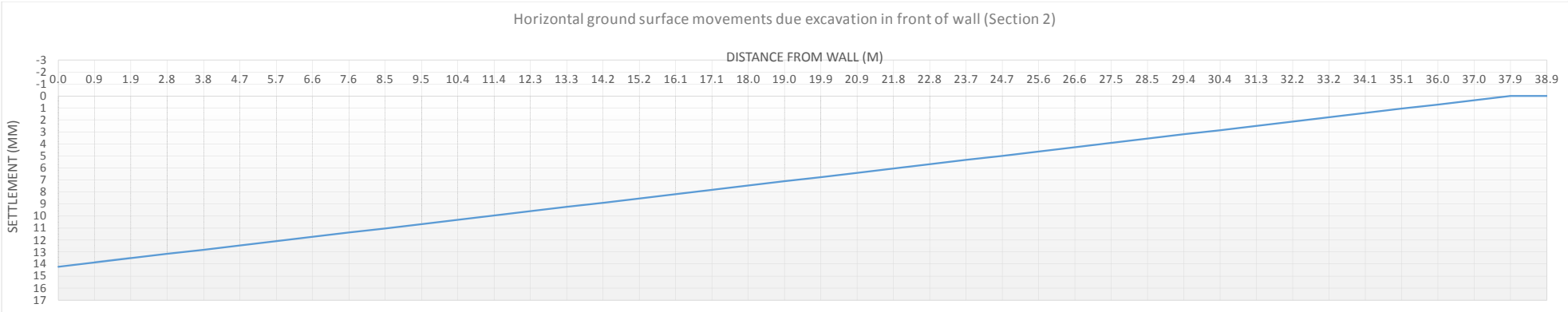
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	0.9485	1.897	2.8455	3.794	4.7425	5.691	6.6395	7.588	8.5365	9.485	10.4335	11.382	12.3305	13.279	14.2275	15.176	16.1245	17.073	18.0215	18.97	19.9185	20.867	21.8155	22.764	23.7125	24.661	25.6095	26.558	27.5065	28.455	29.4035	30.352	31.3005	32.249	33.1975	34.146	35.0945	36.043	36.9915	37.94	38.8885	39.837	40.7855	41.734
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	3.794	4.5528	5.21675	5.97555	6.6395	7.2086	7.588	7.3983	7.11375	6.92405	6.6395	6.4498	6.16525	5.8807	5.5013	5.1219	4.7425	4.3631	3.794	3.4146	3.0352	2.608375	2.37125	2.0867	1.897	1.754725	1.565025	1.42275	1.23305	1.090775	0.85365	0.7588	0.5691	0.28455	0.1897	0.09485	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	0.9485	1.897	2.8455	3.794	4.7425	5.691	6.6395	7.588	8.5365	9.485	10.4335	11.382	12.3305	13.279	14.2275	15.176	16.1245	17.073	18.0215	18.97	19.9185	20.867	21.8155	22.764	23.7125	24.661	25.6095	26.558	27.5065	28.455	29.4035	30.352	31.3005	32.249	33.1975	34.146	35.0945	36.043	36.9915	37.94	38.8885
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	14.2275	13.87181	13.51613	13.16044	12.80475	12.44906	12.09338	11.73769	11.382	11.02631	10.67063	10.31494	9.95925	9.603563	9.247875	8.892188	8.5365	8.180812	7.825125	7.469437	7.11375	6.758062	6.402375	6.046687	5.691	5.335312	4.979625	4.623937	4.26825	3.912562	3.556875	3.201187	2.8455	2.489812	2.134125	1.778437	1.42275	1.067062	0.711375	0.355687	0	0



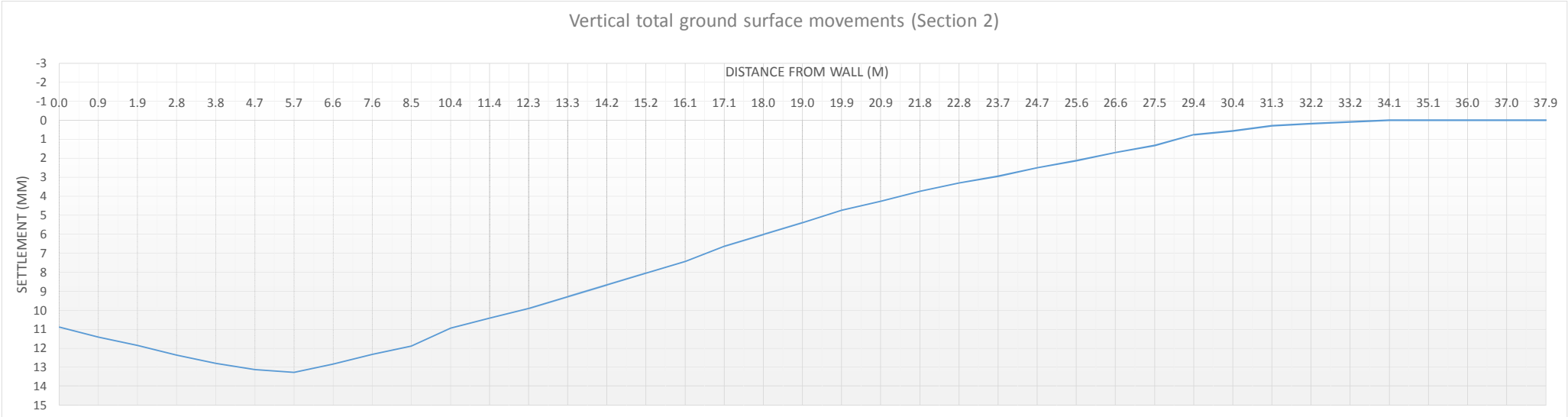
0.533531	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Settlement	14.2275	13.69397	13.16044	12.62691	12.09338	11.55984	11.02631	10.49278	9.95925	9.425719	8.892187	8.358656	7.825125	7.291594	6.758062	6.224531	5.691	5.157469	4.623937	4.090406	3.556875	3.023344	2.489812	1.956281	1.42275	0.889219	0.355687	0	39.837	41.25975	42.6825	44.10525

Settlement due to wall installation and deflection (SECTION 2)

Excavation depth = 9.485 m
Pile Length = 14.2275 m
Pile diameter = 880 mm
EI = 565600 kN.m²/m

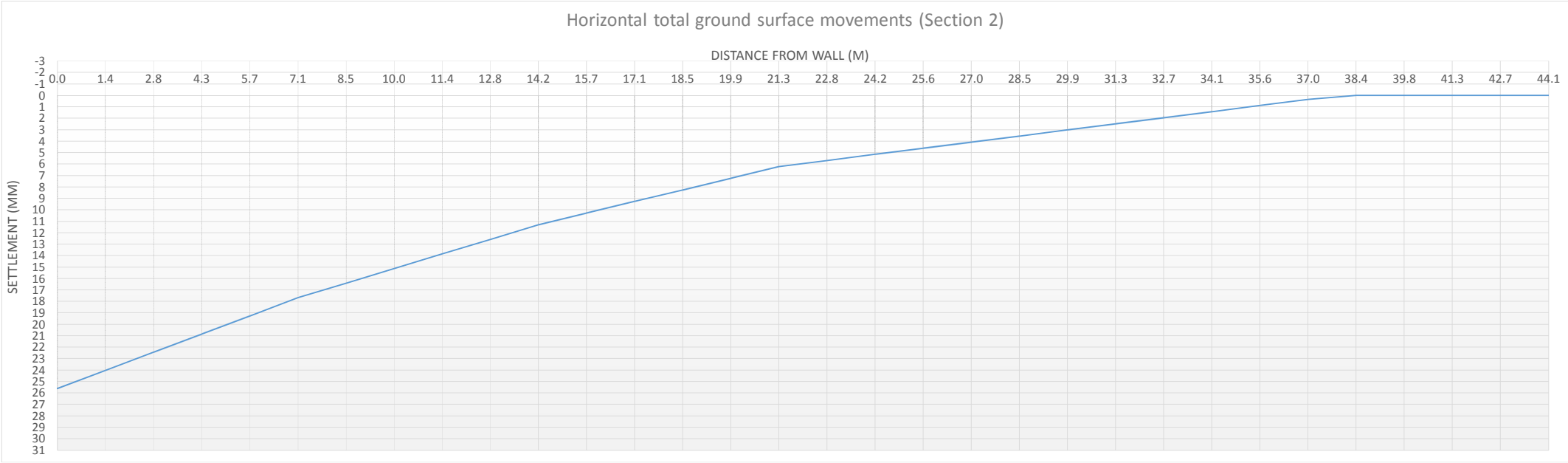
VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	
Distance	0	0.9485	1.897	2.8455	3.794	4.7425	5.691	6.6395	7.588	8.5365	9.485	10.4335	11.382	12.3305	13.279	14.2275	15.176	16.1245	17.073	18.0215	18.97	19.9185	20.867	21.8155	22.764	23.7125	24.661	25.6095	26.558	27.5065	28.455	29.4035	30.352	31.3005	32.249	33.1975	34.146	35.0945	36.043	36.9915	37.94	
Settlement due to wall installation	7.11375	6.876625	6.6395	6.402375	6.16525	5.928125	5.691	5.453875	5.21675	4.979625	4.7425	4.505375	4.26825	4.031125	3.794	3.556875	3.31975	3.082625	2.8455	2.608375	2.37125	2.134125	1.897	1.659875	1.42275	1.185625	0.9485	0.711375	0.47425	0.237125	0	0	0	0	0	0	0	0	0	0	0	
Settlement due to excavation in front of wall	3.794	4.5528	5.21675	5.97555	6.6395	7.2086	7.588	7.3983	7.11375	6.92405	6.6395	6.4498	6.16525	5.8807	5.5013	5.1219	4.7425	4.3631	3.794	3.4146	3.0352	2.608375	2.37125	2.0867	1.897	1.754725	1.565025	1.42275	1.23305	1.090775	0.85365	0.7588	0.5691	0.28455	0.1897	0.09485	0	0	0	0	0	0
Total Settlement	10.90775	11.42943	11.85625	12.37793	12.80475	13.13673	13.279	12.85218	12.3305	11.90368	11.382	10.95518	10.4335	9.911825	9.2953	8.678775	8.06225	7.445725	6.6395	6.022975	5.40645	4.7425	4.26825	3.746575	3.31975	2.94035	2.513525	2.134125	1.7073	1.3279	0.85365	0.7588	0.5691	0.28455	0.1897	0.09485	0	0	0	0	0	0



HORIZONTAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.42275	2.8455	4.26825	5.691	7.11375	8.5365	9.95925	11.382	12.80475	14.2275	15.65025	17.073	18.49575	19.9185	21.34125	22.764	24.18675	25.6095	27.03225	28.455	29.87775	31.3005	32.72325	34.146	35.56875	36.9915	38.41425	39.837	41.25975	42.6825	44.10525
Settlement due to wall installation	11.382	10.32917	9.27633	8.223495	7.17066	6.117825	5.377995	4.638165	3.898335	3.158505	2.418675	1.93494	1.451205	0.96747	0.483735	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	14.2275	13.69397	13.16044	12.62691	12.09338	11.55984	11.02631	10.49278	9.95925	9.425719	8.892187	8.358656	7.825125	7.291594	6.758062	6.224531	5.691	5.157469	4.623937	4.090406	3.556875	3.023344	2.489812	1.956281	1.42275	0.889219	0.355687	0	0	0	0	0
Total Settlement	25.6095	24.02313	22.43677	20.8504	19.26404	17.67767	16.40431	15.13095	13.85759	12.58422	11.31086	10.2936	9.27633	8.259064	7.241797	6.224531	5.691	5.157469	4.623937	4.090406	3.556875	3.023344	2.489812	1.956281	1.42275	0.889219	0.355687	0	0	0	0	0



Category Assessment (SECTION 2)

L	=	-	m	L ₁	=	5	m	L ₂	=	5	m	L ₃	=	5	m	L ₄	=	5	m
H	=	5	m	H ₁	=	5	m	H ₂	=	5	m	H ₃	=	5	m	H ₄	=	5	m
Δ	=	-	m	Δ ₁	=	0.0022	m	Δ ₂	=	0.0034	m	Δ ₃	=	0.0034	m	Δ ₄	=	0.0011	m
δ	=	-	m	δ ₁	=	0.0048	m	δ ₂	=	0.0039	m	δ ₃	=	0.0021	m	δ ₄	=	0.002	m
L/H	=	-		L ₁ /H ₁	=	1		L ₂ /H ₂	=	1		L ₃ /H ₃	=	1		L ₄ /H ₄	=	1	
Δ/L	=	-	%	Δ ₁ /L ₁	=	0.044	%	Δ ₂ /L ₂	=	0.068	%	Δ ₃ /L ₃	=	0.068	%	Δ ₄ /L ₄	=	0.022	%
δ/L	=	-	%	δ ₁ /L ₁	=	0.096	%	δ ₂ /L ₂	=	0.078	%	δ ₃ /L ₃	=	0.042	%	δ ₄ /L ₄	=	0.04	%

From CIRIA C580 Figure 2.18:

From CIRIA C580 Figure 2.18:

From CIRIA C580 Figure 2.18:

From CIRIA C580 Figure 2.18:

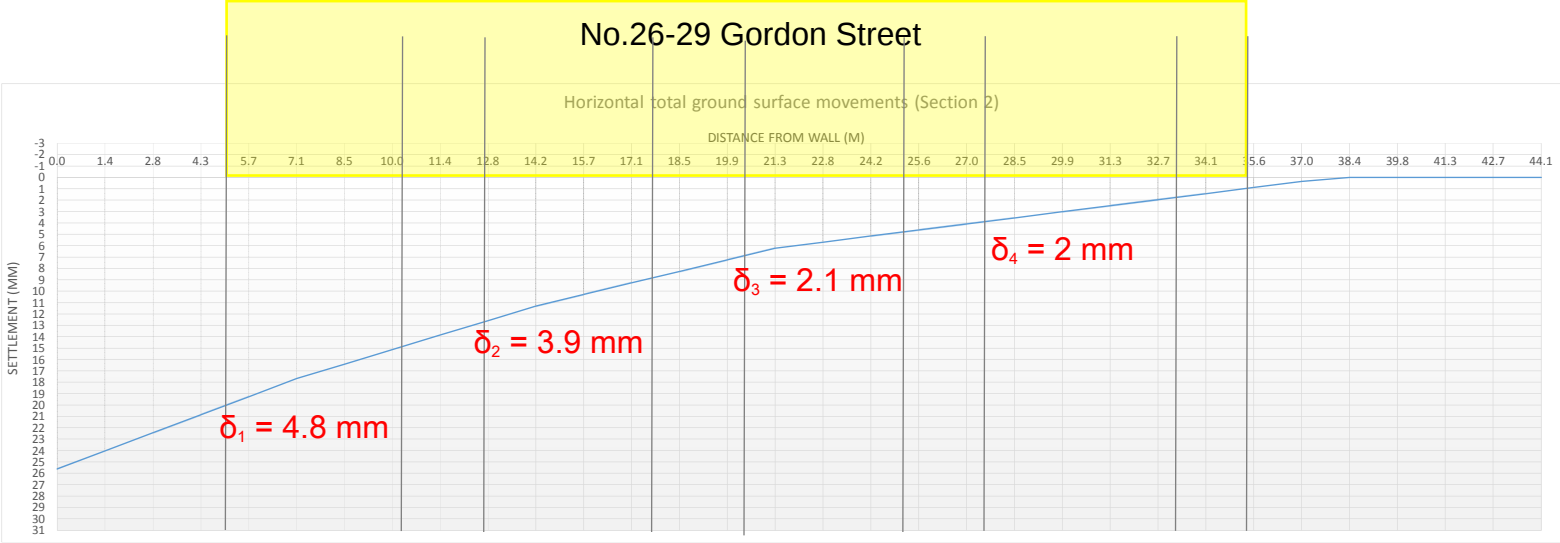
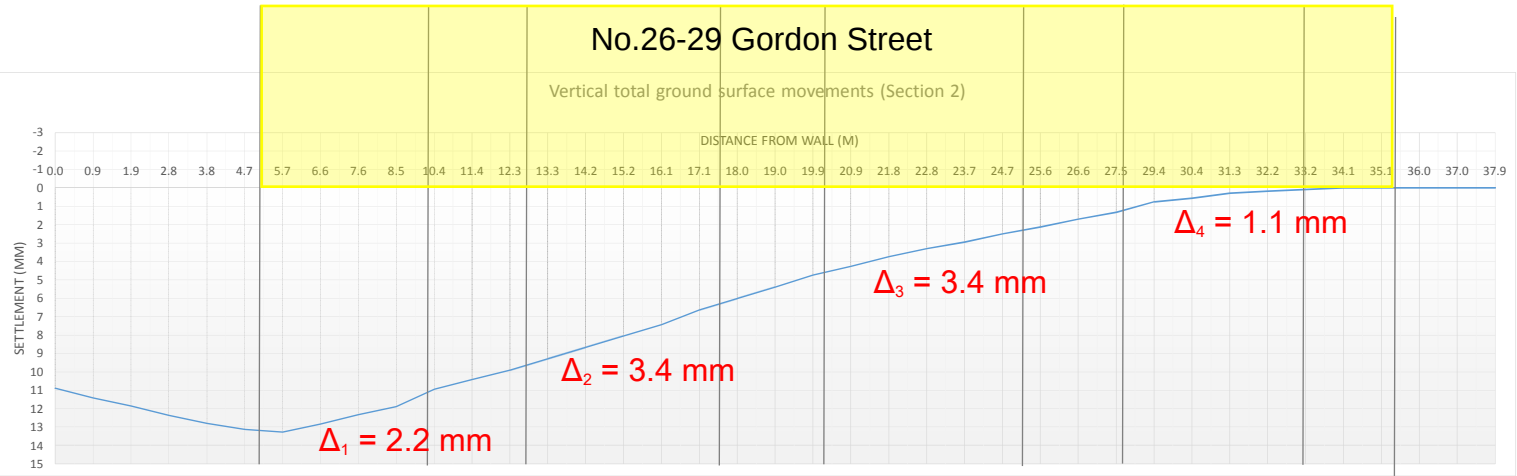
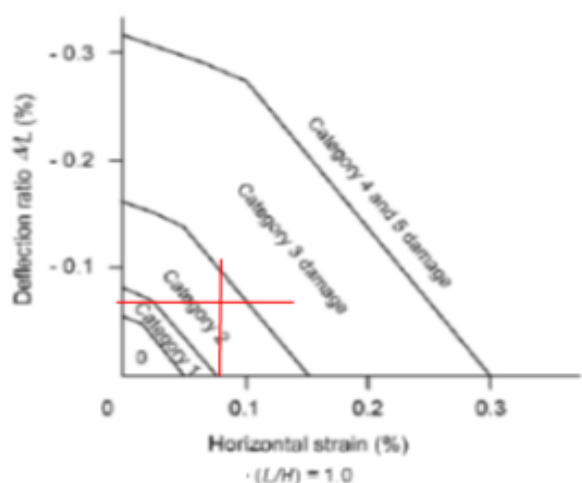
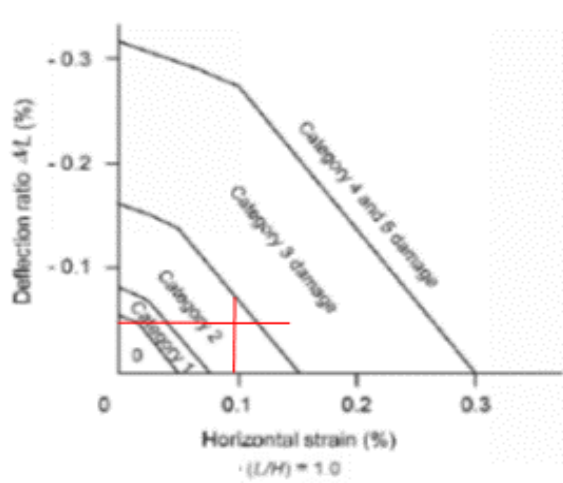
From CIRIA C580 Figure 2.18:

CATEGORY 2

CATEGORY 2

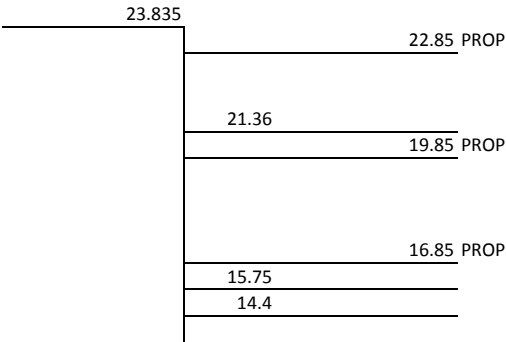
CATEGORY 2

CATEGORY 1



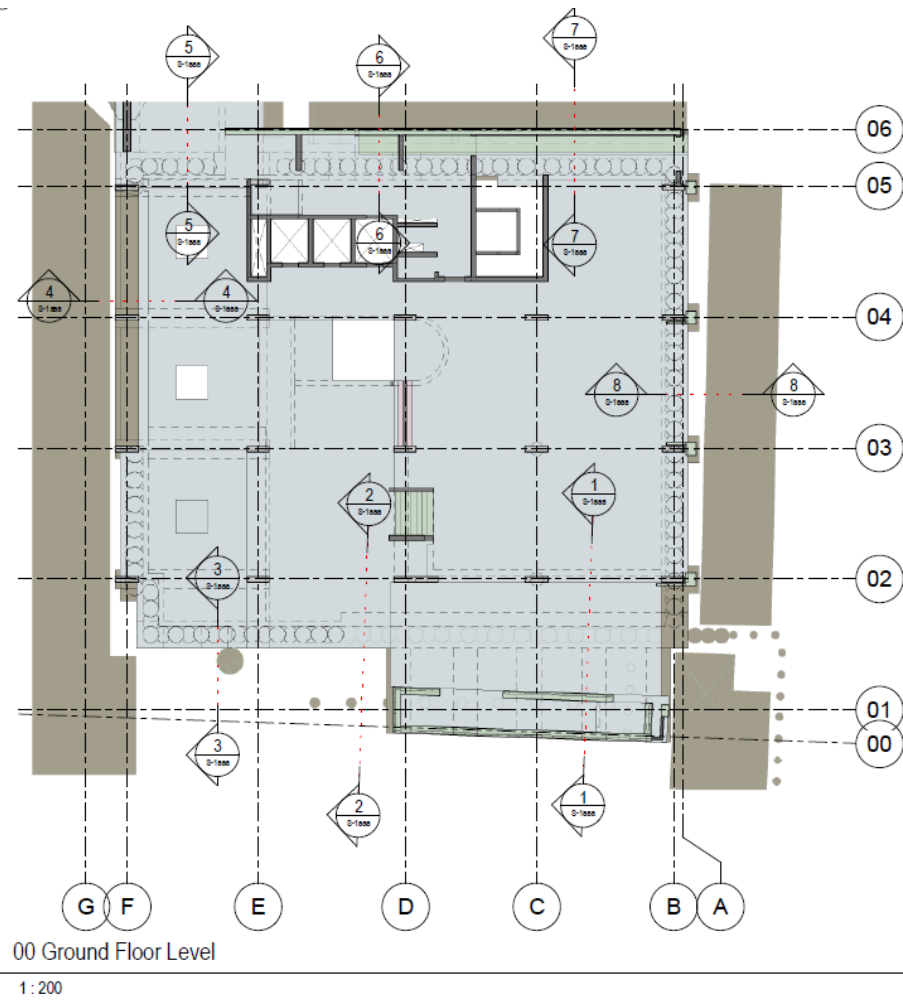
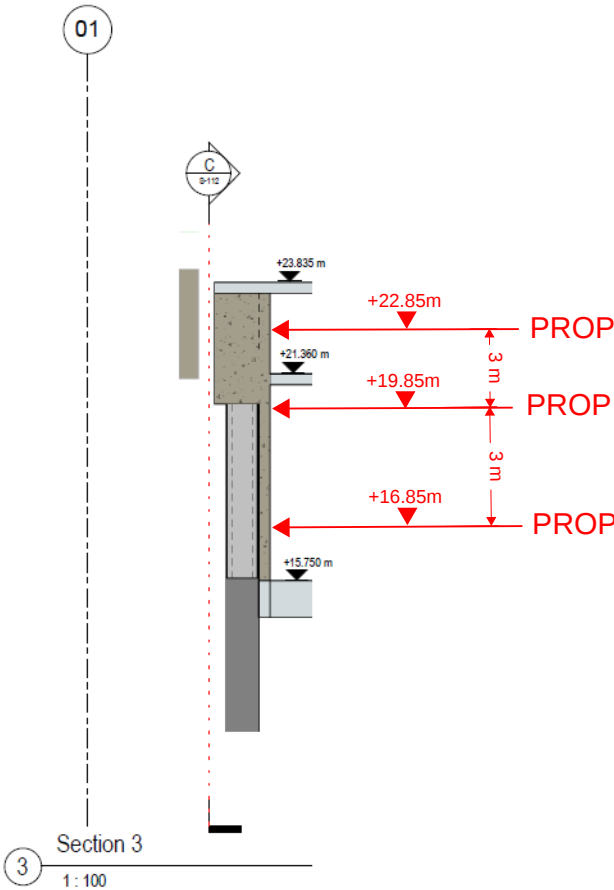
SECTION 3

