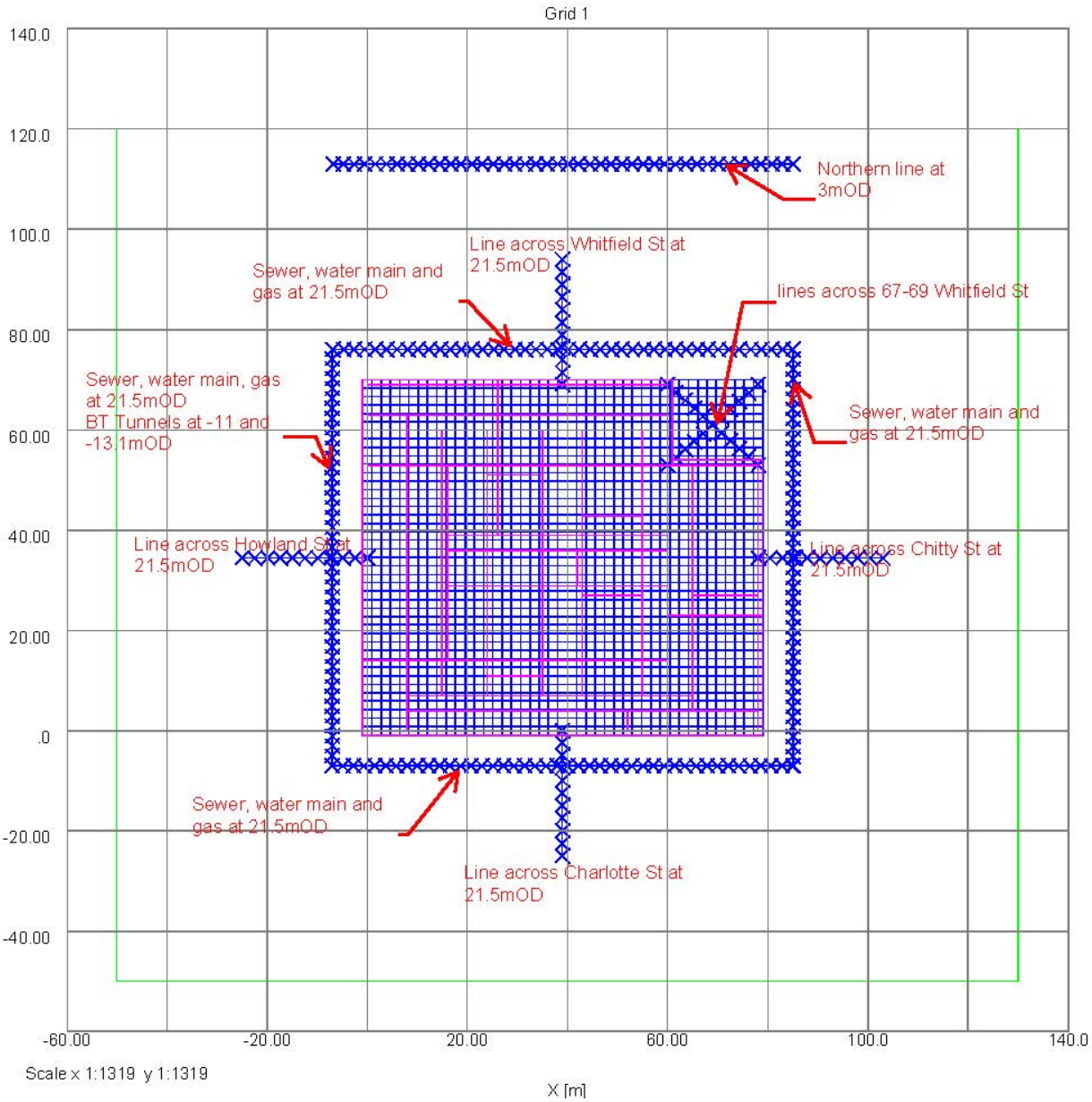

Figure 33 Grid for applied loads and displacement lines modelled in PDISP

9.3.2.2 Contours of ground movements at and above +21.5mOD

Contours of ground movement above +21.5mOD due to demolition, demolition and excavation and following net change in load in the short term and long term are shown in Figure 34, Figure 35, Figure 36 and Figure 37.