Properties



SECANT PILING			
Excavation depth	=	9.435 m	
Pile Length	=	14.1525 m	= 1.5 x excavation depth
Pile diameter	=	880 mm	
EI	=	565600 kN.m ² /m	
h	=	3 m	= average depth between props

Damage Category 2 Wall

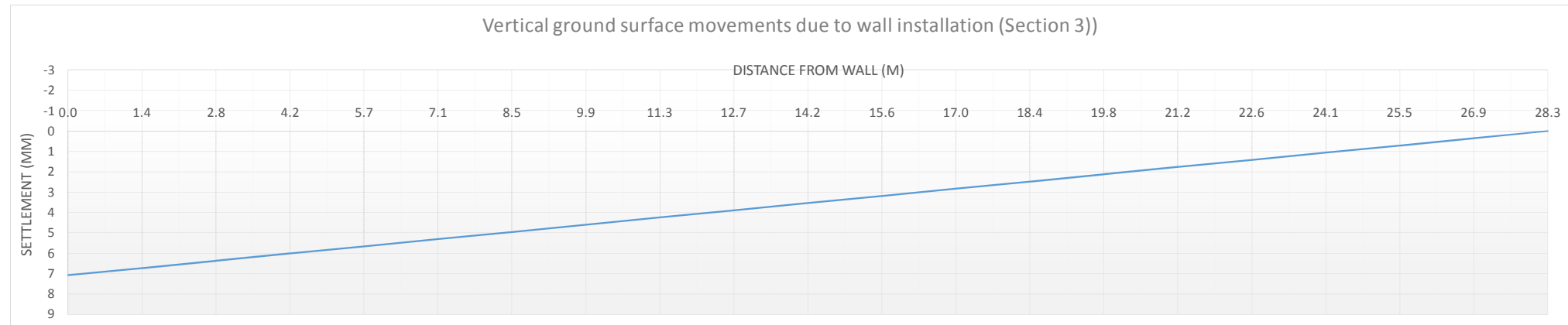


Settlement due to wall installation (SECTION 3)

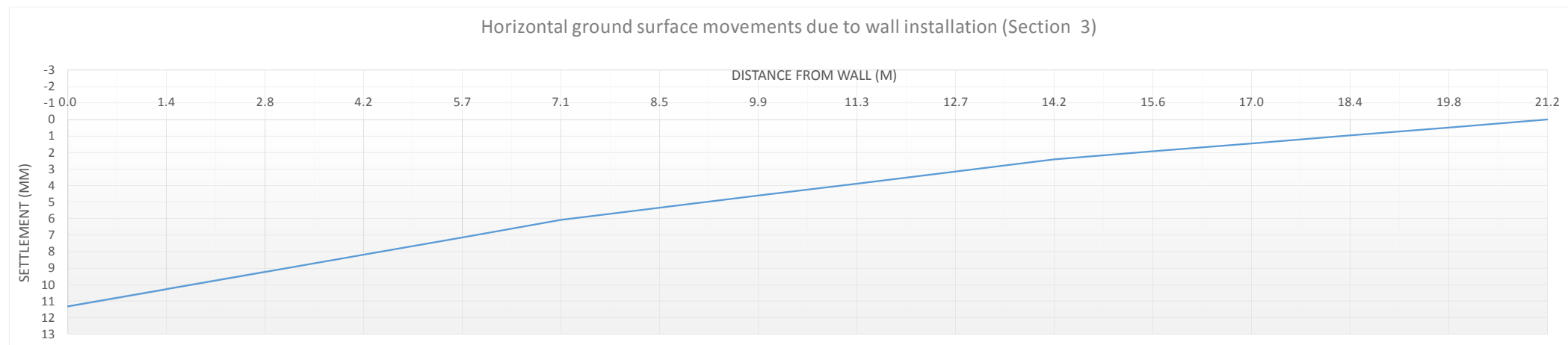
Excavation depth	=	9.435 m
Pile Length	=	14.1525 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6
Distance	0	1.41525	2.8305	4.24575	5.661	7.07625	8.4915	9.90675	11.322	12.73725	14.1525	15.56775	16.983	18.39825	19.8135	21.22875	22.644	24.05925	25.4745	26.88975	28.305	29.72025	31.1355	32.55075	33.966	35.38125	36.7965
%Settlement/Wall depth	0.05	0.0475	0.045	0.0425	0.04	0.0375	0.035	0.0325	0.03	0.0275	0.025	0.0225	0.02	0.0175	0.015	0.0125	0.01	0.0075	0.005	0.0025	0	0	0	0	0	0	0
Settlement	7.07625	6.722438	6.368625	6.014813	5.661	5.307188	4.953375	4.599563	4.24575	3.891938	3.538125	3.184313	2.8305	2.476688	2.122875	1.769063	1.41525	1.061438	0.707625	0.353812	0	0	0	0	0	0	0

[illegible]

HORIZONTAL

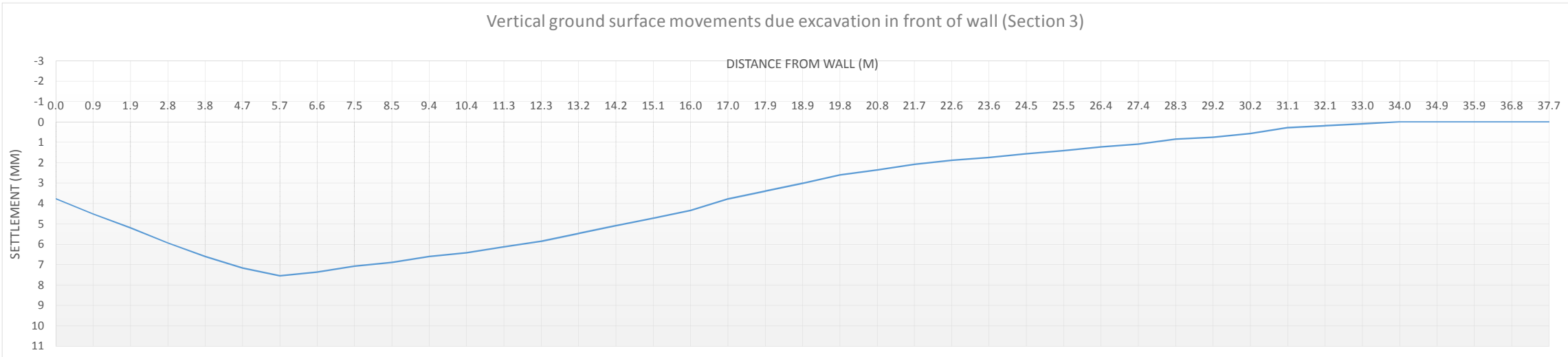
[illegible]

Settlement due to excavation in front of wall (SECTION 3)

Excavation depth	=	9.435 m
Pile Length	=	14.1525 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

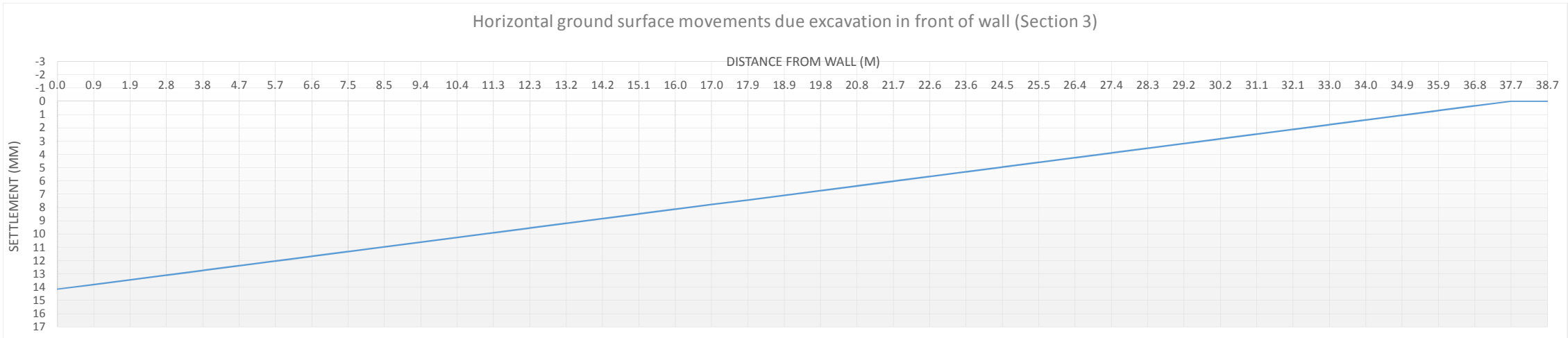
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	0.9435	1.887	2.8305	3.774	4.7175	5.661	6.6045	7.548	8.4915	9.435	10.3785	11.322	12.2655	13.209	14.1525	15.096	16.0395	16.983	17.9265	18.87	19.8135	20.757	21.7005	22.644	23.5875	24.531	25.4745	26.418	27.3615	28.305	29.2485	30.192	31.1355	32.079	33.0225	33.966	34.9095	35.853	36.7965	37.74	38.6835	39.627	40.5705	41.514
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	3.774	4.5288	5.18925	5.94405	6.6045	7.1706	7.548	7.3593	7.07625	6.88755	6.6045	6.4158	6.13275	5.8497	5.4723	5.0949	4.7175	4.3401	3.774	3.3966	3.0192	2.594625	2.35875	2.0757	1.887	1.745475	1.556775	1.41525	1.22655	1.085025	0.84915	0.7548	0.5661	0.28305	0.1887	0.09435	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	0.9435	1.887	2.8305	3.774	4.7175	5.661	6.6045	7.548	8.4915	9.435	10.3785	11.322	12.2655	13.209	14.1525	15.096	16.0395	16.983	17.9265	18.87	19.8135	20.757	21.7005	22.644	23.5875	24.531	25.4745	26.418	27.3615	28.305	29.2485	30.192	31.1355	32.079	33.0225	33.966	34.9095	35.853	36.7965	37.74	38.6835
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	14.1525	13.79869	13.44488	13.09106	12.73725	12.38344	12.02963	11.67581	11.322	10.96819	10.61438	10.26056	9.90675	9.552938	9.199125	8.845313	8.4915	8.137687	7.783875	7.430062	7.07625	6.722437	6.368625	6.014812	5.661	5.307187	4.953375	4.599562	4.24575	3.891937	3.538125	3.184312	2.8305	2.476687	2.122875	1.769062	1.41525	1.061437	0.707625	0.353812	0	0



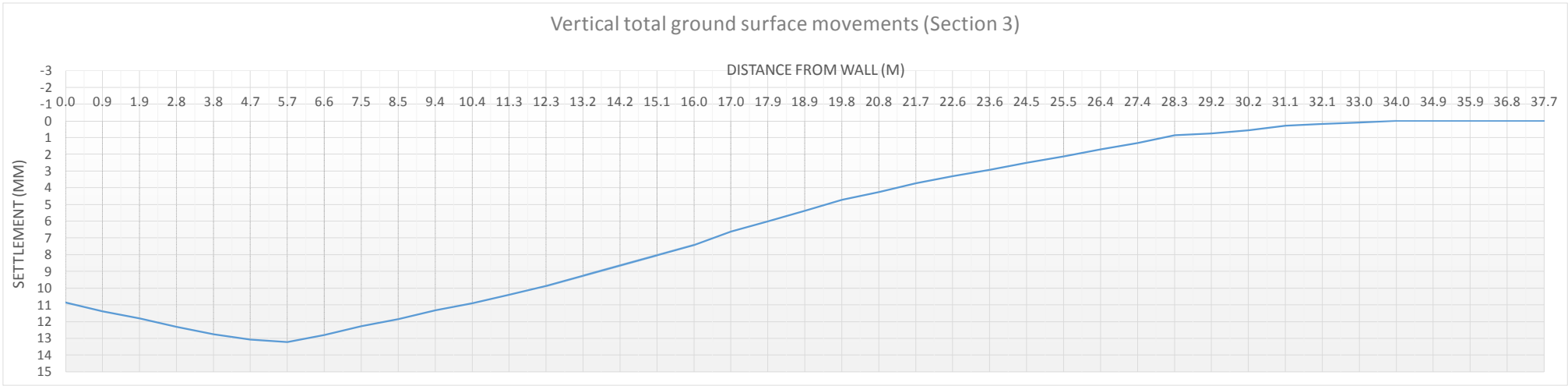
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.41525	2.8305	4.24575	5.661	7.07625	8.4915	9.90675	11.322	12.73725	14.1525	15.56775	16.983	18.39825	19.8135	21.22875	22.644	24.05925	25.4745	26.88975	28.305	29.72025	31.1355	32.55075	33.966	35.38125	36.7965	38.21175	39.627	41.04225	42.4575	43.87275
Settlement	14.1525	13.62178	13.09106	12.56034	12.02963	11.49891	10.96819	10.43747	9.90675	9.376031	8.845312	8.314594	7.783875	7.253156	6.722437	6.191719	5.661	5.130281	4.599562	4.068844	3.538125	3.007406	2.476687	1.945969	1.41525	0.884531	0.353812	0	0	0	0	0

Settlement due to wall installation and deflection (SECTION 3)

Excavation depth = 9.435 m
Pile Length = 14.1525 m
Pile diameter = 880 mm
EI = 565600 kN.m²/m

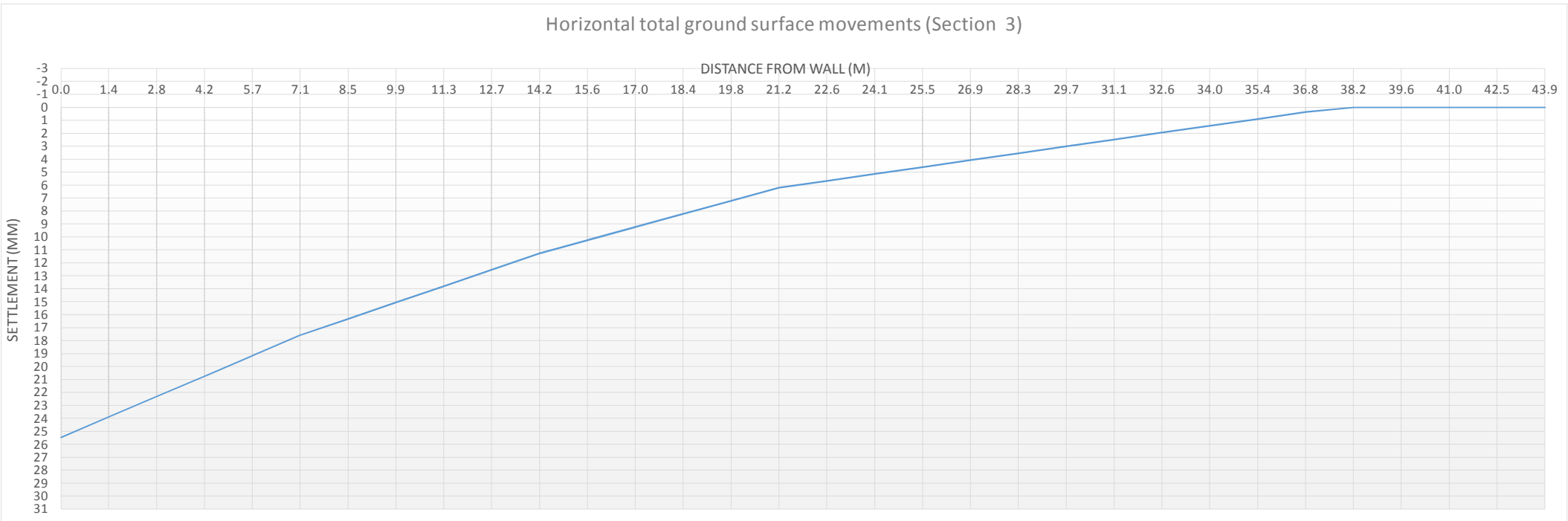
VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4		
Distance	0	0.9435	1.887	2.8305	3.774	4.7175	5.661	6.6045	7.548	8.4915	9.435	10.3785	11.322	12.2655	13.209	14.1525	15.096	16.0395	16.983	17.9265	18.87	19.8135	20.757	21.7005	22.644	23.5875	24.531	25.4745	26.418	27.3615	28.305	29.2485	30.192	31.1355	32.079	33.0225	33.966	34.9095	35.853	36.7965	37.74		
Settlement due to wall installation	7.07625	6.840375	6.6045	6.368625	6.13275	5.896875	5.661	5.425125	5.18925	4.953375	4.7175	4.481625	4.24575	4.009875	3.774	3.538125	3.30225	3.066375	2.8305	2.594625	2.35875	2.122875	1.887	1.651125	1.41525	1.179375	0.9435	0.707625	0.47175	0.235875	0	0	0	0	0	0	0	0	0	0	0	0	
Settlement due to excavation in front of wall	3.774	4.5288	5.18925	5.94405	6.6045	7.1706	7.548	7.3593	7.07625	6.88755	6.6045	6.4158	6.13275	5.8497	5.4723	5.0949	4.7175	4.3401	3.774	3.3966	3.0192	2.594625	2.35875	2.0757	1.887	1.745475	1.556775	1.41525	1.22655	1.085025	0.84915	0.7548	0.5661	0.28305	0.1887	0.09435	0	0	0	0	0	0	0
Total Settlement	10.85025	11.36918	11.79375	12.31268	12.73725	13.06748	13.209	12.78443	12.2655	11.84093	11.322	10.89743	10.3785	9.859575	9.2463	8.633025	8.01975	7.406475	6.6045	5.991225	5.37795	4.7175	4.24575	3.726825	3.30225	2.92485	2.500275	2.122875	1.6983	1.3209	0.84915	0.7548	0.5661	0.28305	0.1887	0.09435	0	0	0	0	0	0	



HORIZONTAL

Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.41525	2.8305	4.24575	5.661	7.07625	8.4915	9.90675	11.322	12.73725	14.1525	15.56775	16.983	18.39825	19.8135	21.22875	22.644	24.05925	25.4745	26.88975	28.305	29.72025	31.1355	32.55075	33.966	35.38125	36.7965	38.21175	39.627	41.04225	42.4575	43.87275
Settlement due to wall installation	11.322	10.27472	9.22743	8.180145	7.13286	6.085575	5.349645	4.613715	3.877785	3.141855	2.405925	1.92474	1.443555	0.96237	0.481185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	14.1525	13.62178	13.09106	12.56034	12.02963	11.49891	10.96819	10.43747	9.90675	9.376031	8.845312	8.314594	7.783875	7.253156	6.722437	6.191719	5.661	5.130281	4.599562	4.068844	3.538125	3.007406	2.476687	1.945969	1.41525	0.884531	0.353812	0	0	0	0	0
Total Settlement	25.4745	23.8965	22.31849	20.74049	19.16249	17.58448	16.31783	15.05118	13.78454	12.51789	11.25124	10.23933	9.22743	8.215526	7.203622	6.191719	5.661	5.130281	4.599562	4.068844	3.538125	3.007406	2.476687	1.945969	1.41525	0.884531	0.353812	0	0	0	0	0



Category Assessment (SECTION 3)

NO BUILDING

L	=	0	m
H	=	0	m

Δ	=	0.013209	m
δ	=	0.025475	m

L/H	=	-
-----	---	---

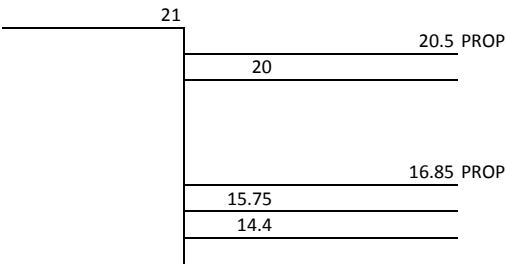
δ/L	=	-	%
Δ/L	=	-	%

From CIRIA C580 Figure 2.18:

CATEGORY 0

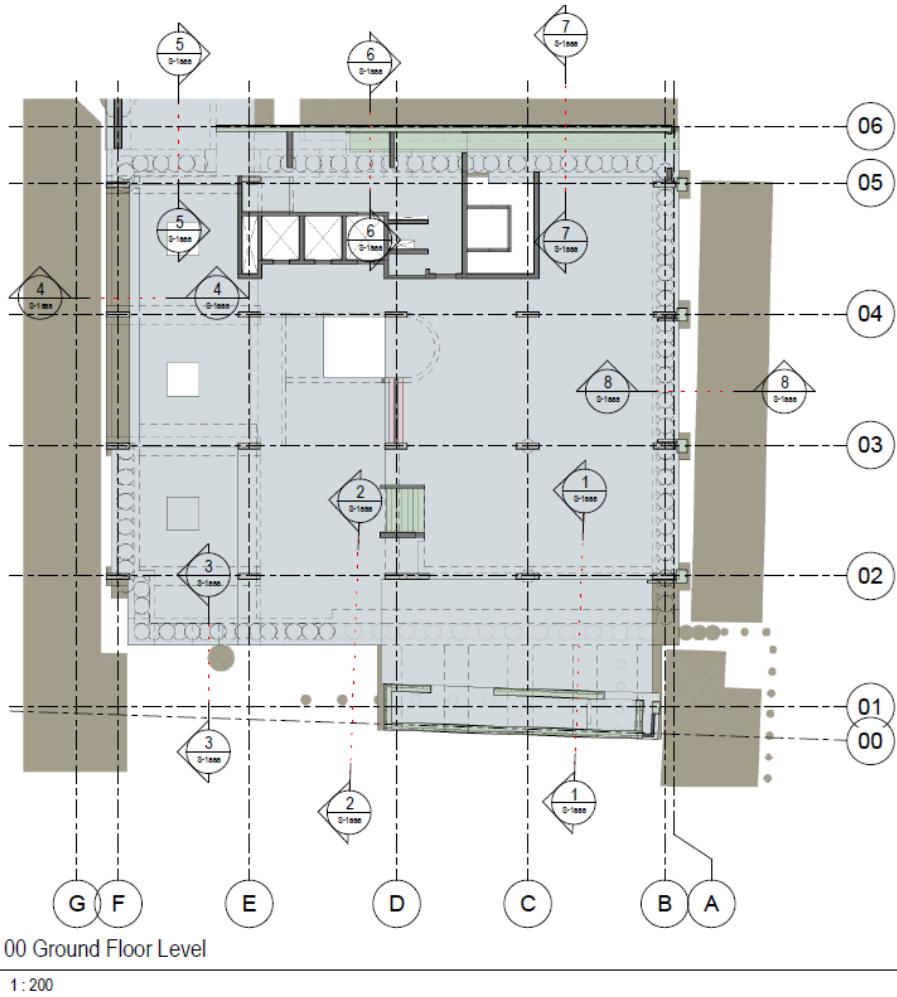
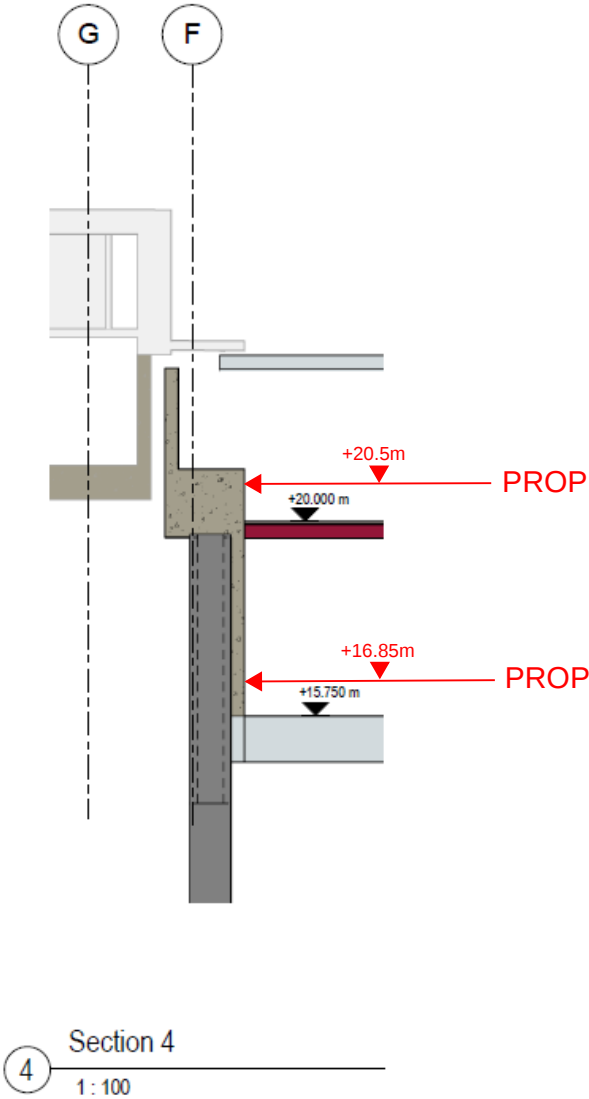
SECTION 4

Properties



SECANT PILING			
Excavation depth	=	6.6 m	
Pile Length	=	9.9 m	= 1.5 x excavation depth
Pile diameter	=	880 mm	
EI	=	565600 kN.m ² /m	
h	=	3.65 m	= average depth between props

Damage Category 2 Wall

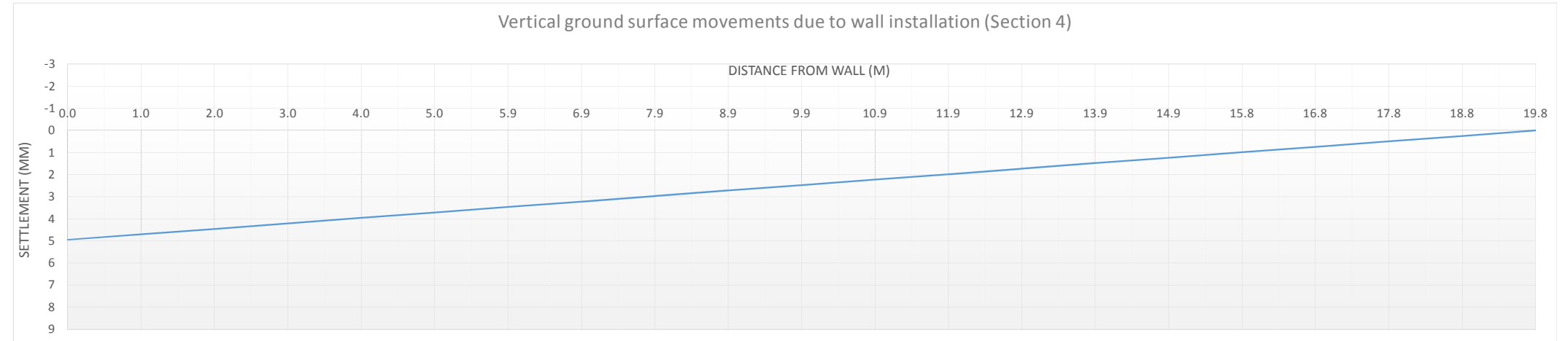


Settlement due to wall installation (SECTION 4)

Excavation depth	=	6.6 m
Pile Length	=	9.9 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

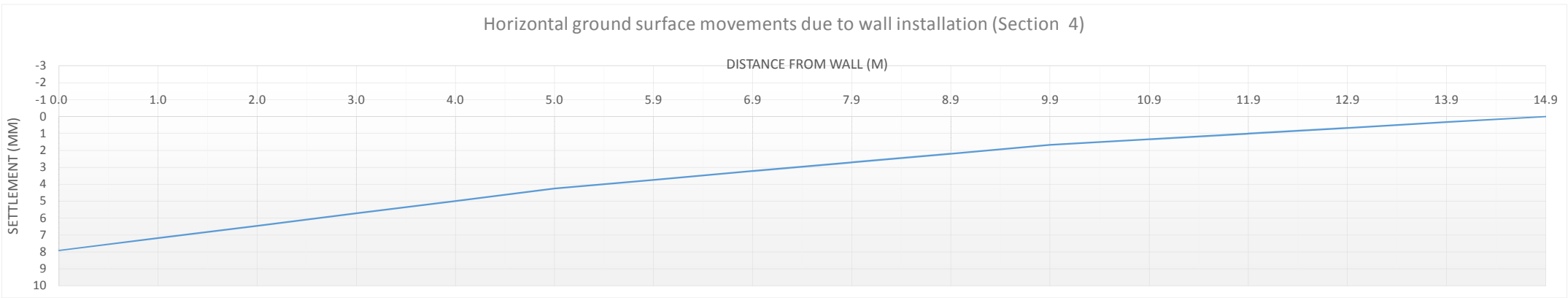
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6
Distance	0	0.99	1.98	2.97	3.96	4.95	5.94	6.93	7.92	8.91	9.9	10.89	11.88	12.87	13.86	14.85	15.84	16.83	17.82	18.81	19.8	20.79	21.78	22.77	23.76	24.75	25.74
%Settlement/Wall depth	0.05	0.0475	0.045	0.0425	0.04	0.0375	0.035	0.0325	0.03	0.0275	0.025	0.0225	0.02	0.0175	0.015	0.0125	0.01	0.0075	0.005	0.0025	0	0	0	0	0	0	0
Settlement	4.95	4.7025	4.455	4.2075	3.96	3.7125	3.465	3.2175	2.97	2.7225	2.475	2.2275	1.98	1.7325	1.485	1.2375	0.99	0.7425	0.495	0.2475	0	0	0	0	0	0	0



0.165	Distance	0	0.66	1.32	1.98	2.64	3.3	3.96	4.62	5.28	5.94	6.6	7.26	7.92	8.58	9.24	9.9	10.56	11.22	11.88	12.54	13.2	13.86	14.52	15.18	15.84	16.5	17.16	17.82	18.48	19.14	19.8	20.46	21.12	21.78	22.44	23.1	23.76	24.42	25.08	25.74	26.4	27.06	27.72
	Settlement	4.95	4.785	4.62	4.455	4.29	4.125	3.96	3.795	3.63	3.465	3.3	3.135	2.97	2.805	2.64	2.475	2.31	2.145	1.98	1.815	1.65	1.485	1.32	1.155	0.99	0.825	0.66	0.495	0.33	0.165	0	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	0.99	1.98	2.97	3.96	4.95	5.94	6.93	7.92	8.91	9.9	10.89	11.88	12.87	13.86	14.85	15.84	16.83	17.82	18.81	19.8	20.79	21.78	22.77	23.76	24.75	25.74	26.73	27.72	28.71	29.7	30.69
%Settlement/Wall depth	0.08	0.0726	0.0652	0.0578	0.0504	0.043	0.0378	0.0326	0.0274	0.0222	0.017	0.0136	0.0102	0.0068	0.0034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement	7.92	7.1874	6.4548	5.7222	4.9896	4.257	3.7422	3.2274	2.7126	2.1978	1.683	1.3464	1.0098	0.6732	0.3366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

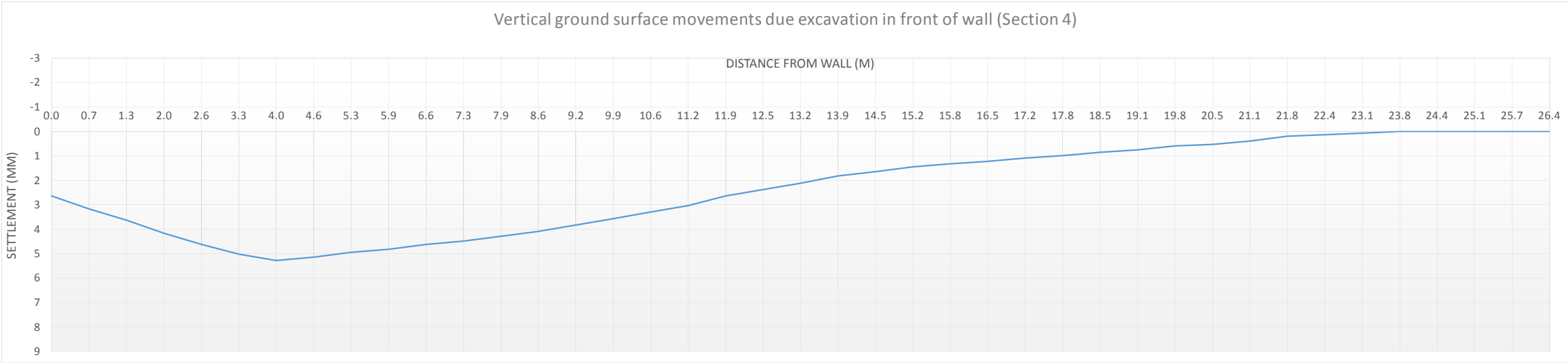


Settlement due to excavation in front of wall (SECTION 4)

Excavation depth	=	6.6 m
Pile Length	=	9.9 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

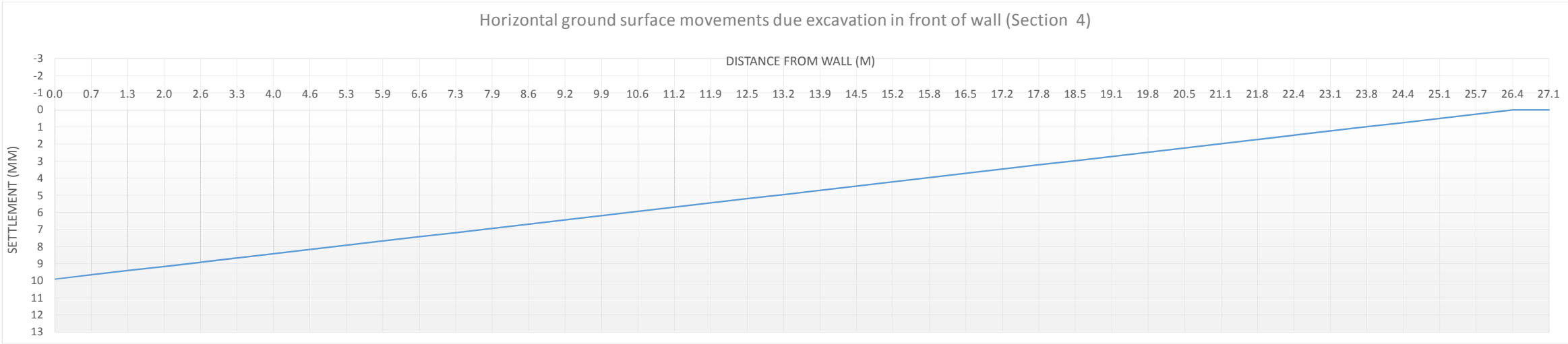
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	0.66	1.32	1.98	2.64	3.3	3.96	4.62	5.28	5.94	6.6	7.26	7.92	8.58	9.24	9.9	10.56	11.22	11.88	12.54	13.2	13.86	14.52	15.18	15.84	16.5	17.16	17.82	18.48	19.14	19.8	20.46	21.12	21.78	22.44	23.1	23.76	24.42	25.08	25.74	26.4	27.06	27.72	28.38	29.04
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	2.64	3.168	3.63	4.158	4.62	5.016	5.28	5.148	4.95	4.818	4.62	4.488	4.29	4.092	3.828	3.564	3.3	3.036	2.64	2.376	2.112	1.815	1.65	1.452	1.32	1.221	1.089	0.99	0.858	0.759	0.594	0.528	0.396	0.198	0.132	0.066	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	0.66	1.32	1.98	2.64	3.3	3.96	4.62	5.28	5.94	6.6	7.26	7.92	8.58	9.24	9.9	10.56	11.22	11.88	12.54	13.2	13.86	14.52	15.18	15.84	16.5	17.16	17.82	18.48	19.14	19.8	20.46	21.12	21.78	22.44	23.1	23.76	24.42	25.08	25.74	26.4	27.06
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	9.9	9.6525	9.405	9.1575	8.91	8.6625	8.415	8.1675	7.92	7.6725	7.425	7.1775	6.93	6.6825	6.435	6.1875	5.94	5.6925	5.445	5.1975	4.95	4.7025	4.455	4.2075	3.96	3.7125	3.465	3.2175	2.97	2.7225	2.475	2.2275	1.98	1.7325	1.485	1.2375	0.99	0.7425	0.495	0.2475	0	0



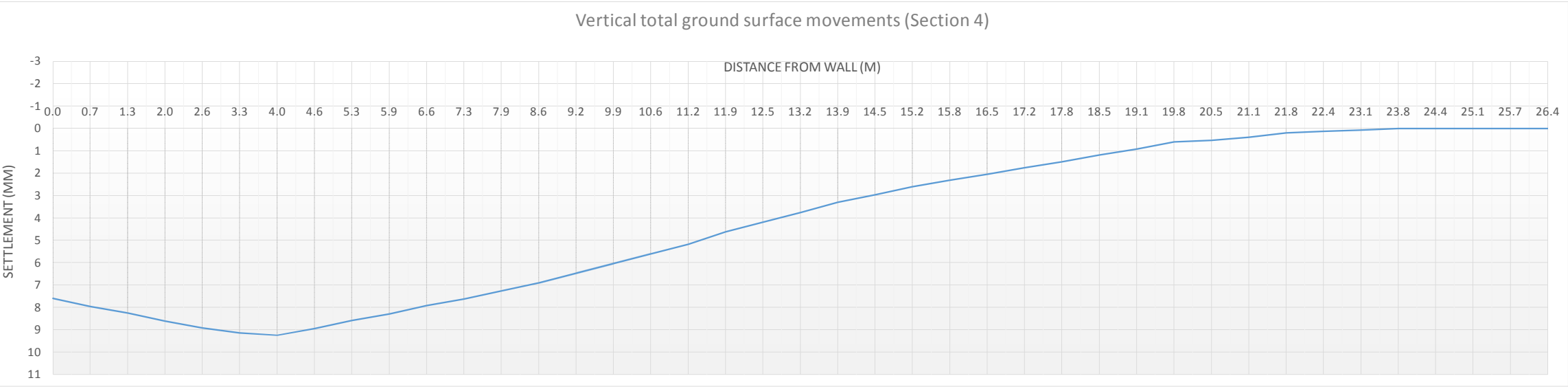
0.37125	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Settlement	0	0.99	1.98	2.97	3.96	4.95	5.94	6.93	7.92	8.91	9.9	10.89	11.88	12.87	13.86	14.85	15.84	16.83	17.82	18.81	19.8	20.79	21.78	22.77	23.76	24.75	25.74	26.73	27.72	28.71	29.7	30.69

Settlement due to wall installation and deflection (SECTION 4)

Excavation depth	=	6.6 m
Pile Length	=	9.9 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

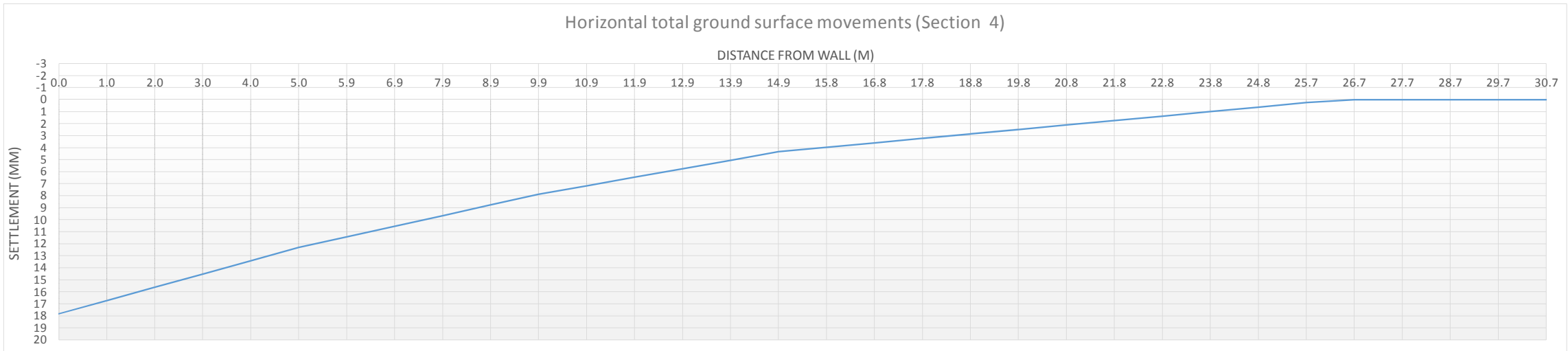
VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	
Distance	0	0.66	1.32	1.98	2.64	3.3	3.96	4.62	5.28	5.94	6.6	7.26	7.92	8.58	9.24	9.9	10.56	11.22	11.88	12.54	13.2	13.86	14.52	15.18	15.84	16.5	17.16	17.82	18.48	19.14	19.8	20.46	21.12	21.78	22.44	23.1	23.76	24.42	25.08	25.74	26.4	
Settlement due to wall installation	4.95	4.785	4.62	4.455	4.29	4.125	3.96	3.795	3.63	3.465	3.3	3.135	2.97	2.805	2.64	2.475	2.31	2.145	1.98	1.815	1.65	1.485	1.32	1.155	0.99	0.825	0.66	0.495	0.33	0.165	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	2.64	3.168	3.63	4.158	4.62	5.016	5.28	5.148	4.95	4.818	4.62	4.488	4.29	4.092	3.828	3.564	3.3	3.036	2.64	2.376	2.112	1.815	1.65	1.452	1.32	1.221	1.089	0.99	0.858	0.759	0.594	0.528	0.396	0.198	0.132	0.066	0	0	0	0	0	0
Total Settlement	7.59	7.953	8.25	8.613	8.91	9.141	9.24	8.943	8.58	8.283	7.92	7.623	7.26	6.897	6.468	6.039	5.61	5.181	4.62	4.191	3.762	3.3	2.97	2.607	2.31	2.046	1.749	1.485	1.188	0.924	0.594	0.528	0.396	0.198	0.132	0.066	0	0	0	0	0	0



HORIZONTAL

	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Distance	0	0.99	1.98	2.97	3.96	4.95	5.94	6.93	7.92	8.91	9.9	10.89	11.88	12.87	13.86	14.85	15.84	16.83	17.82	18.81	19.8	20.79	21.78	22.77	23.76	24.75	25.74	26.73	27.72	28.71	29.7	30.69
Settlement due to wall installation	7.92	7.1874	6.4548	5.7222	4.9896	4.257	3.7422	3.2274	2.7126	2.1978	1.683	1.3464	1.0098	0.6732	0.3366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	9.9	9.52875	9.1575	8.78625	8.415	8.04375	7.6725	7.30125	6.93	6.55875	6.1875	5.81625	5.445	5.07375	4.7025	4.33125	3.96	3.58875	3.2175	2.84625	2.475	2.10375	1.7325	1.36125	0.99	0.61875	0.2475	0	0	0	0	0	0
Total Settlement	17.82	16.71615	15.6123	14.50845	13.4046	12.30075	11.4147	10.52865	9.6426	8.75655	7.8705	7.16265	6.4548	5.74695	5.0391	4.33125	3.96	3.58875	3.2175	2.84625	2.475	2.10375	1.7325	1.36125	0.99	0.61875	0.2475	0	0	0	0	0	0

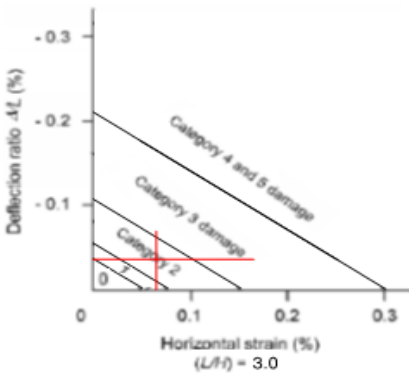


Category Assessment (SECTION 4)

L	=	28 m	L ₁	=	7 m	L ₂	=	7 m	L ₃	=	7 m	L ₄	=	7 m	L ₁₊₂	=	14 m	L ₁₊₂₊₃	=	21 m
H	=	9.3 m	H ₁	=	9.3 m	H ₂	=	9.3 m	H ₃	=	9.3 m	H ₁₊₂	=	9.3 m	H ₁₊₂	=	9.3 m	H ₁₊₂₊₃	=	9.3 m
Δ	=	0.00924 m	Δ ₁	=	0.0021 m	Δ ₂	=	0.0046 m	Δ ₃	=	0.0024 m	Δ ₄	=	0.0001 m	Δ ₁₊₂	=	0.0067 m	Δ ₁₊₂₊₃	=	0.0091 m
δ	=	0.01782 m	δ ₁	=	0.007 m	δ ₂	=	0.0054 m	δ ₃	=	0.0026 m	δ ₄	=	0.0014 m	δ ₁₊₂	=	0.0124 m	δ ₁₊₂₊₃	=	0.015 m
L/H	=	3.010753	L ₁ /H ₁	=	0.752688	L ₂ /H ₂	=	0.752688	L ₃ /H ₃	=	0.752688	L ₄ /H ₄	=	0.752688	L ₁₊₂ /H ₁₊₂	=	1.505376	L ₁₊₂₊₃ /H ₁₊₂₊	=	2.258065
δ/L	=	0.063643 %	δ ₁ /L ₁	=	0.1 %	δ ₂ /L ₂	=	0.077143 %	δ ₃ /L ₃	=	0.037143 %	δ ₄ /L ₄	=	0.02 %	δ ₁₊₂ /L ₁₊₂	=	0.088571 %	δ ₁₊₂₊₃ /L ₁₊₂₊	=	0.071429 %
Δ/L	=	0.033 %	Δ ₁ /L ₁	=	0.03 %	Δ ₂ /L ₂	=	0.065714 %	Δ ₃ /L ₃	=	0.034286 %	Δ ₄ /L ₄	=	0.001429 %	Δ ₁₊₂ /L ₁₊₂	=	0.047857 %	Δ ₁₊₂₊₃ /L ₁₊₂₊	=	0.043333 %

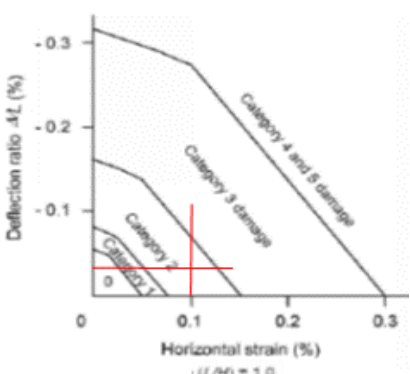
From CIRIA C580 Figure 2.18:

CATEGORY 2



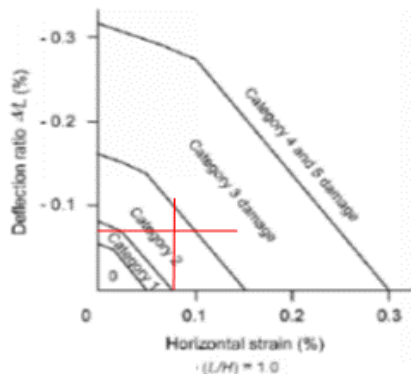
From CIRIA C580 Figure 2.18:

CATEGORY 2



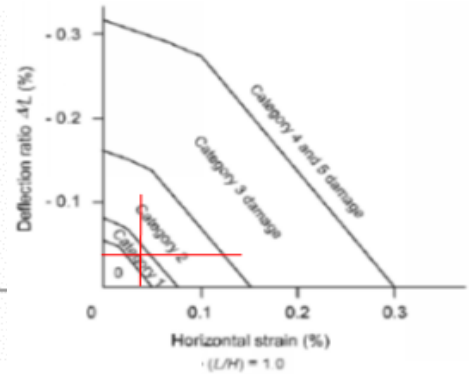
From CIRIA C580 Figure 2.18:

CATEGORY 2



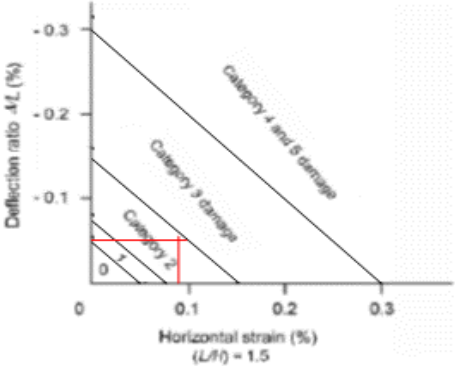
From CIRIA C580 Figure 2.18:

CATEGORY 1



From CIRIA C580 Figure 2.18:

CATEGORY 0

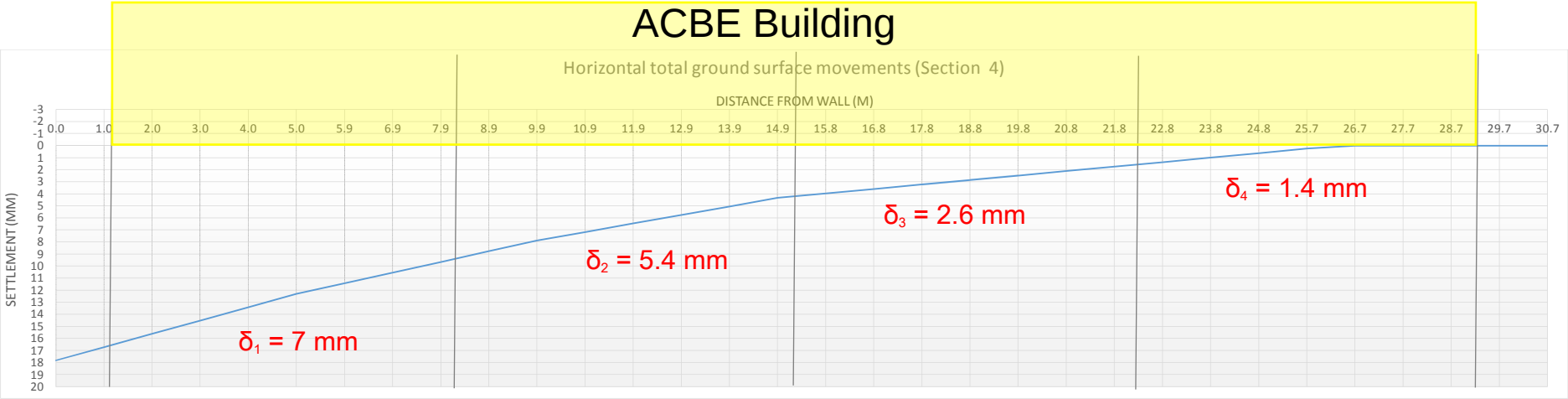
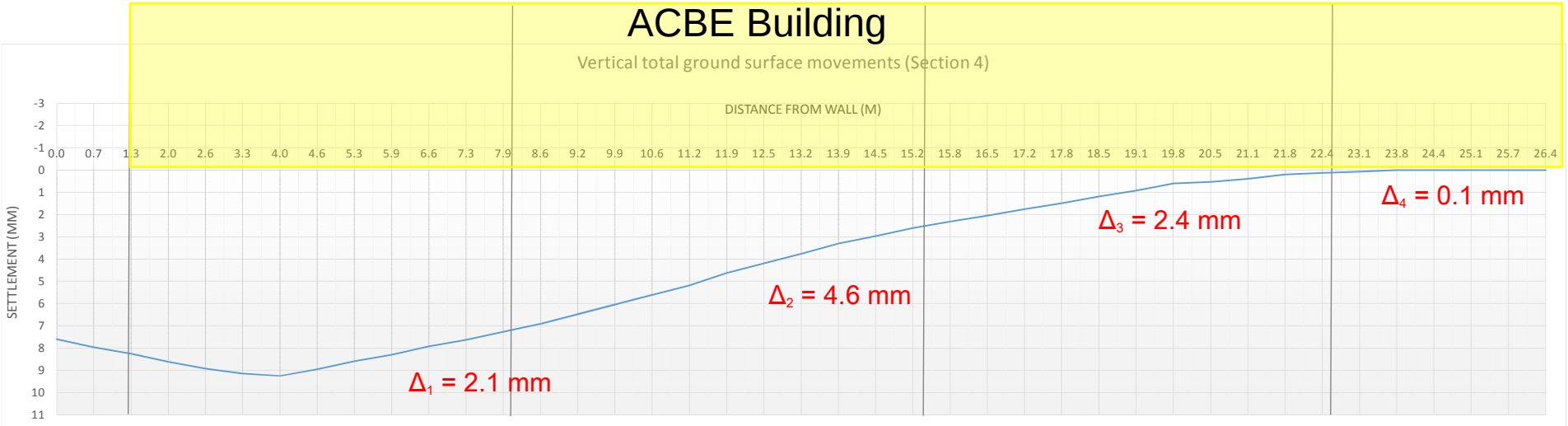


From CIRIA C580 Figure 2.18:

CATEGORY 2

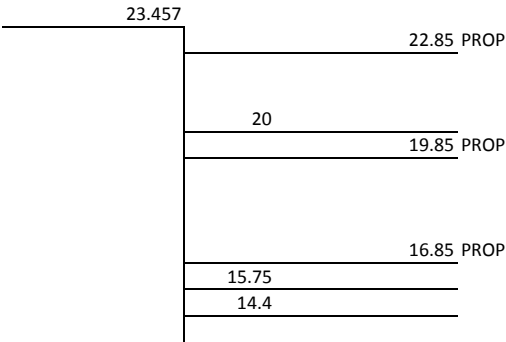
From CIRIA C580 Figure 2.18:

CATEGORY 2



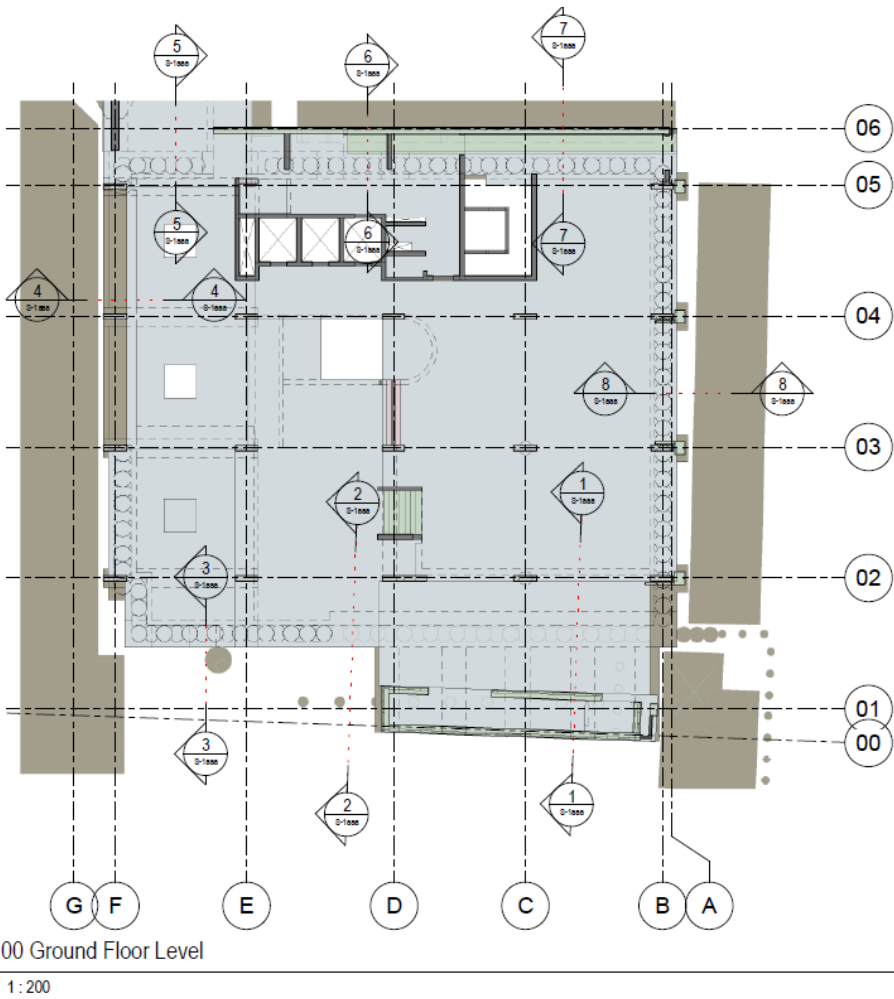
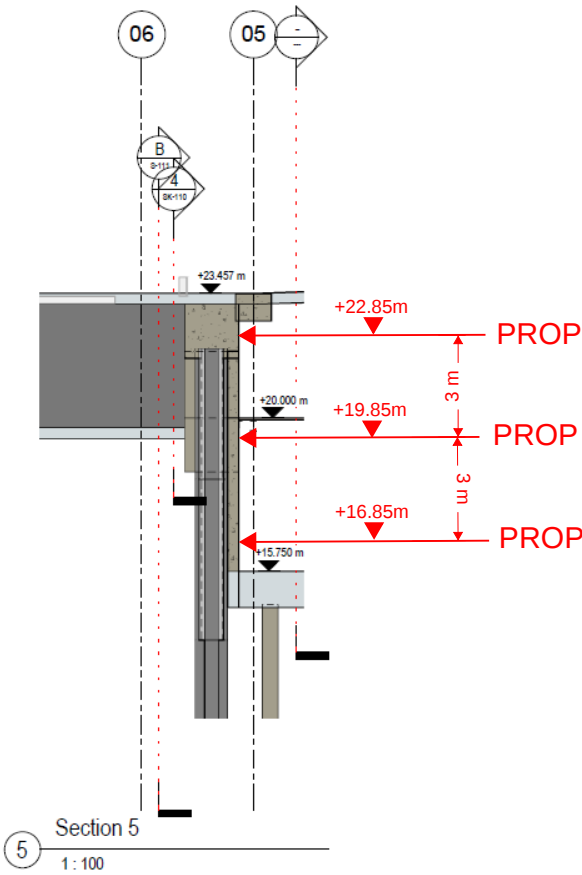
SECTION 5

Properties



SECANT PILING		
Excavation depth	= 9.057 m	
Pile Length	= 13.5855 m	= 1.5 x excavation depth
Pile diameter	= 880 mm	
EI	= 565600 kN.m ² /m	
h	= 3 m	= average depth between props

Damage Category 2 Wall

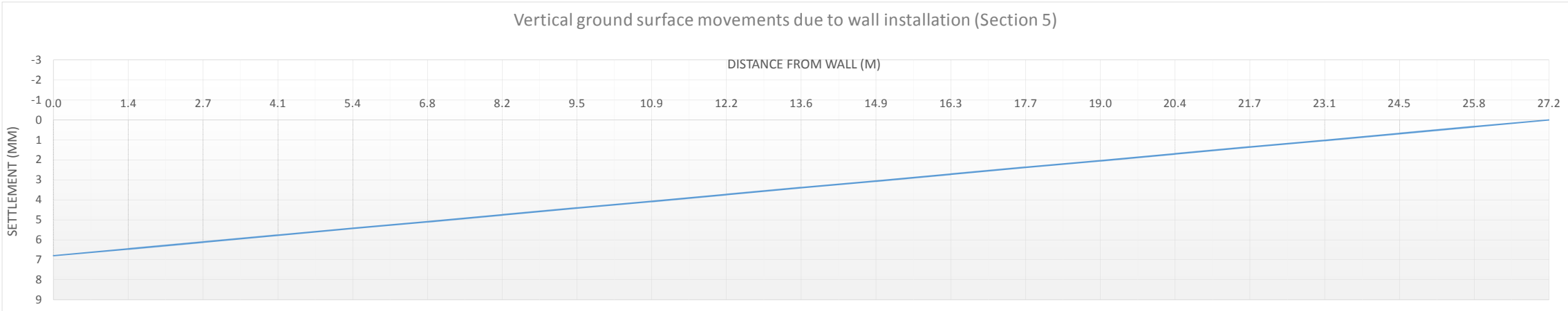


Settlement due to wall installation (SECTION 5)

Excavation depth	=	9.057 m
Pile Length	=	13.5855 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

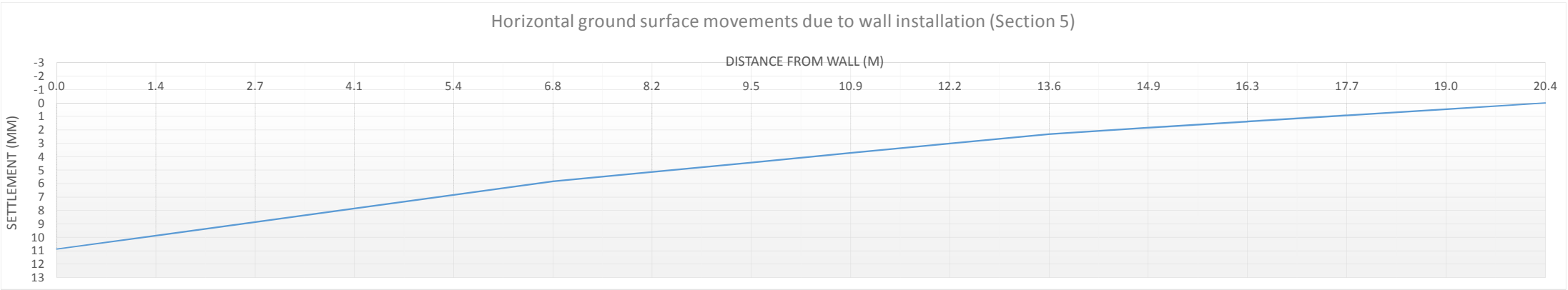
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6
Distance	0	1.35855	2.7171	4.07565	5.4342	6.79275	8.1513	9.50985	10.8684	12.22695	13.5855	14.94405	16.3026	17.66115	19.0197	20.37825	21.7368	23.09535	24.4539	25.81245	27.171	28.52955	29.8881	31.24665	32.6052	33.96375	35.3223
%Settlement/Wall depth	0.05	0.0475	0.045	0.0425	0.04	0.0375	0.035	0.0325	0.03	0.0275	0.025	0.0225	0.02	0.0175	0.015	0.0125	0.01	0.0075	0.005	0.0025	0	0	0	0	0	0	0
Settlement	6.79275	6.453113	6.113475	5.773838	5.4342	5.094563	4.754925	4.415288	4.07565	3.736013	3.396375	3.056738	2.7171	2.377463	2.037825	1.698188	1.35855	1.018913	0.679275	0.339637	0	0	0	0	0	0	0



Distance	0	0.9057	1.8114	2.7171	3.6228	4.5285	5.4342	6.3399	7.2456	8.1513	9.057	9.9627	10.8684	11.7741	12.6798	13.5855	14.4912	15.3969	16.3026	17.2083	18.114	19.0197	19.9254	20.8311	21.7368	22.6425	23.5482	24.4539	25.3596	26.2653	27.171	28.0767	28.9824	29.8881	30.7938	31.6995	32.6052	33.5109	34.4166	35.3223	36.228	37.1337	38.0394
Settlement	6.79275	6.566325	6.3399	6.113475	5.88705	5.660625	5.4342	5.207775	4.98135	4.754925	4.5285	4.302075	4.07565	3.849225	3.6228	3.396375	3.16995	2.943525	2.7171	2.490675	2.26425	2.037825	1.8114	1.584975	1.35855	1.132125	0.9057	0.679275	0.45285	0.226425	0	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.35855	2.7171	4.07565	5.4342	6.79275	8.1513	9.50985	10.8684	12.22695	13.5855	14.94405	16.3026	17.66115	19.0197	20.37825	21.7368	23.09535	24.4539	25.81245	27.171	28.52955	29.8881	31.24665	32.6052	33.96375	35.3223	36.68085	38.0394	39.39795	40.7565	42.11505
%Settlement/Wall depth	0.08	0.0726	0.0652	0.0578	0.0504	0.043	0.0378	0.0326	0.0274	0.0222	0.017	0.0136	0.0102	0.0068	0.0034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Settlement	10.8684	9.863073	8.857746	7.852419	6.847092	5.841765	5.135319	4.428873	3.722427	3.015981	2.309535	1.847628	1.385721	0.923814	0.461907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

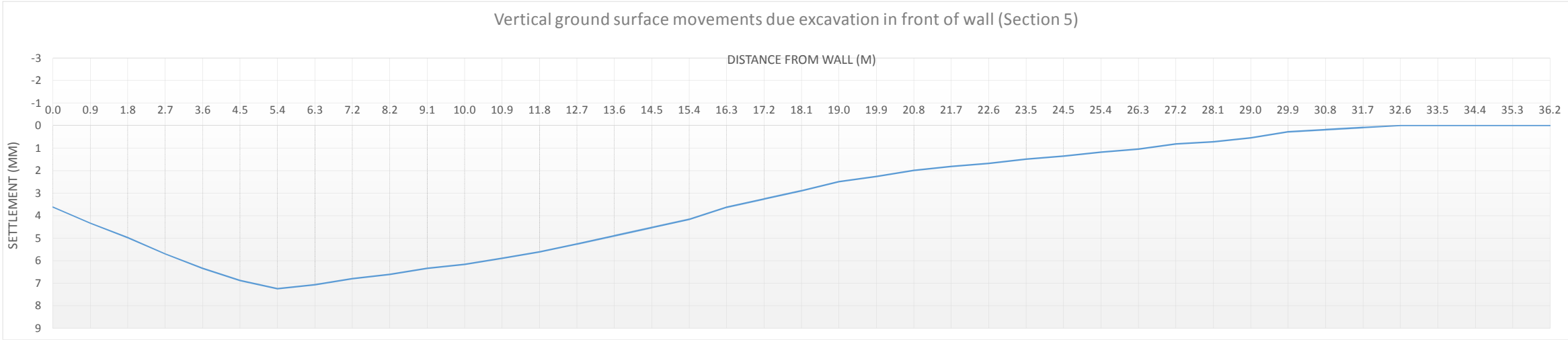


Settlement due to excavation in front of wall (SECTION 5)

Excavation depth	=	9.057 m
Pile Length	=	13.5855 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

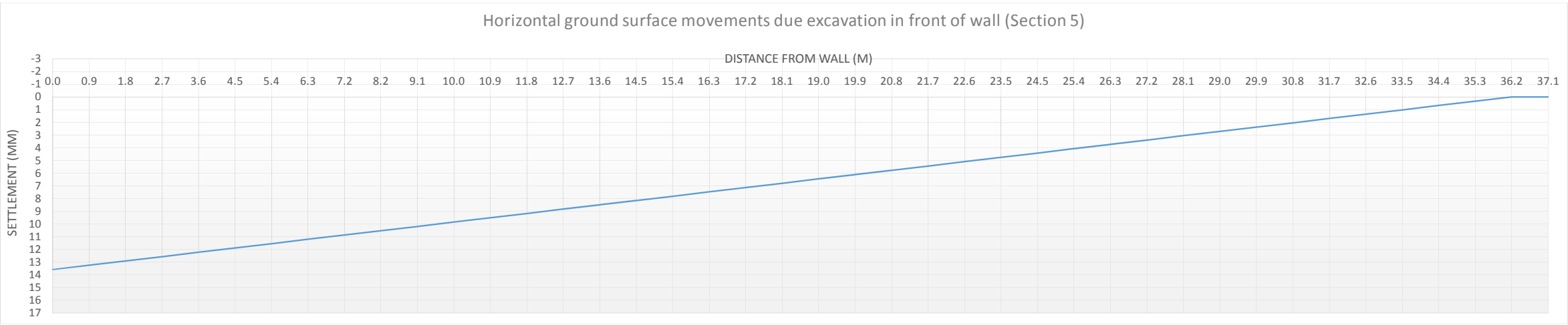
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	0.9057	1.8114	2.7171	3.6228	4.5285	5.4342	6.3399	7.2456	8.1513	9.057	9.9627	10.8684	11.7741	12.6798	13.5855	14.4912	15.3969	16.3026	17.2083	18.114	19.0197	19.9254	20.8311	21.7368	22.6425	23.5482	24.4539	25.3596	26.2653	27.171	28.0767	28.9824	29.8881	30.7938	31.6995	32.6052	33.5109	34.4166	35.3223	36.228	37.1337	38.0394	38.9451	39.8508
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	3.6228	4.34736	4.98135	5.70591	6.3399	6.88332	7.2456	7.06446	6.79275	6.61161	6.3399	6.15876	5.88705	5.61534	5.25306	4.89078	4.5285	4.16622	3.6228	3.26052	2.89824	2.490675	2.26425	1.99254	1.8114	1.675545	1.494405	1.35855	1.17741	1.041555	0.81513	0.72456	0.54342	0.27171	0.18114	0.09057	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	0.9057	1.8114	2.7171	3.6228	4.5285	5.4342	6.3399	7.2456	8.1513	9.057	9.9627	10.8684	11.7741	12.6798	13.5855	14.4912	15.3969	16.3026	17.2083	18.114	19.0197	19.9254	20.8311	21.7368	22.6425	23.5482	24.4539	25.3596	26.2653	27.171	28.0767	28.9824	29.8881	30.7938	31.6995	32.6052	33.5109	34.4166	35.3223	36.228	37.1337
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	13.5855	13.24586	12.90623	12.56659	12.22695	11.88731	11.54768	11.20804	10.8684	10.52876	10.18913	9.849488	9.50985	9.170213	8.830575	8.490938	8.1513	7.811663	7.472025	7.132387	6.79275	6.453112	6.113475	5.773837	5.4342	5.094562	4.754925	4.415287	4.07565	3.736012	3.396375	3.056737	2.7171	2.377462	2.037825	1.698187	1.35855	1.018912	0.679275	0.339637	0	0



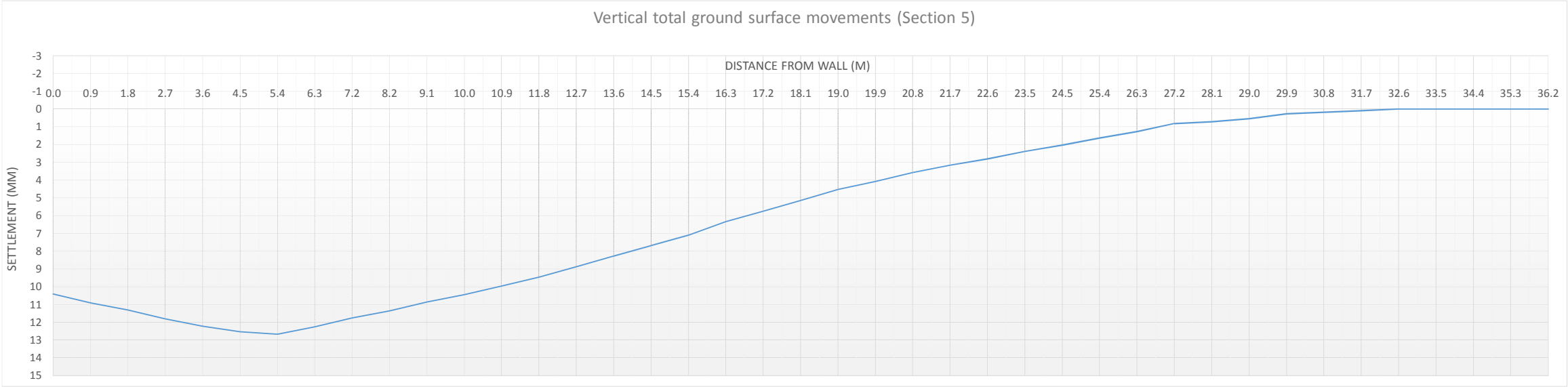
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.35855	2.7171	4.07565	5.4342	6.79275	8.1513	9.50985	10.8684	12.22695	13.5855	14.94405	16.3026	17.66115	19.0197	20.37825	21.7368	23.09535	24.4539	25.81245	27.171	28.52955	29.8881	31.24665	32.6052	33.96375	35.3223	36.68085	38.0394	39.39795	40.7565	42.11505
Settlement	13.5855	13.07604	12.56659	12.05713	11.54768	11.03822	10.52876	10.01931	9.50985	9.000394	8.490938	7.981481	7.472025	6.962569	6.453113	5.943656	5.4342	4.924744	4.415288	3.905831	3.396375	2.886919	2.377463	1.868006	1.35855	0.849094	0.339637	0	0	0	0	0

Settlement due to wall installation and deflection (SECTION 5)

Excavation depth = 9.057 m
Pile Length = 13.5855 m
Pile diameter = 880 mm
EI = 565600 kN.m²/m

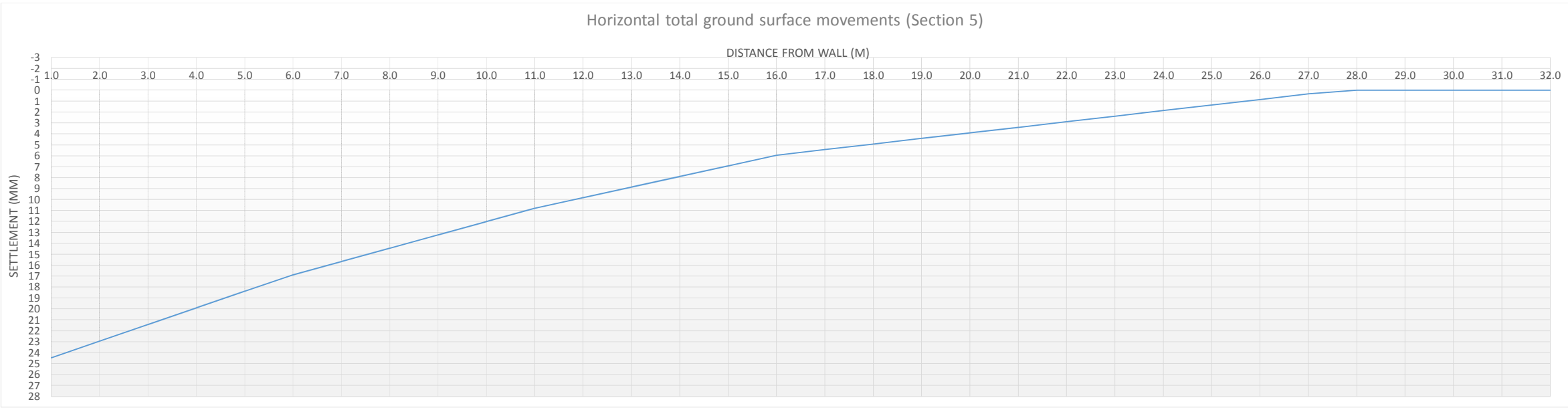
VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	
Distance	0	0.9057	1.8114	2.7171	3.6228	4.5285	5.4342	6.3399	7.2456	8.1513	9.057	9.9627	10.8684	11.7741	12.6798	13.5855	14.4912	15.3969	16.3026	17.2083	18.114	19.0197	19.9254	20.8311	21.7368	22.6425	23.5482	24.4539	25.3596	26.2653	27.171	28.0767	28.9824	29.8881	30.7938	31.6995	32.6052	33.5109	34.4166	35.3223	36.228	
Settlement due to wall installation	6.79275	6.566325	6.3399	6.113475	5.88705	5.660625	5.4342	5.207775	4.98135	4.754925	4.5285	4.302075	4.07565	3.849225	3.6228	3.396375	3.16995	2.943525	2.7171	2.490675	2.26425	2.037825	1.8114	1.584975	1.35855	1.132125	0.9057	0.679275	0.45285	0.226425	0	0	0	0	0	0	0	0	0	0	0	
Settlement due to excavation in front of wall	3.6228	4.34736	4.98135	5.70591	6.3399	6.88332	7.2456	7.06446	6.79275	6.61161	6.3399	6.15876	5.88705	5.61534	5.25306	4.89078	4.5285	4.16622	3.6228	3.26052	2.89824	2.490675	2.26425	1.99254	1.8114	1.675545	1.494405	1.35855	1.17741	1.041555	0.81513	0.72456	0.54342	0.27171	0.18114	0.09057	0	0	0	0	0	0
Total Settlement	10.41555	10.91369	11.32125	11.81939	12.22695	12.54395	12.6798	12.72224	11.7741	11.36654	10.8684	10.46084	9.9627	9.464565	8.87586	8.287155	7.69845	7.109745	6.3399	5.751195	5.16249	4.5285	4.07565	3.577515	3.16995	2.80767	2.400105	2.037825	1.63026	1.26798	0.81513	0.72456	0.54342	0.27171	0.18114	0.09057	0	0	0	0	0	0



HORIZONTAL

	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Distance	0	1.35855	2.7171	4.07565	5.4342	6.79275	8.1513	9.50985	10.8684	12.22695	13.5855	14.94405	16.3026	17.66115	19.0197	20.37825	21.7368	23.09535	24.4539	25.81245	27.171	28.52955	29.8881	31.24665	32.6052	33.96375	35.3223	36.68085	38.0394	39.39795	40.7565	42.11505
Settlement due to wall installation	10.8684	9.863073	8.857746	7.852419	6.847092	5.841765	5.135319	4.428873	3.722427	3.015981	2.309535	1.847628	1.385721	0.923814	0.461907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	13.5855	13.07604	12.56659	12.05713	11.54768	11.03822	10.52876	10.01931	9.50985	9.000394	8.490938	7.981481	7.472025	6.962569	6.453113	5.943656	5.4342	4.924744	4.415288	3.905831	3.396375	2.886919	2.377463	1.868006	1.35855	0.849094	0.339637	0	0	0	0	0	0
Total Settlement	24.4539	22.93912	21.42433	19.90955	18.39477	16.87998	15.66408	14.44818	13.23228	12.01637	10.80047	9.829109	8.857746	7.886383	6.91502	5.943656	5.4342	4.924744	4.415288	3.905831	3.396375	2.886919	2.377463	1.868006	1.35855	0.849094	0.339637	0	0	0	0	0	0



Category Assessment (SECTION 5)

NO BUILDING

L	=	0	m
H	=	0	m

Δ	=	0.01268	m
δ	=	0.024454	m

L/H	=	-
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δ/L	=	-	%
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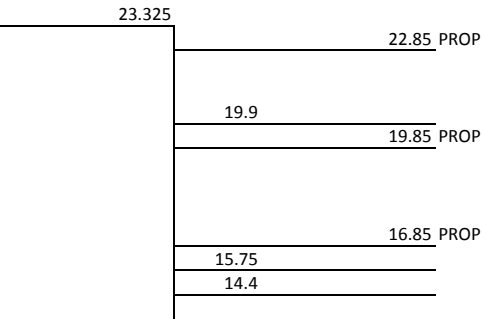
Δ/L	=	-	%
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From CIRIA C580 Figure 2.18:

CATEGORY 0

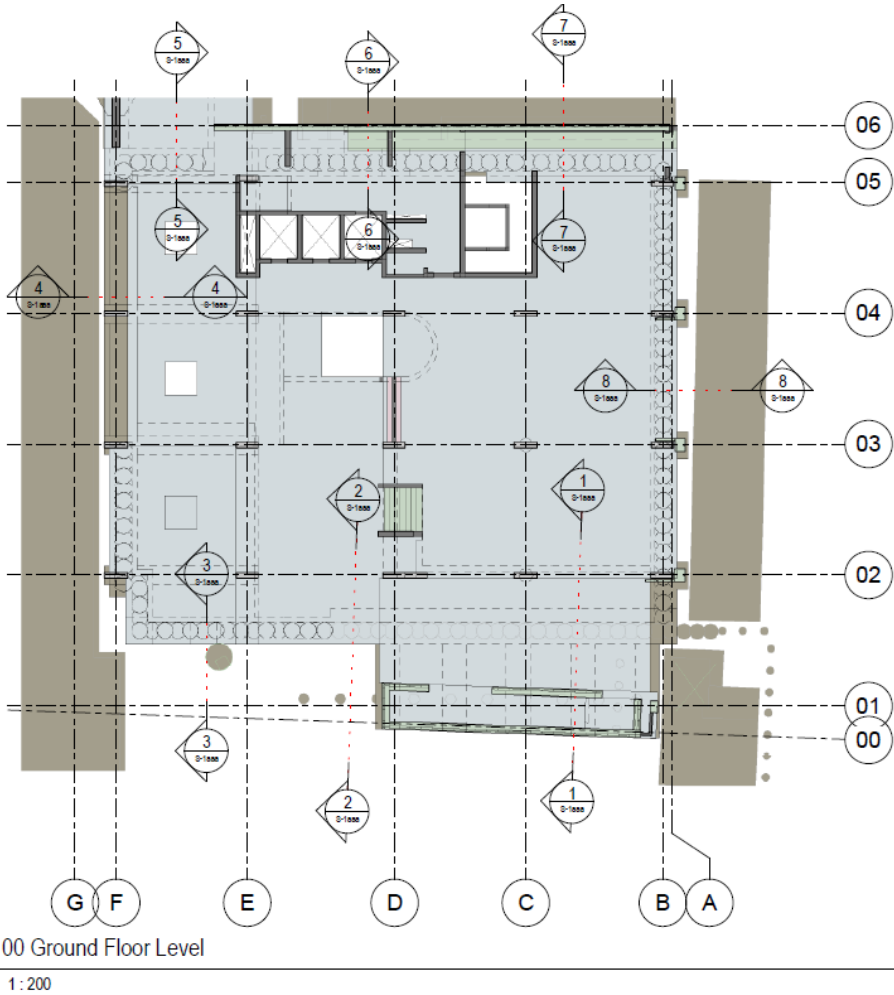
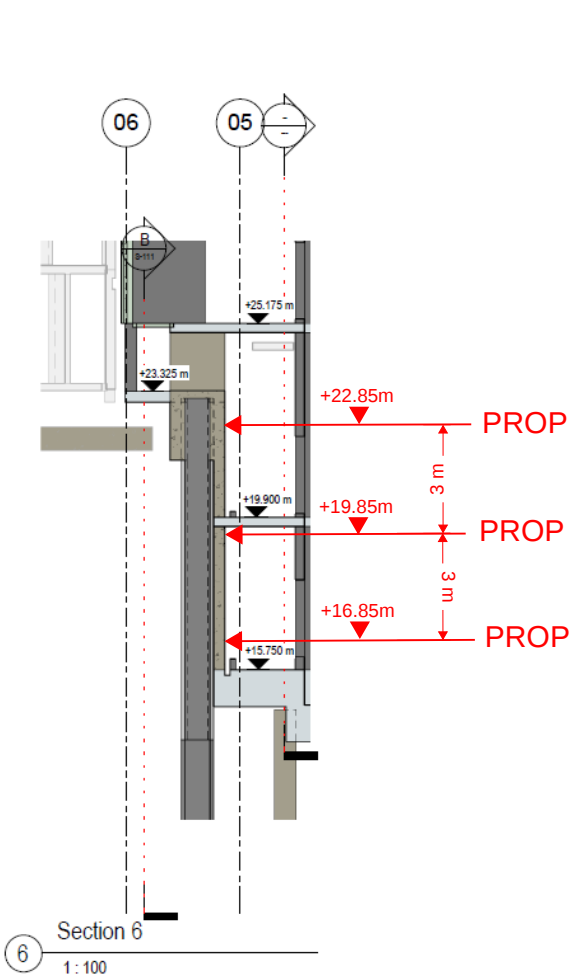
SECTION 6

Properties



SECANT PILING			
Excavation depth	=	8.925 m	
Pile Length	=	13.3875 m	= 1.5 x excavation depth
Pile diameter	=	880 mm	
EI	=	565600 kN.m ² /m	
h	=	3 m	= average depth between props

Damage Category 2 Wall

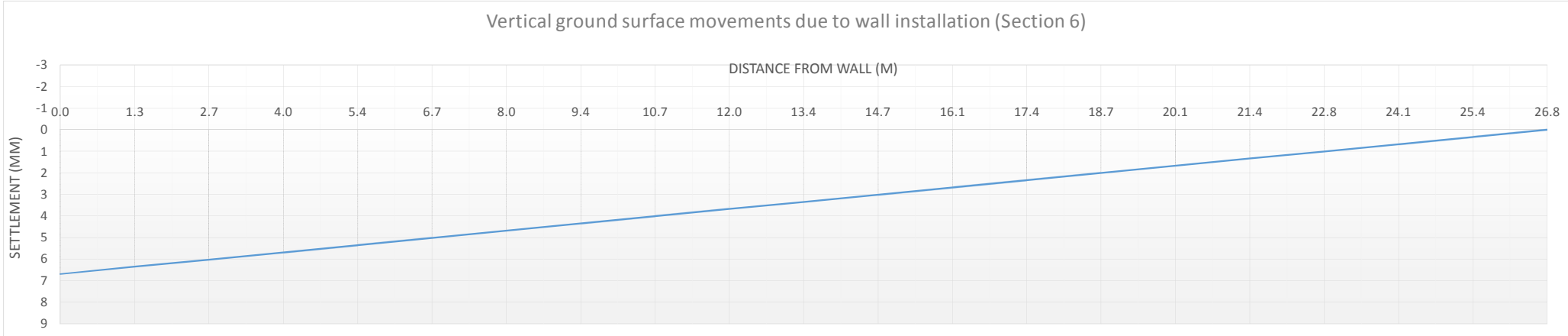


Settlement due to wall installation (SECTION 6)

Excavation depth	=	8.925 m
Pile Length	=	13.3875 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

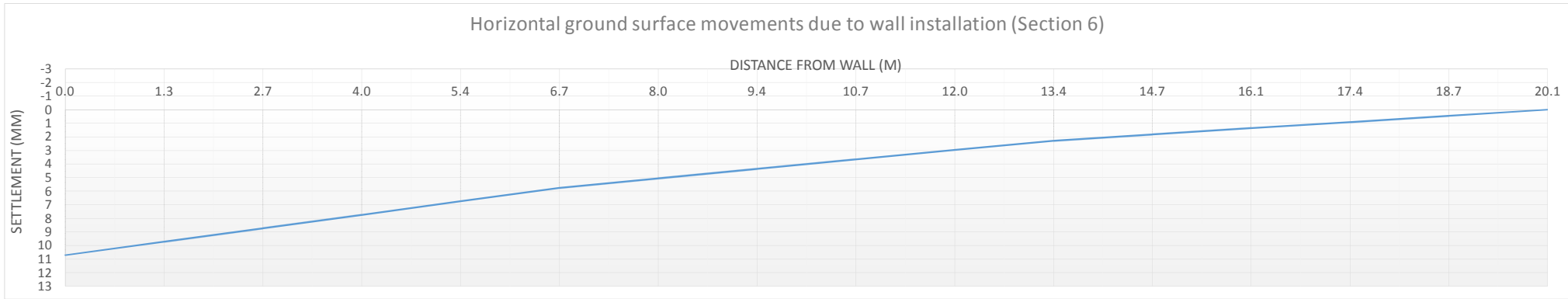
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6
Distance	0	1.33875	2.6775	4.01625	5.355	6.69375	8.0325	9.37125	10.71	12.04875	13.3875	14.72625	16.065	17.40375	18.7425	20.08125	21.42	22.75875	24.0975	25.43625	26.775	28.11375	29.4525	30.79125	32.13	33.46875	34.8075
%Settlement/Wall depth	0.05	0.0475	0.045	0.0425	0.04	0.0375	0.035	0.0325	0.03	0.0275	0.025	0.0225	0.02	0.0175	0.015	0.0125	0.01	0.0075	0.005	0.0025	0	0	0	0	0	0	0
Settlement	6.69375	6.359063	6.024375	5.689688	5.355	5.020313	4.685625	4.350938	4.01625	3.681563	3.346875	3.012188	2.6775	2.342813	2.008125	1.673438	1.33875	1.004063	0.669375	0.334687	0	0	0	0	0	0	0



0.223125	Distance	0	0.8925	1.785	2.6775	3.57	4.4625	5.355	6.2475	7.14	8.0325	8.925	9.8175	10.71	11.6025	12.495	13.3875	14.28	15.1725	16.065	16.9575	17.85	18.7425	19.635	20.5275	21.42	22.3125	23.205	24.0975	24.99	25.8825	26.775	27.6675	28.56	29.4525	30.345	31.2375	32.13	33.0225	33.915	34.8075	35.7	36.5925	37.485
	Settlement	6.69375	6.470625	6.2475	6.024375	5.80125	5.578125	5.355	5.131875	4.90875	4.685625	4.4625	4.239375	4.01625	3.793125	3.57	3.346875	3.12375	2.900625	2.6775	2.454375	2.23125	2.008125	1.785	1.561875	1.33875	1.115625	0.8925	0.669375	0.44625	0.223125	0	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.33875	2.6775	4.01625	5.355	6.69375	8.0325	9.37125	10.71	12.04875	13.3875	14.72625	16.065	17.40375	18.7425	20.08125	21.42	22.75875	24.0975	25.43625	26.775	28.11375	29.4525	30.79125	32.13	33.46875	34.8075	36.14625	37.485	38.82375	40.1625	41.50125
%Settlement/Wall depth	0.08	0.0726	0.0652	0.0578	0.0504	0.043	0.0378	0.0326	0.0274	0.0222	0.017	0.0136	0.0102	0.0068	0.0034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement	10.71	9.719325	8.72865	7.737975	6.7473	5.756625	5.060475	4.364325	3.668175	2.972025	2.275875	1.8207	1.365525	0.91035	0.455175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

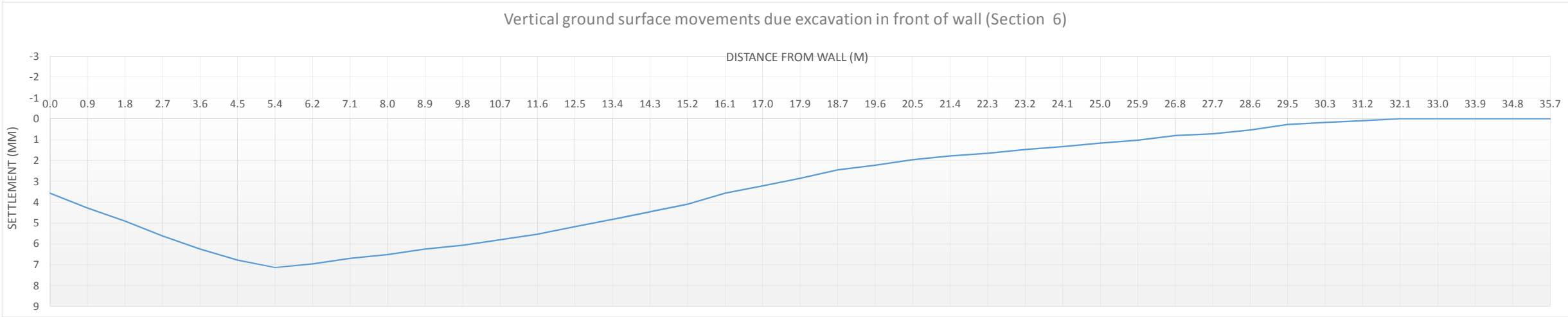


Settlement due to excavation in front of wall (SECTION 6)

Excavation depth	=	8.925 m
Pile Length	=	13.3875 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

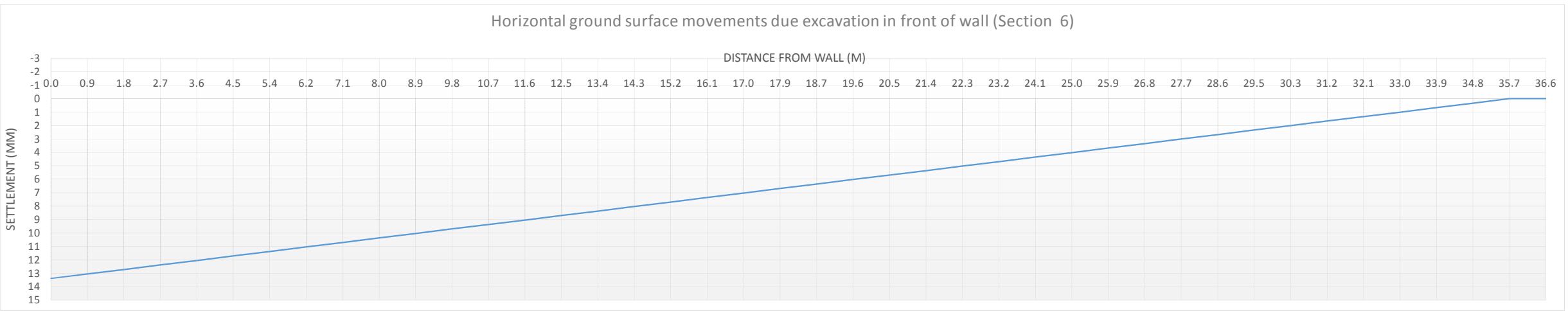
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	0.8925	1.785	2.6775	3.57	4.4625	5.355	6.2475	7.14	8.0325	8.925	9.8175	10.71	11.6025	12.495	13.3875	14.28	15.1725	16.065	16.9575	17.85	18.7425	19.635	20.5275	21.42	22.3125	23.205	24.0975	24.99	25.8825	26.775	27.6675	28.56	29.4525	30.345	31.2375	32.13	33.0225	33.915	34.8075	35.7	36.5925	37.485	38.3775	39.27
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	3.57	4.284	4.90875	5.62275	6.2475	6.783	7.14	6.9615	6.69375	6.51525	6.2475	6.069	5.80125	5.5335	5.1765	4.8195	4.4625	4.1055	3.57	3.213	2.856	2.454375	2.23125	1.9635	1.785	1.651125	1.472625	1.33875	1.16025	1.026375	0.80325	0.714	0.5355	0.26775	0.1785	0.08925	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	0.8925	1.785	2.6775	3.57	4.4625	5.355	6.2475	7.14	8.0325	8.925	9.8175	10.71	11.6025	12.495	13.3875	14.28	15.1725	16.065	16.9575	17.85	18.7425	19.635	20.5275	21.42	22.3125	23.205	24.0975	24.99	25.8825	26.775	27.6675	28.56	29.4525	30.345	31.2375	32.13	33.0225	33.915	34.8075	35.7	36.5925
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	13.3875	13.05281	12.71813	12.38344	12.04875	11.71406	11.37938	11.04469	10.71	10.37531	10.04063	9.705937	9.37125	9.036563	8.701875	8.367187	8.0325	7.697812	7.363125	7.028437	6.69375	6.359062	6.024375	5.689687	5.355	5.020312	4.685625	4.350937	4.01625	3.681562	3.346875	3.012187	2.6775	2.342812	2.008125	1.673437	1.33875	1.004062	0.669375	0.334687	0	0



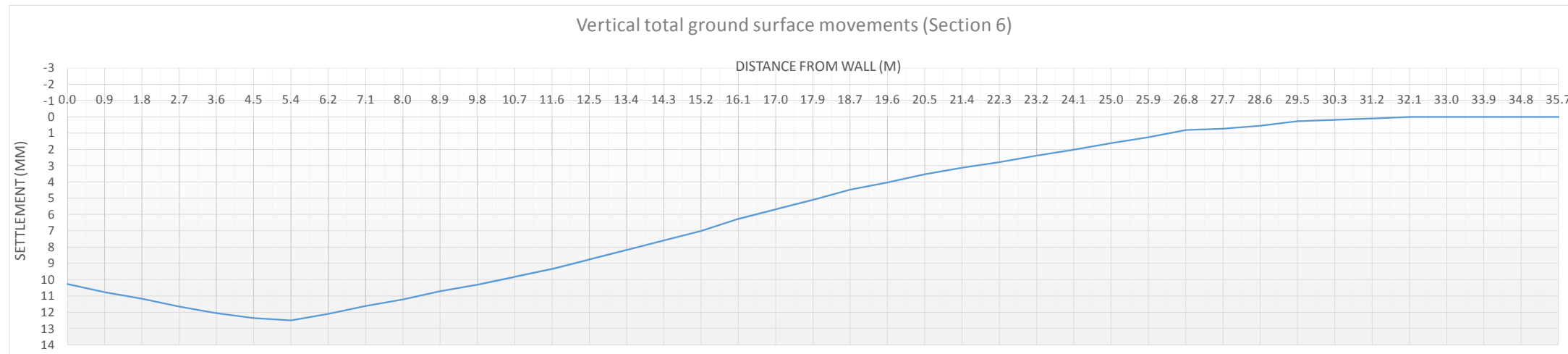
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Distance	0	1.33875	2.6775	4.01625	5.355	6.69375	8.0325	9.37125	10.71	12.04875	13.3875	14.72625	16.065	17.40375	18.7425	20.08125	21.42	22.75875	24.0975	25.43625	26.775	28.11375	29.4525	30.79125	32.13	33.46875	34.8075	36.14625	37.485	38.82375	40.1625	41.50125
0.502031	Settlement	13.3875	12.88547	12.38344	11.88141	11.37938	10.87734	10.37531	9.873281	9.37125	8.869219	8.367187	7.865156	7.363125	6.861094	6.359062	5.857031	5.355	4.852969	4.350937	3.848906	3.346875	2.844844	2.342812	1.840781	1.33875	0.836719	0.334687	0	0	0	0	0

Settlement due to wall installation and deflection (SECTION 6)

Excavation depth	=	8.925 m
Pile Length	=	13.3875 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

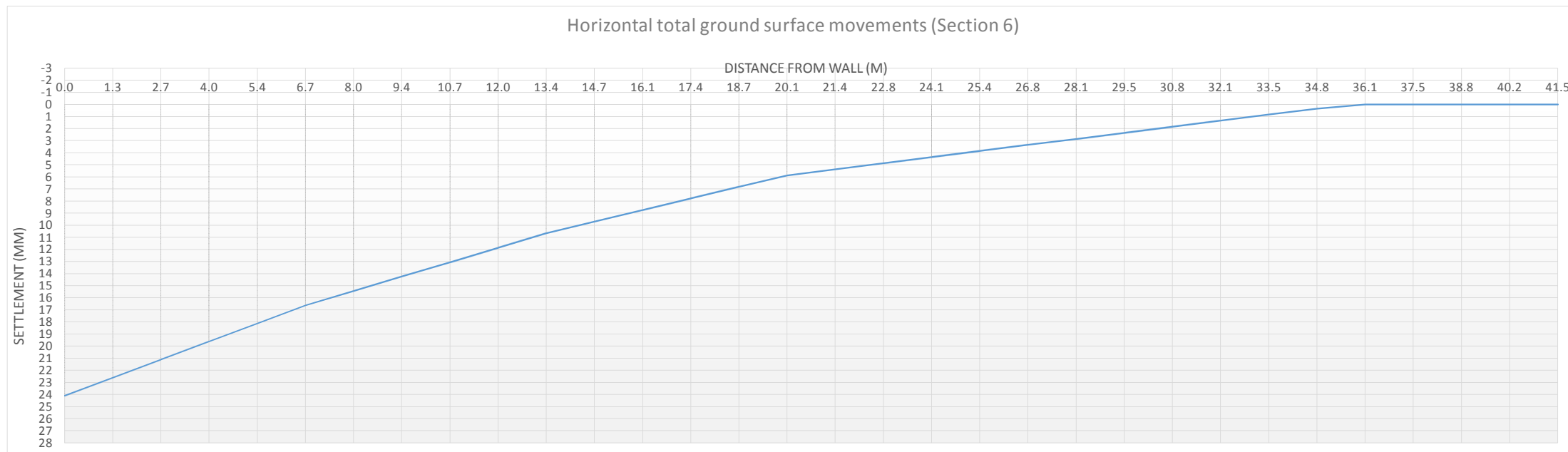
VERTICAL

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	
Distance	0	0.8925	1.785	2.6775	3.57	4.4625	5.355	6.2475	7.14	8.0325	8.925	9.8175	10.71	11.6025	12.495	13.3875	14.28	15.1725	16.065	16.9575	17.85	18.7425	19.635	20.5275	21.42	22.3125	23.205	24.0975	24.99	25.8825	26.775	27.6675	28.56	29.4525	30.345	31.2375	32.13	33.0225	33.915	34.8075	35.7	
Settlement due to wall installation	6.69375	6.470625	6.2475	6.024375	5.80125	5.578125	5.355	5.131875	4.90875	4.685625	4.4625	4.239375	4.01625	3.793125	3.57	3.346875	3.12375	2.900625	2.6775	2.454375	2.23125	2.008125	1.785	1.561875	1.33875	1.115625	0.8925	0.669375	0.44625	0.223125	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	3.57	4.284	4.90875	5.62275	6.2475	6.783	7.14	6.9615	6.69375	6.51525	6.2475	6.069	5.80125	5.5335	5.1765	4.8195	4.4625	4.1055	3.57	3.213	2.856	2.454375	2.23125	1.9635	1.785	1.651125	1.472625	1.33875	1.16025	1.026375	0.80325	0.714	0.5355	0.26775	0.1785	0.08925	0	0	0	0	0	0
Total Settlement	10.26375	10.75463	11.15625	11.64713	12.04875	12.36113	12.495	12.09338	11.6025	11.20088	10.71	10.30838	9.8175	9.326625	8.7465	8.166375	7.58625	7.006125	6.2475	5.667375	5.08725	4.4625	4.01625	3.525375	3.12375	2.76675	2.365125	2.008125	1.6065	1.2495	0.80325	0.714	0.5355	0.26775	0.1785	0.08925	0	0	0	0	0	0



HORIZONTAL

	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Distance	0	1.33875	2.6775	4.01625	5.355	6.69375	8.0325	9.37125	10.71	12.04875	13.3875	14.72625	16.065	17.40375	18.7425	20.08125	21.42	22.75875	24.0975	25.43625	26.775	28.11375	29.4525	30.79125	32.13	33.46875	34.8075	36.14625	37.485	38.82375	40.1625	41.50125
Settlement due to wall installation	10.71	9.719325	8.72865	7.737975	6.7473	5.756625	5.060475	4.364325	3.668175	2.972025	2.275875	1.8207	1.365525	0.91035	0.455175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Settlement due to excavation in front of wall	13.3875	12.88547	12.38344	11.88141	11.37938	10.87734	10.37531	9.873281	9.37125	8.869219	8.367187	7.865156	7.363125	6.861094	6.359062	5.857031	5.355	4.852969	4.350937	3.848906	3.346875	2.844844	2.342812	1.840781	1.33875	0.836719	0.334687	0	0	0	0	0	
Total Settlement	24.0975	22.60479	21.11209	19.61938	18.12668	16.63397	15.43579	14.23761	13.03943	11.84124	10.64306	9.685856	8.72865	7.771444	6.814237	5.857031	5.355	4.852969	4.350937	3.848906	3.346875	2.844844	2.342812	1.840781	1.33875	0.836719	0.334687	0	0	0	0	0	

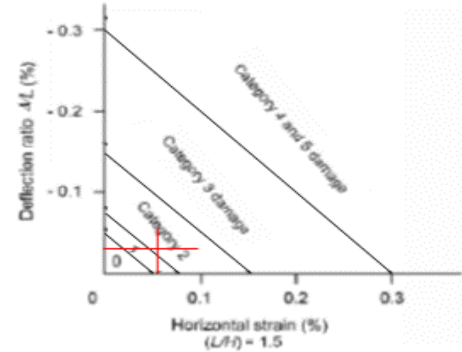
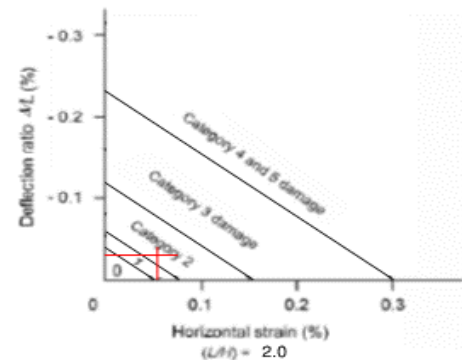


Category Assessment (SECTION 6)

L	=	45 m
H	=	27 m
Δ	=	0.012495 m
δ	=	0.024098 m
L/H	=	1.666667
δ/L	=	0.05355 %
Δ/L	=	0.027767 %

From CIRIA C580 Figure 2.18:

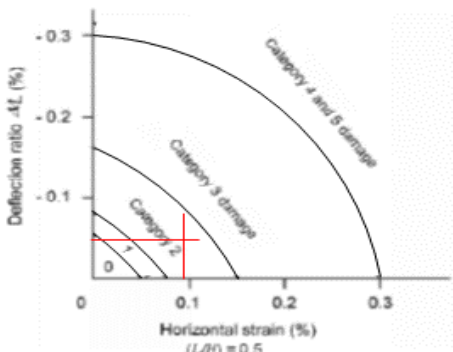
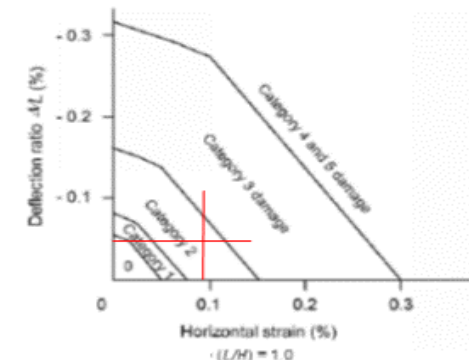
CATEGORY 2



L ₁	=	15 m
H ₁	=	27 m
Δ ₁	=	0.0067 m
δ ₁	=	0.0139 m
L ₁ /H ₁	=	0.555556
δ ₁ /L ₁	=	0.092667 %
Δ ₁ /L ₁	=	0.044667 %

From CIRIA C580 Figure 2.18:

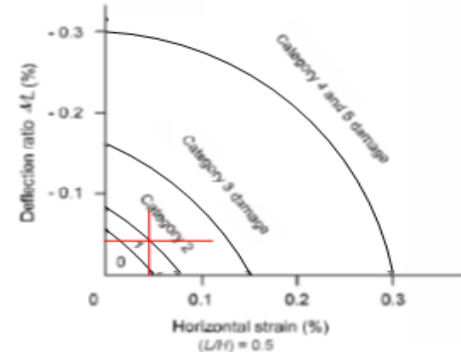
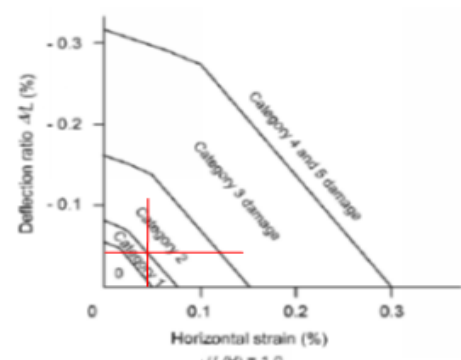
CATEGORY 2



L ₂	=	15 m
H ₂	=	27 m
Δ ₂	=	0.0058 m
δ ₂	=	0.0066 m
L ₂ /H ₂	=	0.555556
δ ₂ /L ₂	=	0.044 %
Δ ₂ /L ₂	=	0.038667 %

From CIRIA C580 Figure 2.18:

CATEGORY 1



L ₃	=	15 m
H ₃	=	27 m
Δ ₃	=	0 m
δ ₃	=	0.0015 m
L ₃ /H ₃	=	0.555556
δ ₃ /L ₃	=	0.01 %
Δ ₃ /L ₃	=	0 %

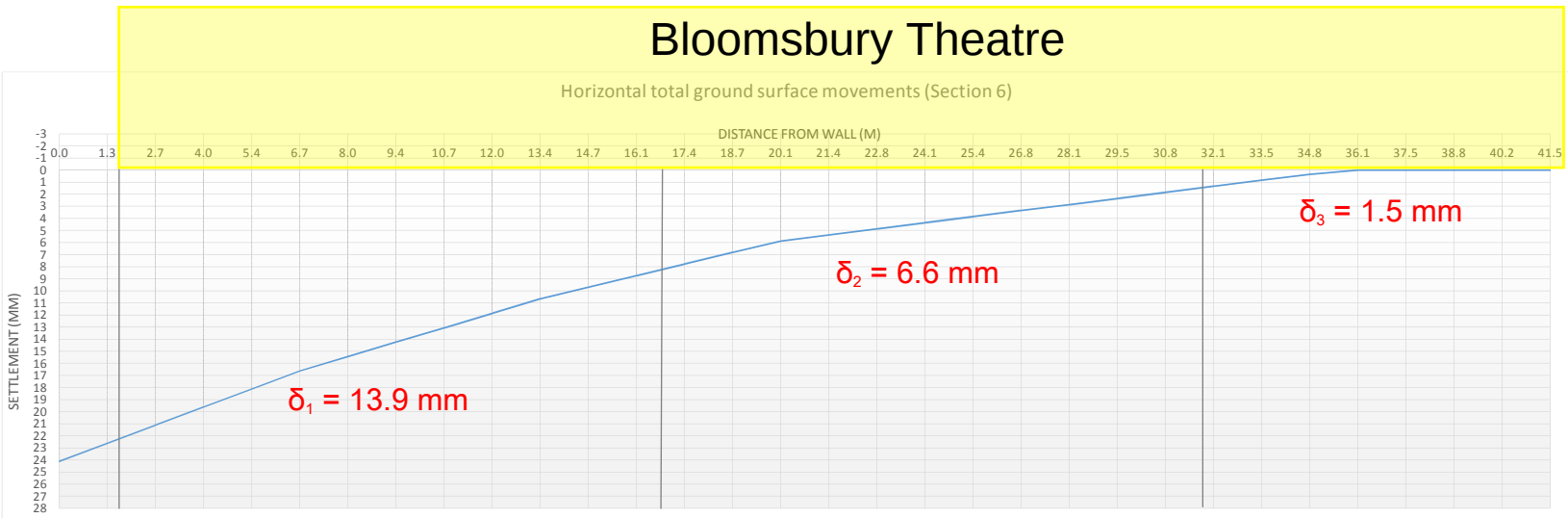
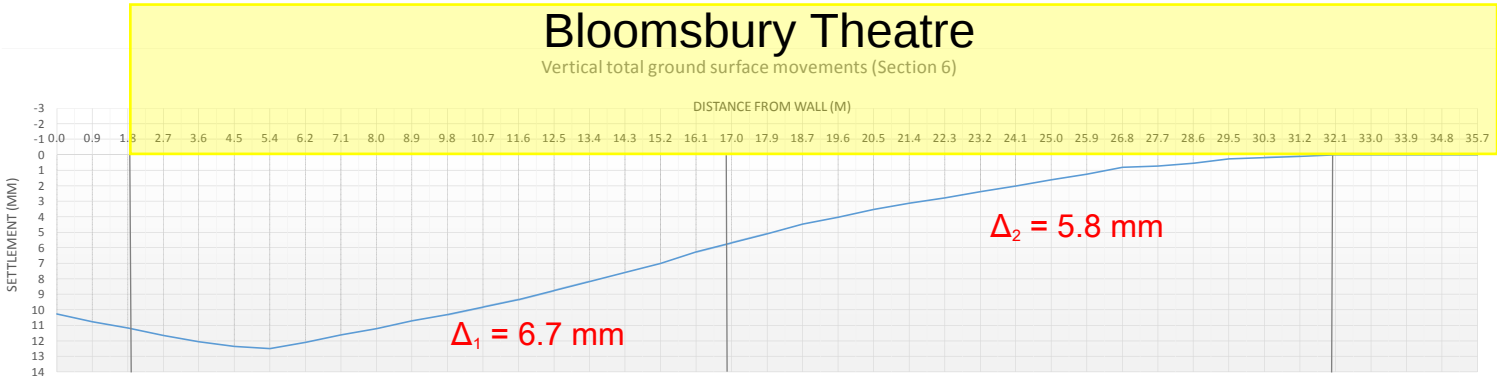
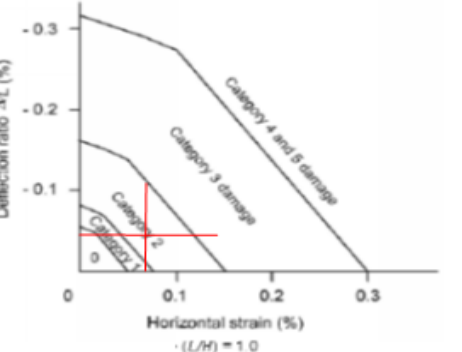
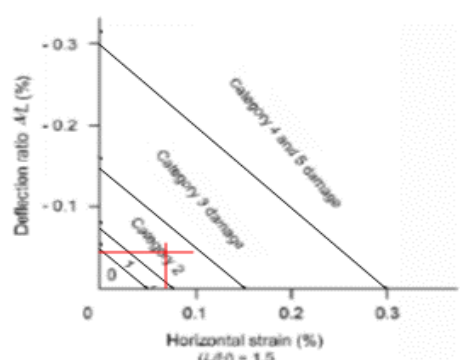
From CIRIA C580 Figure 2.18:

CATEGORY 0

L ₁₊₂	=	30 m
H ₁₊₂	=	27 m
Δ ₁₊₂	=	0.0125 m
δ ₁₊₂	=	0.0205 m
L ₁₊₂ /H ₁₊₂	=	1.111111
δ ₁₊₂ /L ₁₊₂	=	0.068333 %
Δ ₁₊₂ /L ₁₊₂	=	0.041667 %

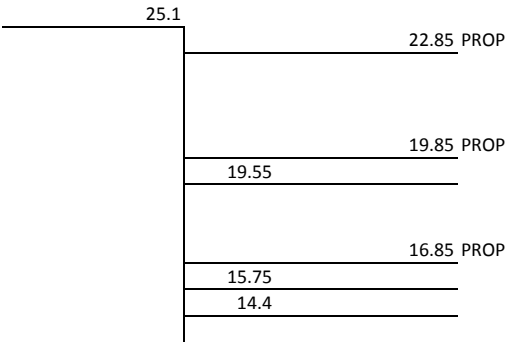
From CIRIA C580 Figure 2.18:

CATEGORY 2



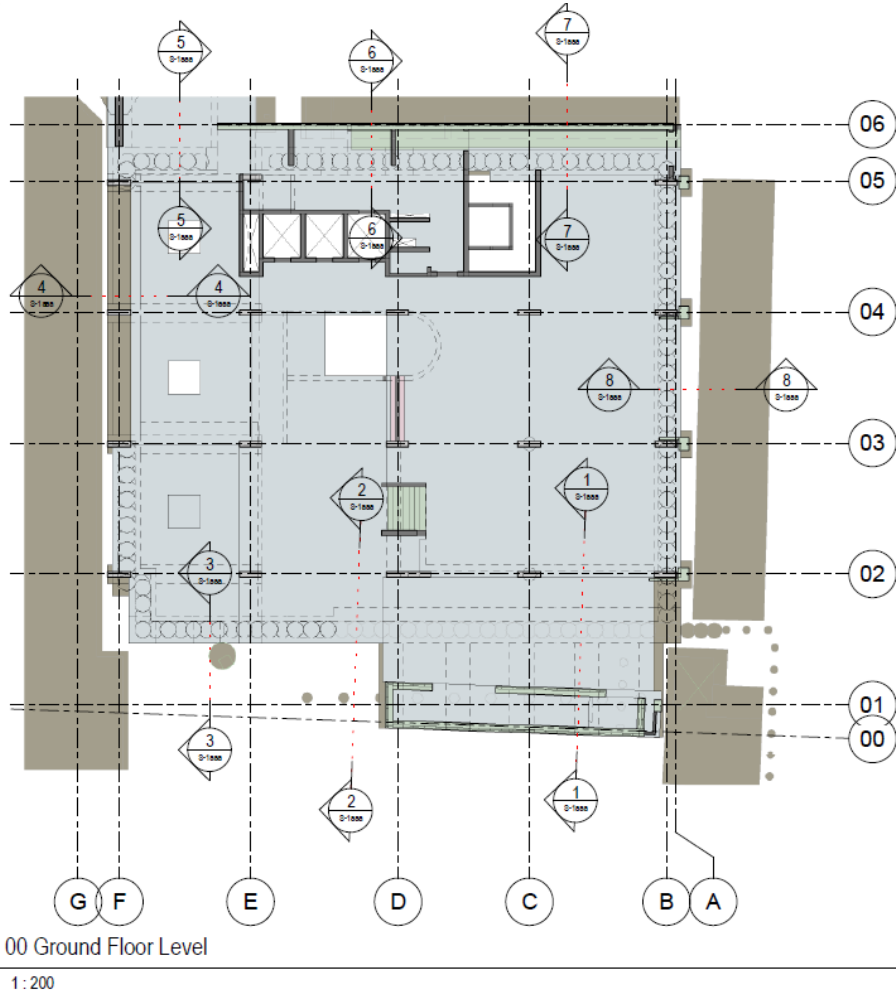
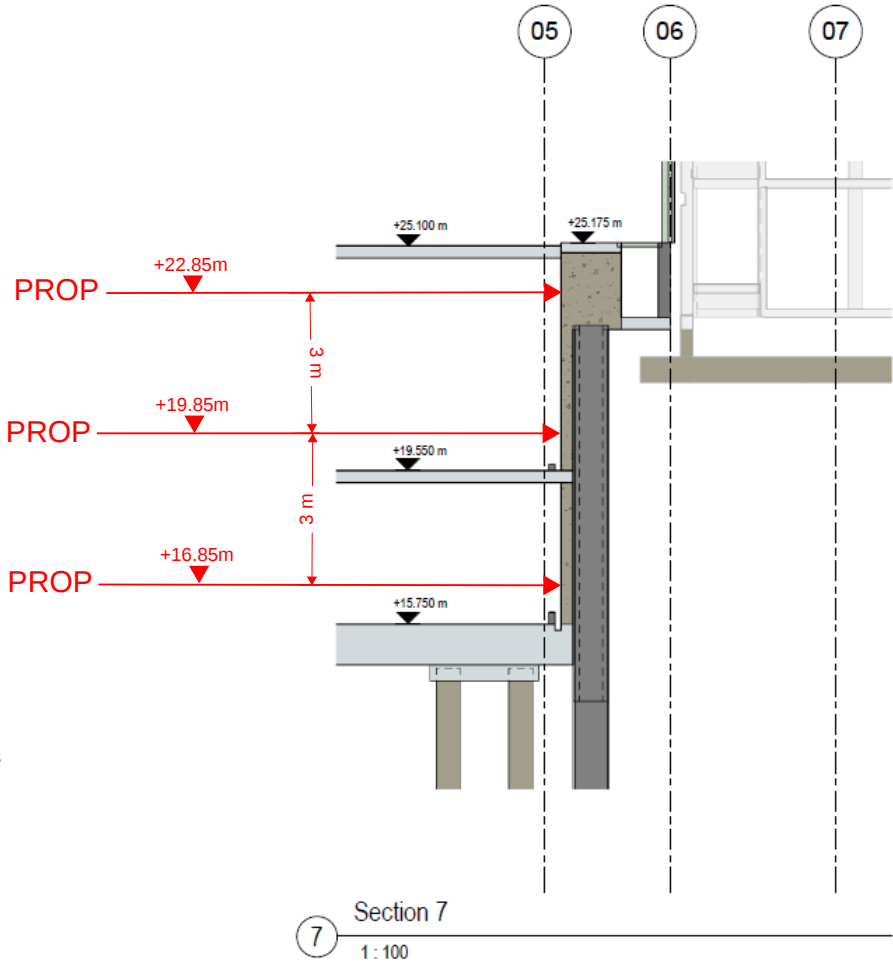
SECTION 7

Properties



SECANT PILING			
Excavation depth	=	10.7 m	
Pile Length	=	16.05 m	= 1.5 x excavation depth
Pile diameter	=	880 mm	
EI	=	565600 kN.m ² /m	
h	=	3 m	= average depth between props

Damage Category 2 Wall

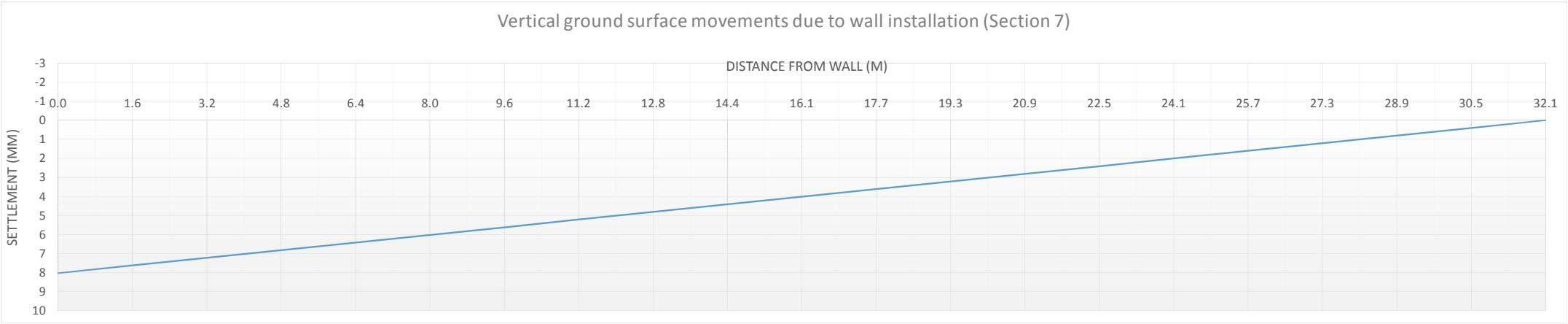


Settlement due to wall installation (SECTION 7)

Excavation depth	=	10.7 m
Pile Length	=	16.05 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

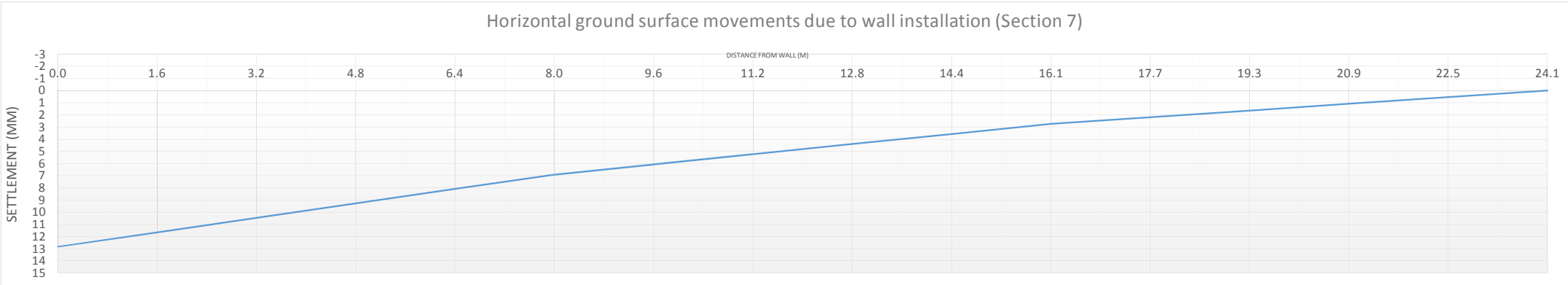
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6
Distance	0	1.605	3.21	4.815	6.42	8.025	9.63	11.235	12.84	14.445	16.05	17.655	19.26	20.865	22.47	24.075	25.68	27.285	28.89	30.495	32.1	33.705	35.31	36.915	38.52	40.125	41.73
%Settlement/Wall depth	0.05	0.0475	0.045	0.0425	0.04	0.0375	0.035	0.0325	0.03	0.0275	0.025	0.0225	0.02	0.0175	0.015	0.0125	0.01	0.0075	0.005	0.0025	0	0	0	0	0	0	0
Settlement	8.025	7.62375	7.2225	6.82125	6.42	6.01875	5.6175	5.21625	4.815	4.41375	4.0125	3.61125	3.21	2.80875	2.4075	2.00625	1.605	1.20375	0.8025	0.40125	0	0	0	0	0	0	0



	Distance	0	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.7	11.77	12.84	13.91	14.98	16.05	17.12	18.19	19.26	20.33	21.4	22.47	23.54	24.61	25.68	26.75	27.82	28.89	29.96	31.03	32.1	33.17	34.24	35.31	36.38	37.45	38.52	39.59	40.66	41.73	42.8	43.87	44.94
0.2675	Settlement	8.025	7.7575	7.49	7.2225	6.955	6.6875	6.42	6.1525	5.885	5.6175	5.35	5.0825	4.815	4.5475	4.28	4.0125	3.745	3.4775	3.21	2.9425	2.675	2.4075	2.14	1.8725	1.605	1.3375	1.07	0.8025	0.535	0.2675	0	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL

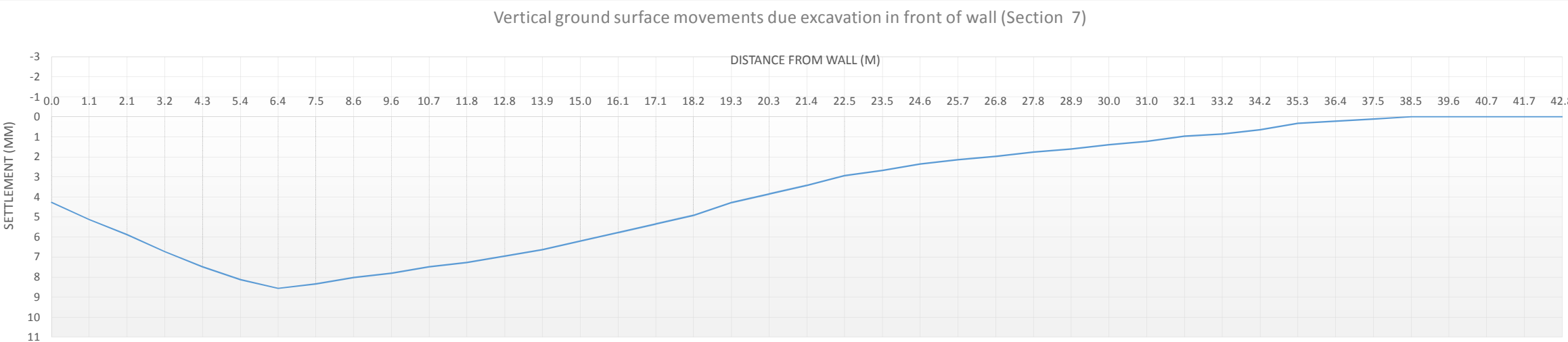
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
Distance	0	1.605	3.21	4.815	6.42	8.025	9.63	11.235	12.84	14.445	16.05	17.655	19.26	20.865	22.47	24.075	25.68	27.285	28.89	30.495	32.1	33.705	35.31	36.915	38.52	40.125	41.73	43.335	44.94	46.545	48.15	49.755
%Settlement/Wall depth	0.08	0.0726	0.0652	0.0578	0.0504	0.043	0.0378	0.0326	0.0274	0.0222	0.017	0.0136	0.0102	0.0068	0.0034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement	12.84	11.6523	10.4646	9.2769	8.0892	6.9015	6.0669	5.2323	4.3977	3.5631	2.7285	2.1828	1.6371	1.0914	0.5457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Settlement due to excavation in front of wall (SECTION 7)

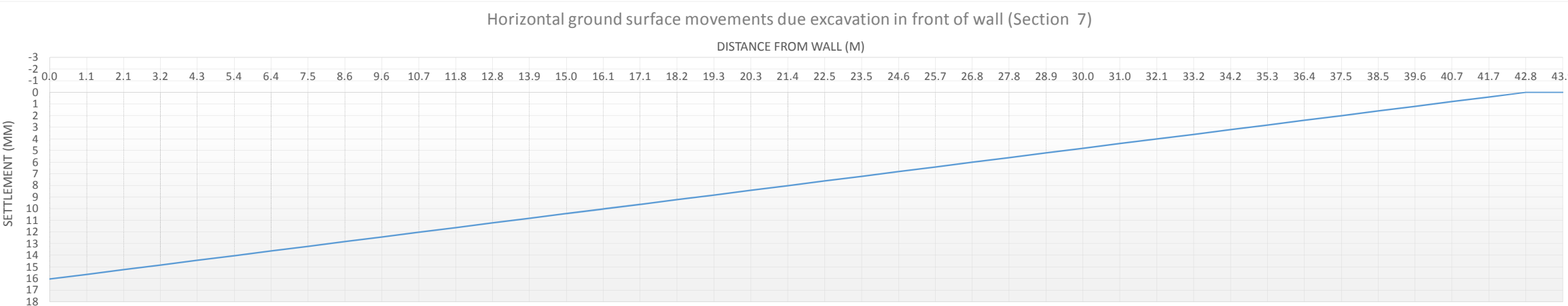
Excavation depth	=	10.7 m
Pile Length	=	16.05 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL

[illegible]

HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Distance	0	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.7	11.77	12.84	13.91	14.98	16.05	17.12	18.19	19.26	20.33	21.4	22.47	23.54	24.61	25.68	26.75	27.82	28.89	29.96	31.03	32.1	33.17	34.24	35.31	36.38	37.45	38.52	39.59	40.66	41.73	42.8	43.87	44.94	46.01	47.08	48.15	49.22	50.29	51.36	52.43	53.5	54.57	55.64	56.71	57.78	58.85	59.92	60.99	62.06	63.13	64.2	65.27	66.34	67.41	68.48	69.55	70.62	71.69	72.76	73.83	74.9	75.97	77.04	78.11	79.18	80.25	81.32	82.39	83.46	84.53	85.6	86.67	87.74	88.81	89.88	90.95	92.02	93.09	94.16	95.23	96.3	97.37	98.44	99.51	100.58	101.65	102.72	103.79	104.86	105.93	107	108.07	109.14	110.21	111.28	112.35	113.42	114.49	115.56	116.63	117.7	118.77	119.84	120.91	121.98	123.05	124.12	125.19	126.26	127.33	128.4	129.47	130.54	131.61	132.68	133.75	134.82	135.89	136.96	138.03	139.1	140.17	141.24	142.31	143.38	144.45	145.52	146.59	147.66	148.73	149.8	150.87	151.94	153.01	154.08	155.15	156.22	157.29	158.36	159.43	160.5	161.57	162.64	163.71	164.78	165.85	166.92	167.99	169.06	170.13	171.2	172.27	173.34	174.41	175.48	176.55	177.62	178.69	179.76	180.83	181.9	182.97	184.04	185.11	186.18	187.25	188.32	189.39	190.46	191.53	192.6	193.67	194.74	195.81	196.88	197.95	199.02	200.09	201.16	202.23	203.3	204.37	205.44	206.51	207.58	208.65	209.72	210.79	211.86	212.93	214	215.07	216.14	217.21	218.28	219.35	220.42	221.49	222.56	223.63	224.7	225.77	226.84	227.91	228.98	230.05	231.12	232.19	233.26	234.33	235.4	236.47	237.54	238.61	239.68	240.75	241.82	242.89	243.96	245.03	246.1	247.17	248.24	249.31	250.38	251.45	252.52	253.59	254.66	255.73	256.8	257.87	258.94	260.01	261.08	262.15	263.22	264.29	265.36	266.43	267.5	268.57	269.64	270.71	271.78	272.85	273.92	274.99	276.06	277.13	278.2	279.27	280.34	281.41	282.48	283.55	284.62	285.69	286.76	287.83	288.9	290	291.07	292.14	293.21	294.28	295.35	296.42	297.49	298.56	299.63	300.7	301.77	302.84	303.91	304.98	306.05	307.12	308.19	309.26	310.33	311.4	312.47	313.54	314.61	315.68	316.75	317.82	318.89	319.96	321.03	322.1	323.17	324.24	325.31	326.38	327.45	328.52	329.59	330.66	331.73	332.8	333.87	334.94	336.01	337.08	338.15	339.22	340.29	341.36	342.43	343.5	344.57	345.64	346.71	347.78	348.85	349.92	351	352.07	353.14	354.21	355.28	356.35	357.42	358.49	359.56	360.63	361.7	362.77	363.84	364.91	365.98	367.05	368.12	369.19	370.26	371.33	372.4	373.47	374.54	375.61	376.68	377.75	378.82	379.89	380.96	382.03	383.1	384.17	385.24	386.31	387.38	388.45	389.52	390.59	391.66	392.73	393.8	394.87	395.94	397.01	398.08	399.15	400.22	401.29	402.36	403.43	404.5	405.57	406.64	407.71	408.78	409.85	410.92	412	413.07	414.14	415.21	416.28	417.35	418.42	419.49	420.56	421.63	422.7	423.77	424.84	425.91	426.98	428.05	429.12	430.19	431.26	432.33	433.4	434.47	435.54	436.61	437.68	438.75	439.82	440.89	441.96	443.03	444.1	445.17	446.24	447.31	448.38	449.45	450.52	451.59	452.66	453.73	454.8	455.87	456.94	458.01	459.08	460.15	461.22	462.29	463.36	464.43	465.5	466.57	467.64	468.71	469.78	470.85	471.92	472.99	474.06	475.13	476.2	477.27	478.34	479.41	480.48	481.55	482.62	483.69	484.76	485.83	486.9	487.97	489.04	490.11	491.18	492.25	493.32	494.39	495.46	496.53	497.6	498.67	499.74	500.81	501.88	502.95	504.02	505.09	506.16	507.23	508.3	509.37	510.44	511.51	512.58	513.65	514.72	515.79	516.86	517.93	519	520.07	521.14	522.21	523.28	524.35	525.42	526.49	527.56	528.63	529.7	530.77	531.84	532.91	533.98	535.05	536.12	537.19	538.26	539.33	540.4	541.47	542.54	543.61	544.68	545.75	546.82	547.89	548.96	550.03	551.1	552.17	553.24	554.31	555.38	556.45	557.52	558.59	559.66	560.73	561.8	562.87	563.94	565.01	566.08	567.15	568.22	569.29	570.36	571.43	572.5	573.57	574.64	575.71	576.78	577.85	578.92	579.99	581.06	582.13	583.2	584.27	585.34	586.41	587.48	588.55	589.62	590.69	591.76	592.83	593.9	594.97	596.04	597.11	598.18	599.25	600.32	601.39	602.46	603.53	604.6	605.67	606.74	607.81	608.88	609.95	611.02	612.09	613.16	614.23	615.3	616.37	617.44	618.51	619.58	620.65	621.72	622.79	623.86	624.93	626	627.07	628.14	629.21	630.28	631.35	632.42	633.49	634.56	635.63	636.7	637.77	638.84	639.91	640.98	642.05	643.12	644.19	645.26	646.33	647.4	648.47	649.54	650.61	651.68	652.75	653.82	654.89	655.96	657.03	658.1	659.17	660.24	661.31	662.38	663.45	664.52	665.59	666.66	667.73	668.8	669.87	670.94	672.01	673.08	674.15	675.22	676.29	677.36	678.43	679.5	680.57	681.64	682.71	683.78	684.85	685.92	686.99	688.06	689.13	690.2	691.27	692.34	693.41	694.48	695.55	696.62	697.69	698.76	699.83	700.9	701.97	703.04	704.11	705.18	706.25	707.32	708.39	709.46	710.53	711.6	712.67	713.74	714.81	715.88	716.95	718.02	719.09	720.16	721.23	722.3	723.37	724.44	725.51	726.58	727.65	728.72	729.79	730.86	731.93	733	734.07	735.14	736.21	737.28	738.35	739.42	740.49	741.56	742.63	743.7	744.77	745.84	746.91	747.98	749.05	750.12	751.19	752.26	753.33	754.4	755.47	756.54	757.61	758.68	759.75	760.82	761.89	762.96	764.03	765.1	766.17	767.24	768.31	769.38	770.45	771.



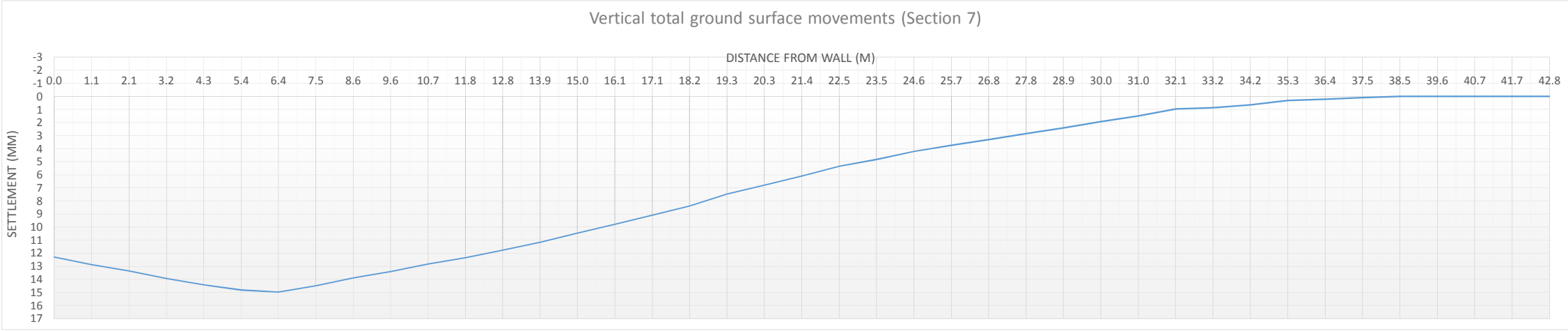
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3
Distance	0	1.605	3.21	4.815	6.42	8.025	9.63	11.235	12.84	14.445	16.05	17.655	19.26	20.865	22.47	24.075	25.68	27.285	28.89	30.495	32.1	33.705	35.31	36.915	38.52	40.125	41.73	43.335	44.94	46.545	48.15	49.755
Settlement	16.05	15.44813	14.84625	14.24438	13.6425	13.04063	12.43875	11.83688	11.235	10.63313	10.03125	9.429375	8.8275	8.225625	7.62375	7.021875	6.42	5.818125	5.21625	4.6134375	4.0125	3.410625	2.80875	2.206875	1.605	1.003125	0.40125	0	0	0	0	0

Settlement due to wall installation and deflection (SECTION 7)

Excavation depth = 10.7 m
Pile Length = 16.05 m
Pile diameter = 880 mm
EI = 565600 kN.m²/m

VERTICAL

Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	
	0	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.7	11.77	12.84	13.91	14.98	16.05	17.12	18.19	19.26	20.33	21.4	22.47	23.54	24.61	25.68	26.75	27.82	28.89	29.96	31.03	32.1	33.17	34.24	35.31	36.38	37.45	38.52	39.59	40.66	41.73	42.8	
Settlement due to wall installation	8.025	7.7575	7.49	7.2225	6.955	6.6875	6.42	6.1525	5.885	5.6175	5.35	5.0825	4.815	4.5475	4.28	4.0125	3.745	3.4775	3.21	2.9425	2.675	2.4075	2.14	1.8725	1.605	1.3375	1.07	0.8025	0.535	0.2675	0	0	0	0	0	0	0	0	0	0	0	
Settlement due to excavation in front of wall	4.28	5.136	5.885	6.741	7.49	8.132	8.56	8.346	8.025	7.811	7.49	7.276	6.955	6.634	6.206	5.778	5.35	4.922	4.28	3.852	3.424	2.9425	2.675	2.354	2.14	1.9795	1.7655	1.605	1.391	1.2305	0.963	0.856	0.642	0.321	0.214	0.107	0	0	0	0	0	0
Total Settlement	12.305	12.8935	13.375	13.9635	14.445	14.8195	14.98	14.4985	13.91	13.4285	12.84	12.3585	11.77	11.1815	10.486	9.7905	9.095	8.3995	7.49	6.7945	6.099	5.35	4.815	4.2265	3.745	3.317	2.8355	2.4075	1.926	1.498	0.963	0.856	0.642	0.321	0.214	0.107	0	0	0	0	0	0

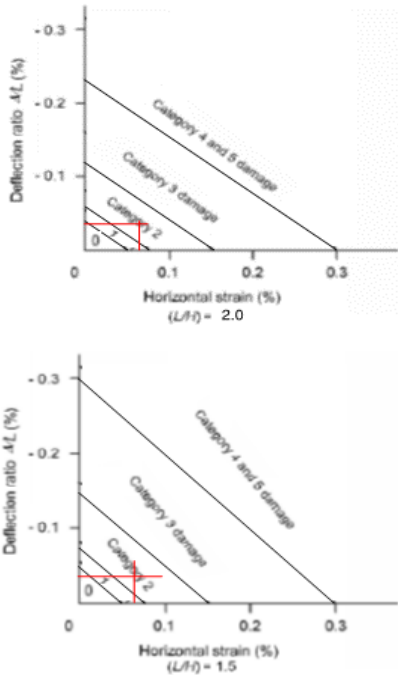


Category Assessment (SECTION 7)

L	=	45 m
H	=	27 m
Δ	=	0.01498 m
δ	=	0.02889 m
L/H	=	1.666667
δ/L	=	0.0642 %
Δ/L	=	0.033289 %

From CIRIA C580 Figure 2.18:

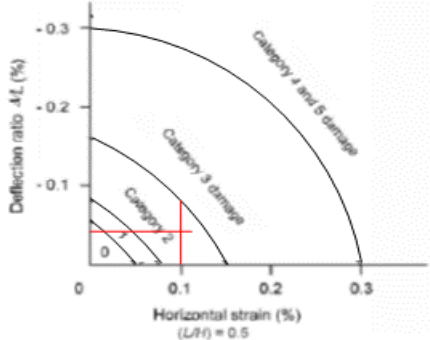
CATEGORY 2



L_1	=	15 m
H_1	=	27 m
Δ_1	=	0.0058 m
δ_1	=	0.0147 m
L_1/H_1	=	0.555556
δ_1/L_1	=	0.098 %
Δ_1/L_1	=	0.038667 %

From CIRIA C580 Figure 2.18:

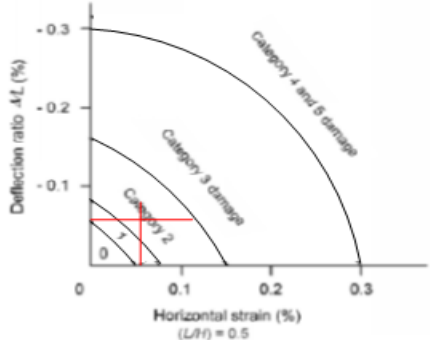
CATEGORY 2



L_2	=	15 m
H_2	=	27 m
Δ_2	=	0.0081 m
δ_2	=	0.0081 m
L_2/H_2	=	0.555556
δ_2/L_2	=	0.054 %
Δ_2/L_2	=	0.054 %

From CIRIA C580 Figure 2.18:

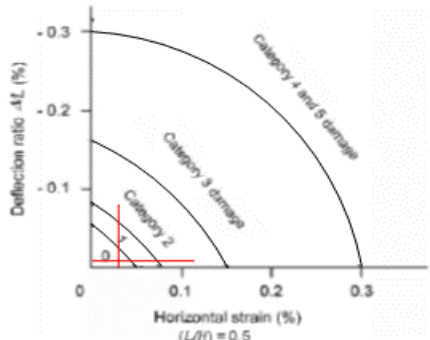
CATEGORY 2



L_3	=	15 m
H_3	=	27 m
Δ_3	=	0.0011 m
δ_3	=	0.0042 m
L_3/H_3	=	0.555556
δ_3/L_3	=	0.028 %
Δ_3/L_3	=	0.007333 %

From CIRIA C580 Figure 2.18:

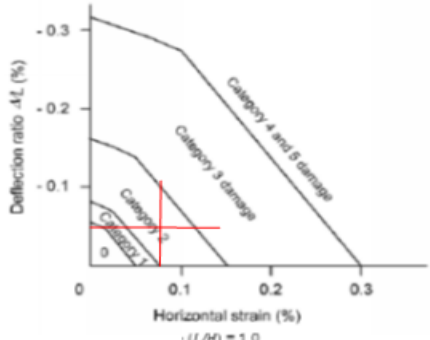
CATEGORY 0



L_{1+2}	=	30 m
H_{1+2}	=	27 m
Δ_{1+2}	=	0.0139 m
δ_{1+2}	=	0.0228 m
L_{1+2}/H_{1+2}	=	1.111111
δ_{1+2}/L_{1+2}	=	0.076 %
Δ_{1+2}/L_{1+2}	=	0.046333 %

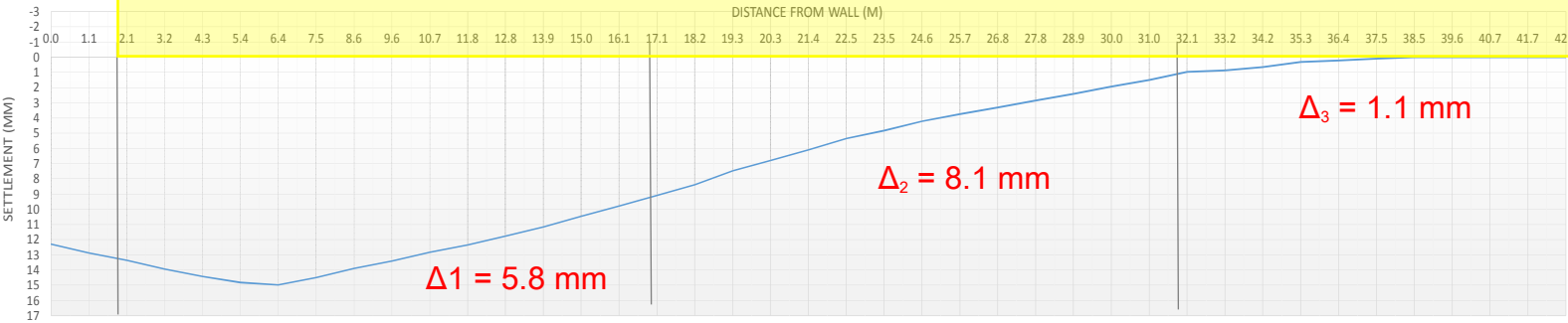
From CIRIA C580 Figure 2.18:

CATEGORY 2



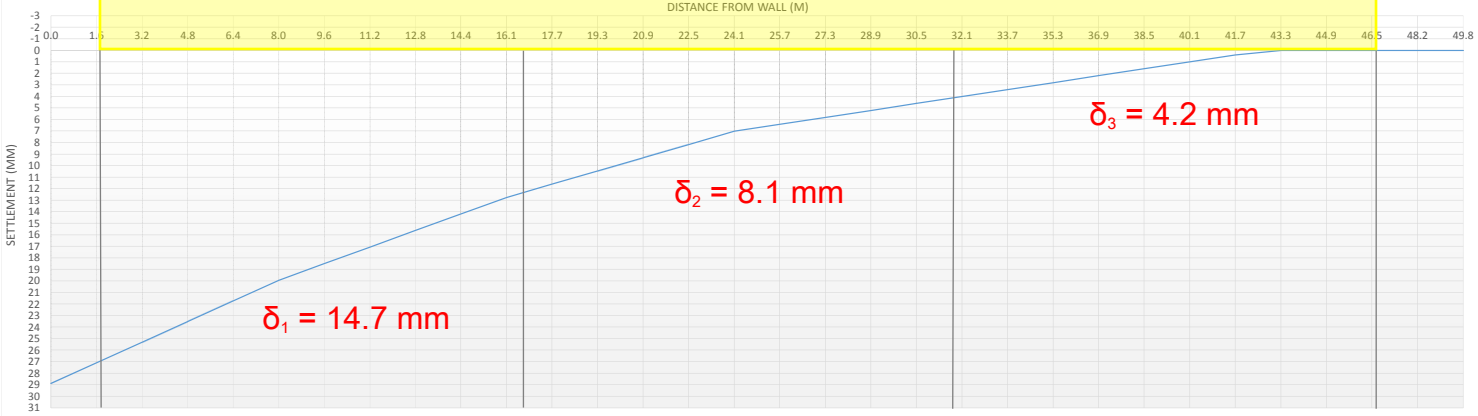
Bloomsbury Theatre

Vertical total ground surface movements (Section 7)



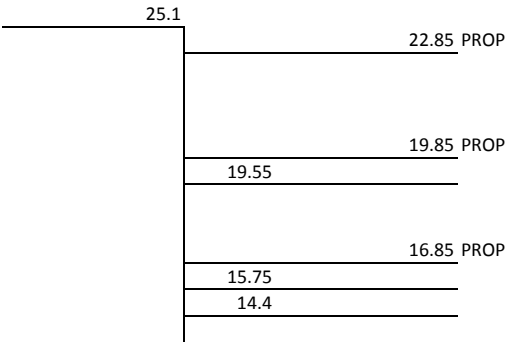
Bloomsbury Theatre

Horizontal total ground surface movements (Section 7)



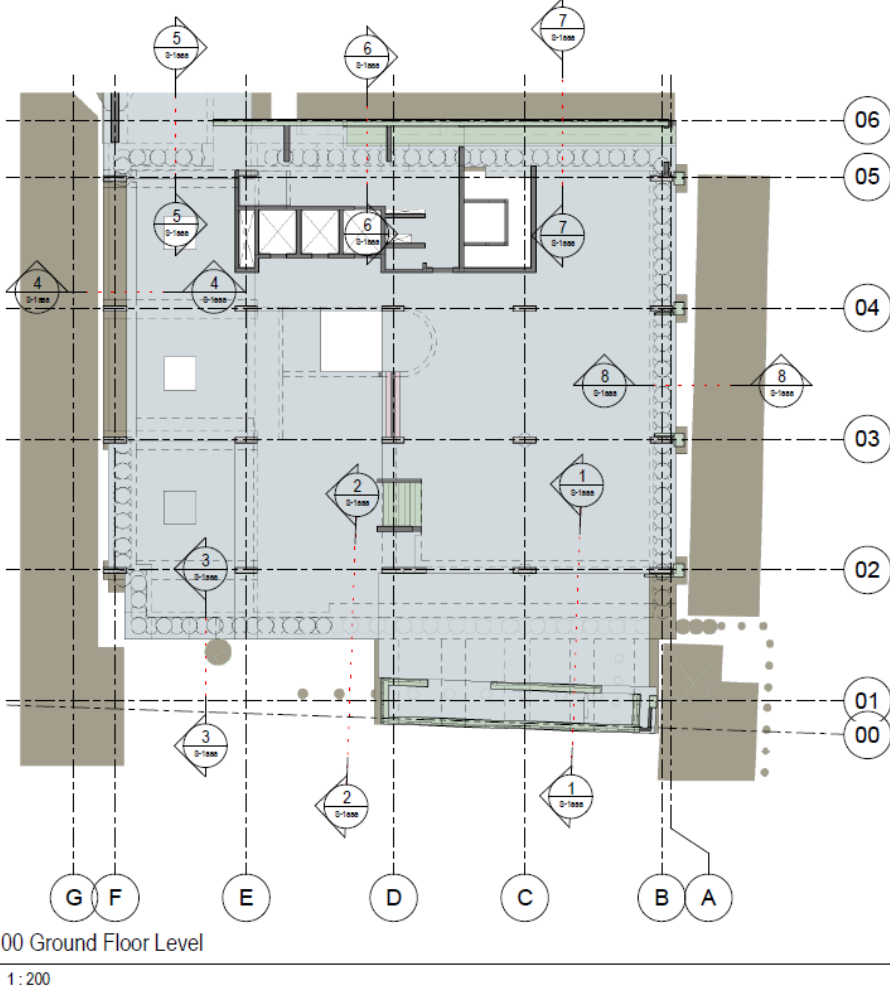
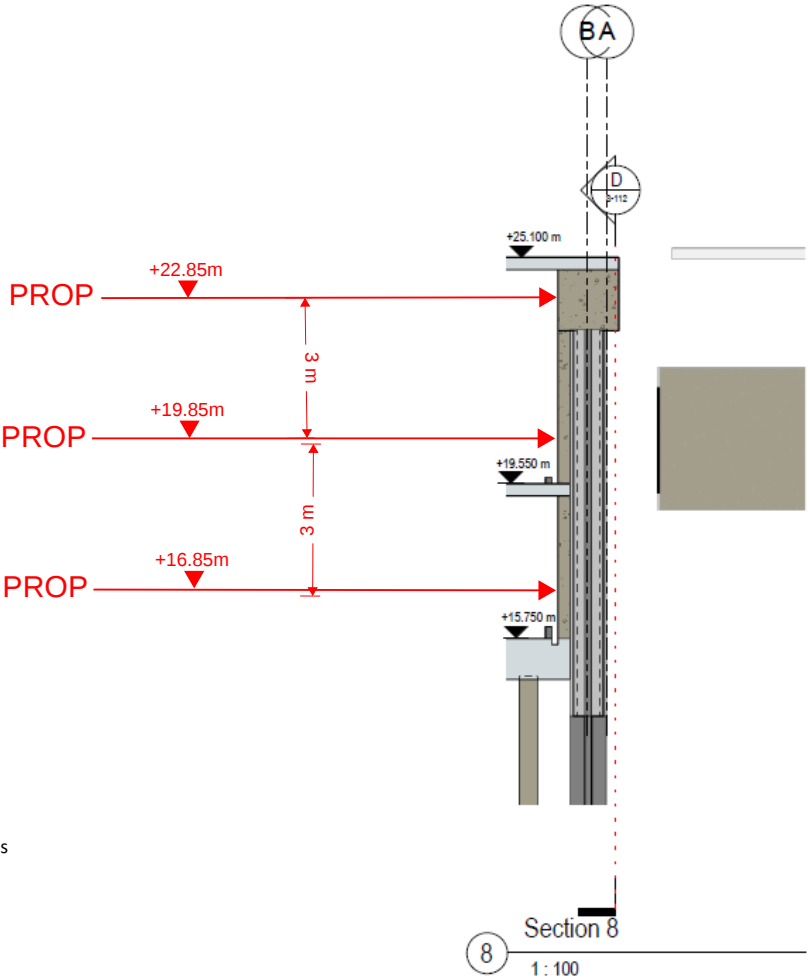
SECTION 8

Properties



SECANT PILING		
Excavation depth	=	10.7 m
Pile Length	=	16.05 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m
h	=	3 m

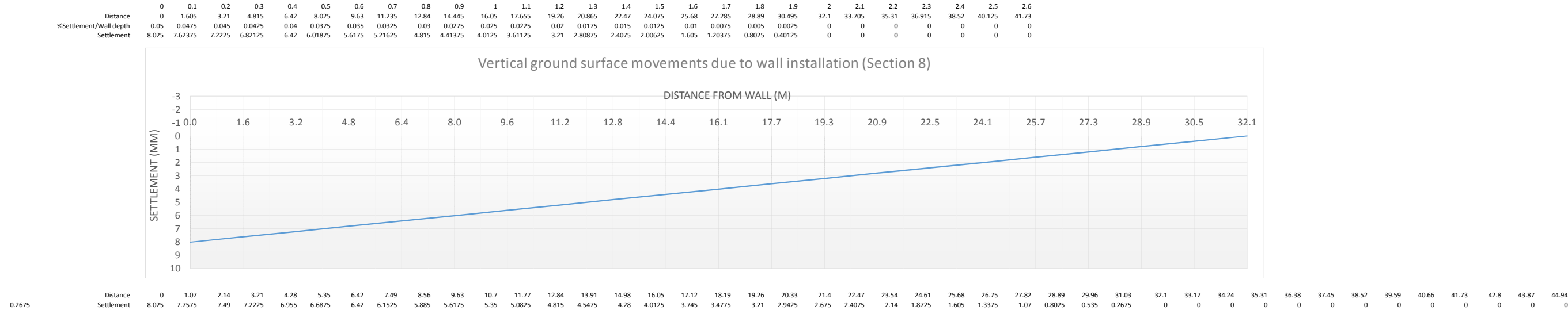
Damage Category 2 Wall



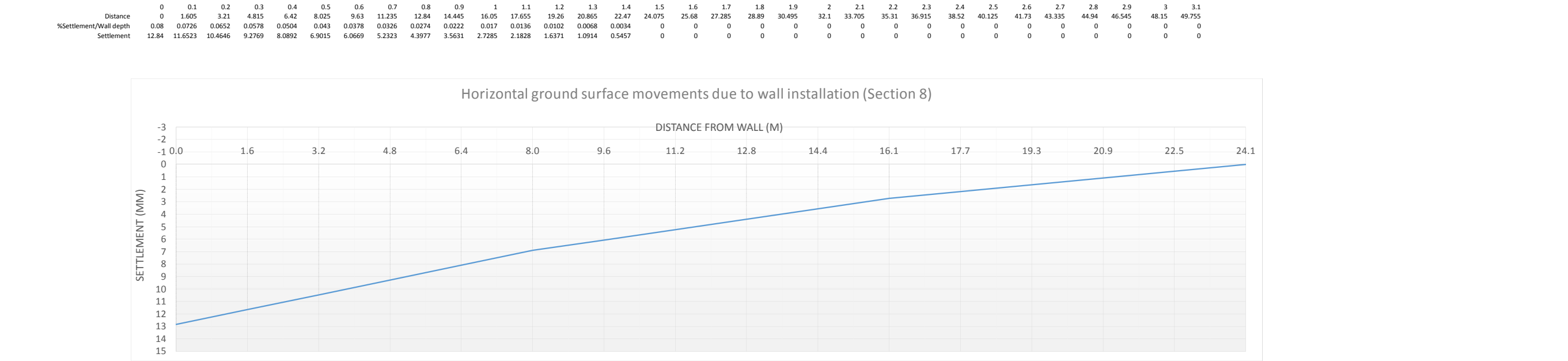
Settlement due to wall installation (SECTION 8)

Excavation depth	=	10.7 m
Pile Length	=	16.05 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

VERTICAL



HORIZONTAL

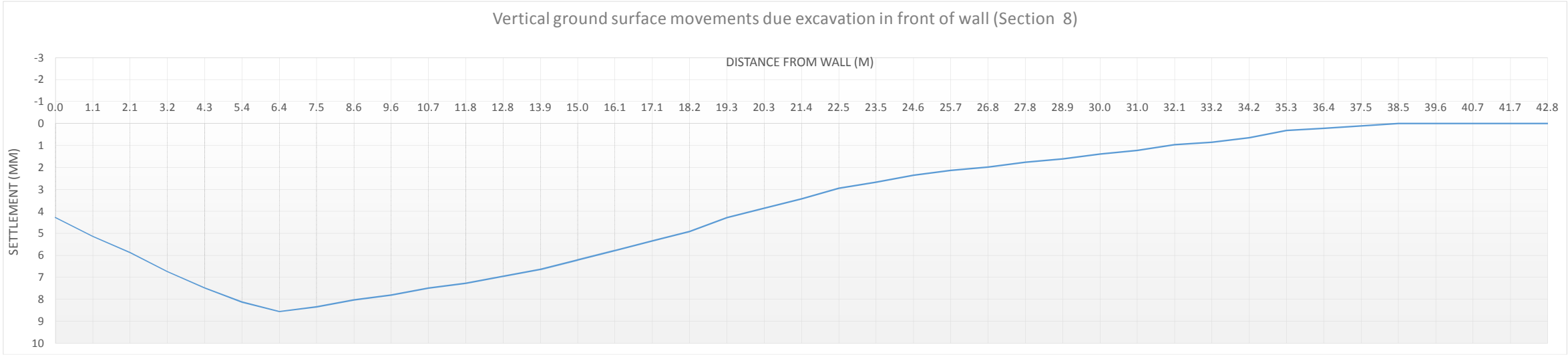


Settlement due to excavation in front of wall (SECTION 8)

Excavation depth	=	10.7 m
Pile Length	=	16.05 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

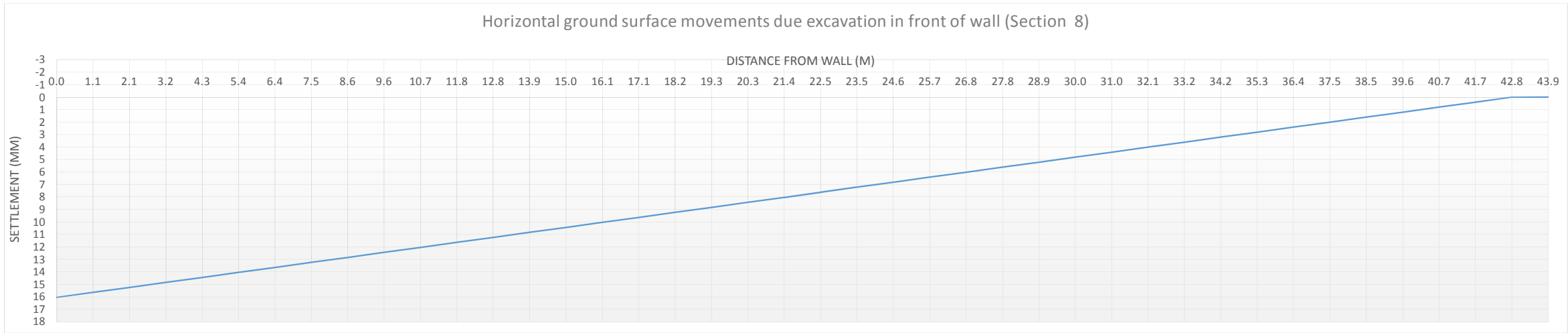
VERTICAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
Distance	0	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.7	11.77	12.84	13.91	14.98	16.05	17.12	18.19	19.26	20.33	21.4	22.47	23.54	24.61	25.68	26.75	27.82	28.89	29.96	31.03	32.1	33.17	34.24	35.31	36.38	37.45	38.52	39.59	40.66	41.73	42.8	43.87	44.94	46.01	47.08
Settlement/Wall depth	0.04	0.048	0.055	0.063	0.07	0.076	0.08	0.078	0.075	0.073	0.07	0.068	0.065	0.062	0.058	0.054	0.05	0.046	0.04	0.036	0.032	0.0275	0.025	0.022	0.02	0.0185	0.0165	0.015	0.013	0.0115	0.009	0.008	0.006	0.003	0.002	0.001	0	0	0	0	0	0	0	0	
Settlement	4.28	5.136	5.885	6.741	7.49	8.132	8.56	8.346	8.025	7.811	7.49	7.276	6.955	6.634	6.206	5.778	5.35	4.922	4.28	3.852	3.424	2.9425	2.675	2.354	2.14	1.9795	1.7655	1.605	1.391	1.2305	0.963	0.856	0.642	0.321	0.214	0.107	0	0	0	0	0	0	0	0	



HORIZONTAL

Distance/Excavation depth	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1
Distance	0	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.7	11.77	12.84	13.91	14.98	16.05	17.12	18.19	19.26	20.33	21.4	22.47	23.54	24.61	25.68	26.75	27.82	28.89	29.96	31.03	32.1	33.17	34.24	35.31	36.38	37.45	38.52	39.59	40.66	41.73	42.8	43.87
Settlement/Wall depth	0.15	0.14625	0.1425	0.13875	0.135	0.13125	0.1275	0.12375	0.12	0.11625	0.1125	0.10875	0.105	0.10125	0.0975	0.09375	0.09	0.08625	0.0825	0.07875	0.075	0.07125	0.0675	0.06375	0.06	0.05625	0.0525	0.04875	0.045	0.04125	0.0375	0.03375	0.03	0.02625	0.0225	0.01875	0.015	0.01125	0.0075	0.00375	0	0
Settlement	16.05	15.64875	15.2475	14.84625	14.445	14.04375	13.6425	13.24125	12.84	12.43875	12.0375	11.63625	11.235	10.83375	10.4325	10.03125	9.63	9.22875	8.8275	8.42625	8.025	7.62375	7.2225	6.82125	6.42	6.01875	5.6175	5.21625	4.815	4.41375	4.0125	3.61125	3.21	2.80875	2.4075	2.00625	1.605	1.20375	0.8025	0.40125	0	0



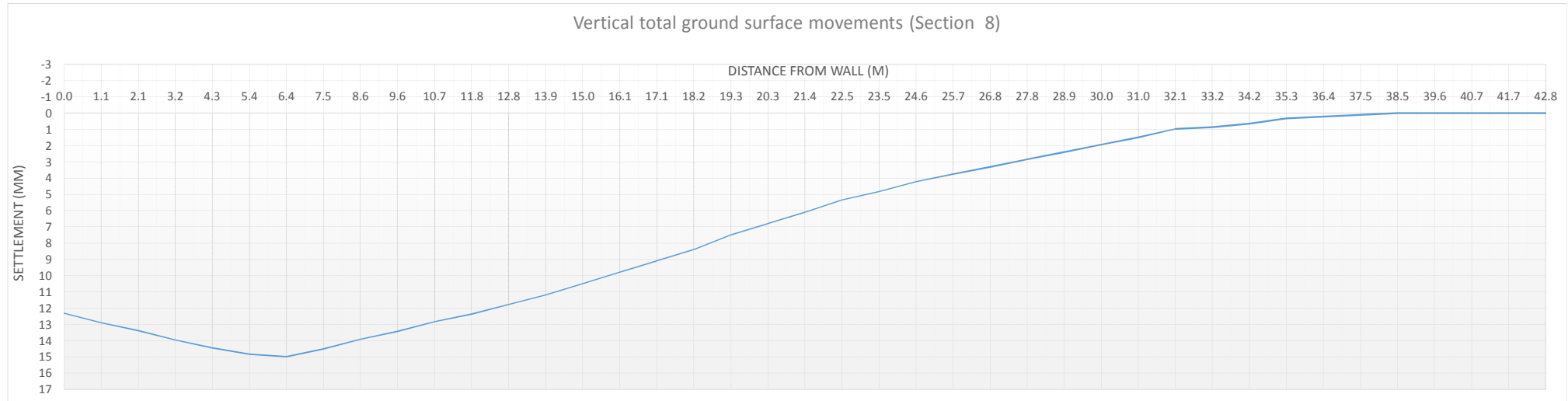
0.601875	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Settlement	16.05	15.44813	14.84625	14.24438	13.6425	13.04063	12.43875	11.83688	11.235	10.63313	10.03125	9.429375	8.8275	8.225625	7.62375	7.021875	6.42	5.818125	5.21625	4.614375	4.0125	3.410625	2.80875	2.206875	1.605	1.003125	0.40125	0	0	0	0	0

Settlement due to wall installation and deflection (SECTION 8)

Excavation depth	=	10.7 m
Pile Length	=	16.05 m
Pile diameter	=	880 mm
EI	=	565600 kN.m ² /m

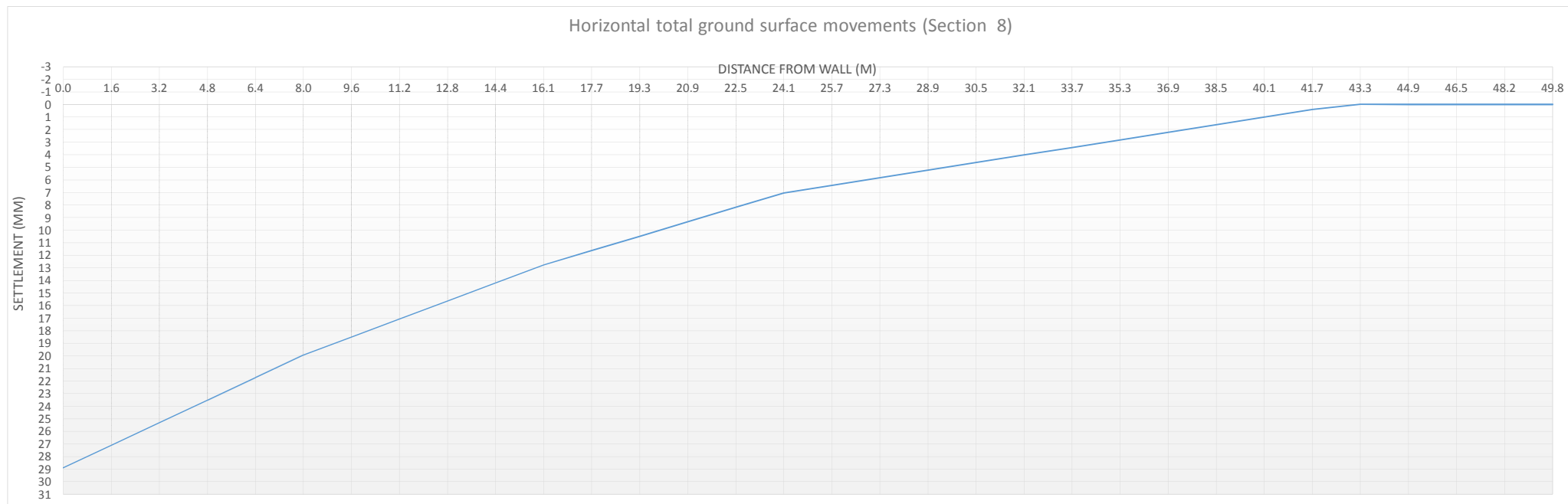
VERTICAL

	0	0	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4		
Distance	0	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.7	11.77	12.84	13.91	14.98	16.05	17.12	18.19	19.26	20.33	21.4	22.47	23.54	24.61	25.68	26.75	27.82	28.89	29.96	31.03	32.1	33.17	34.24	35.31	36.38	37.45	38.52	39.59	40.66	41.73	42.8		
Settlement due to wall installation	8.025	7.7575	7.49	7.2225	6.955	6.6875	6.42	6.1525	5.885	5.6175	5.35	5.0825	4.815	4.5475	4.28	4.0125	3.745	3.4775	3.21	2.9425	2.675	2.4075	2.14	1.8725	1.605	1.3375	1.07	0.8025	0.535	0.2675	0	0	0	0	0	0	0	0	0	0	0	0	
Settlement due to excavation in front of wall	4.28	5.136	5.885	6.741	7.49	8.132	8.56	8.346	8.025	7.811	7.49	7.276	6.955	6.634	6.206	5.778	5.35	4.922	4.28	3.852	3.424	2.9425	2.675	2.354	2.14	1.9795	1.7655	1.605	1.391	1.2305	0.963	0.856	0.642	0.321	0.214	0.107	0	0	0	0	0	0	0
Total Settlement	12.305	12.8935	13.375	13.9635	14.445	14.8195	14.98	14.985	13.91	13.4285	12.84	12.3585	11.77	11.1815	10.486	9.7905	9.095	8.3995	7.49	6.7945	6.099	5.35	4.815	4.2265	3.745	3.317	2.8355	2.4075	1.926	1.498	0.963	0.856	0.642	0.321	0.214	0.107	0	0	0	0	0	0	



HORIZONTAL

	Distance	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1
	Distance	0	1.605	3.21	4.815	6.42	8.025	9.63	11.235	12.84	14.445	16.05	17.655	19.26	20.865	22.47	24.075	25.68	27.285	28.89	30.495	32.1	33.705	35.31	36.915	38.52	40.125	41.73	43.335	44.94	46.545	48.15	49.755
Settlement due to wall installation	12.84	11.6523	10.4646	9.2769	8.0892	6.9015	6.0669	5.2323	4.3977	3.5631	2.7285	2.1828	1.6371	1.0914	0.5457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Settlement due to excavation in front of wall	16.05	15.44813	14.84625	14.24438	13.6425	13.04063	12.43875	11.83688	11.235	10.63313	10.03125	9.429375	8.8275	8.225625	7.62375	7.021875	6.42	5.818125	5.21625	4.614375	4.0125	3.410625	2.80875	2.206875	1.605	1.003125	0.40125	0	0	0	0	0	0
Total Settlement	28.89	27.10043	25.31085	23.52128	21.7317	19.94213	18.50565	17.06918	15.6327	14.19623	12.75975	11.61218	10.4646	9.317025	8.16945	7.021875	6.42	5.818125	5.21625	4.614375	4.0125	3.410625	2.80875	2.206875	1.605	1.003125	0.40125	0	0	0	0	0	0



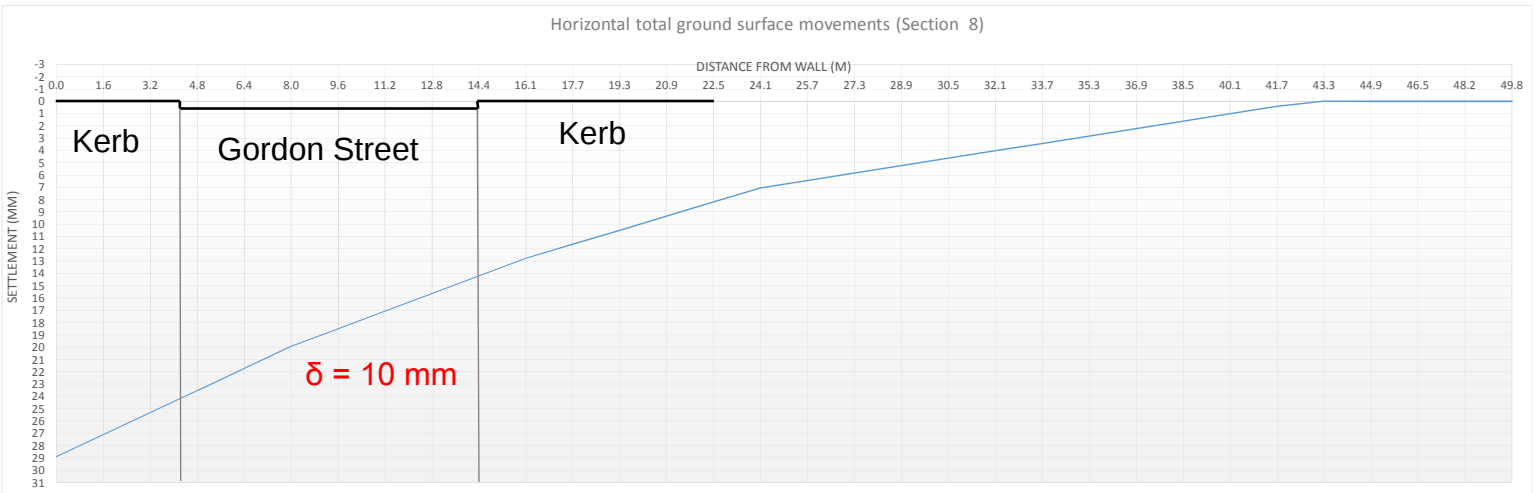
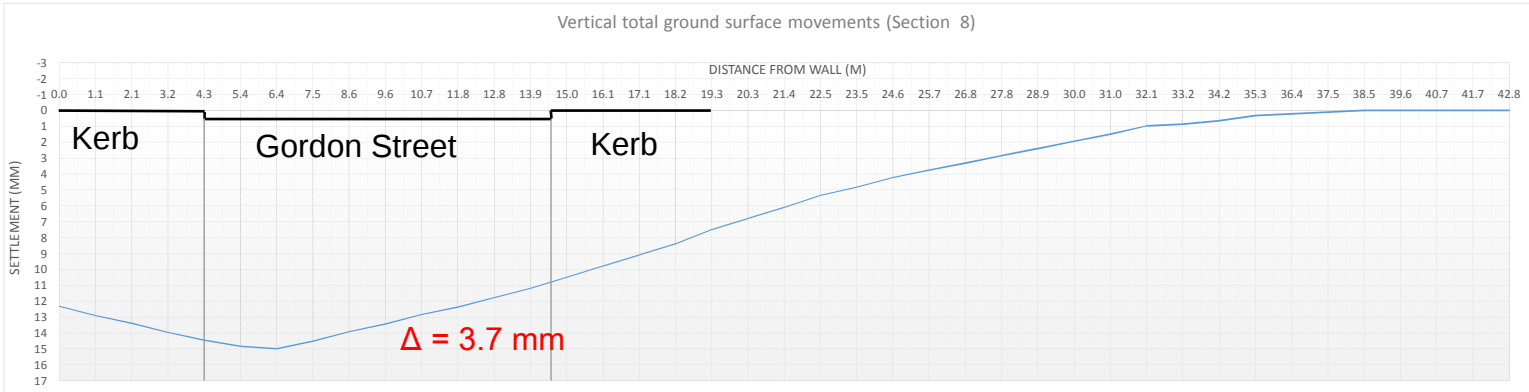
Category Assessment (SECTION 8)

ROAD - GORDON STREET

L	=	10 m
H	=	0 m
Δ	=	0.0037 m
δ	=	0.01 m
L/H	=	-
δ/L	=	0.1 %
Δ/L	=	0.037 %

From CIRIA C580 Figure 2.18:

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