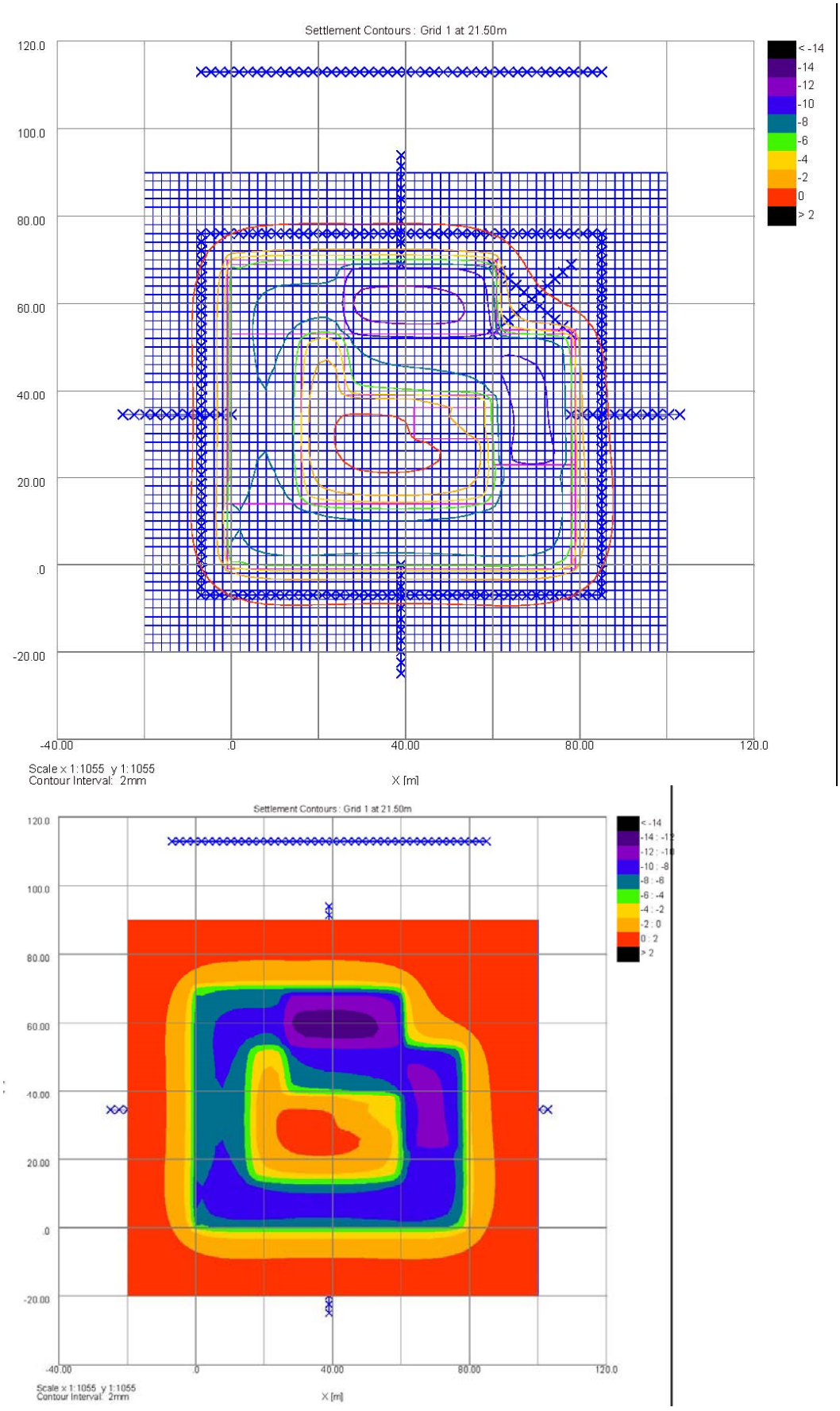

Figure 34 Contours of near surface ground movement following demolition

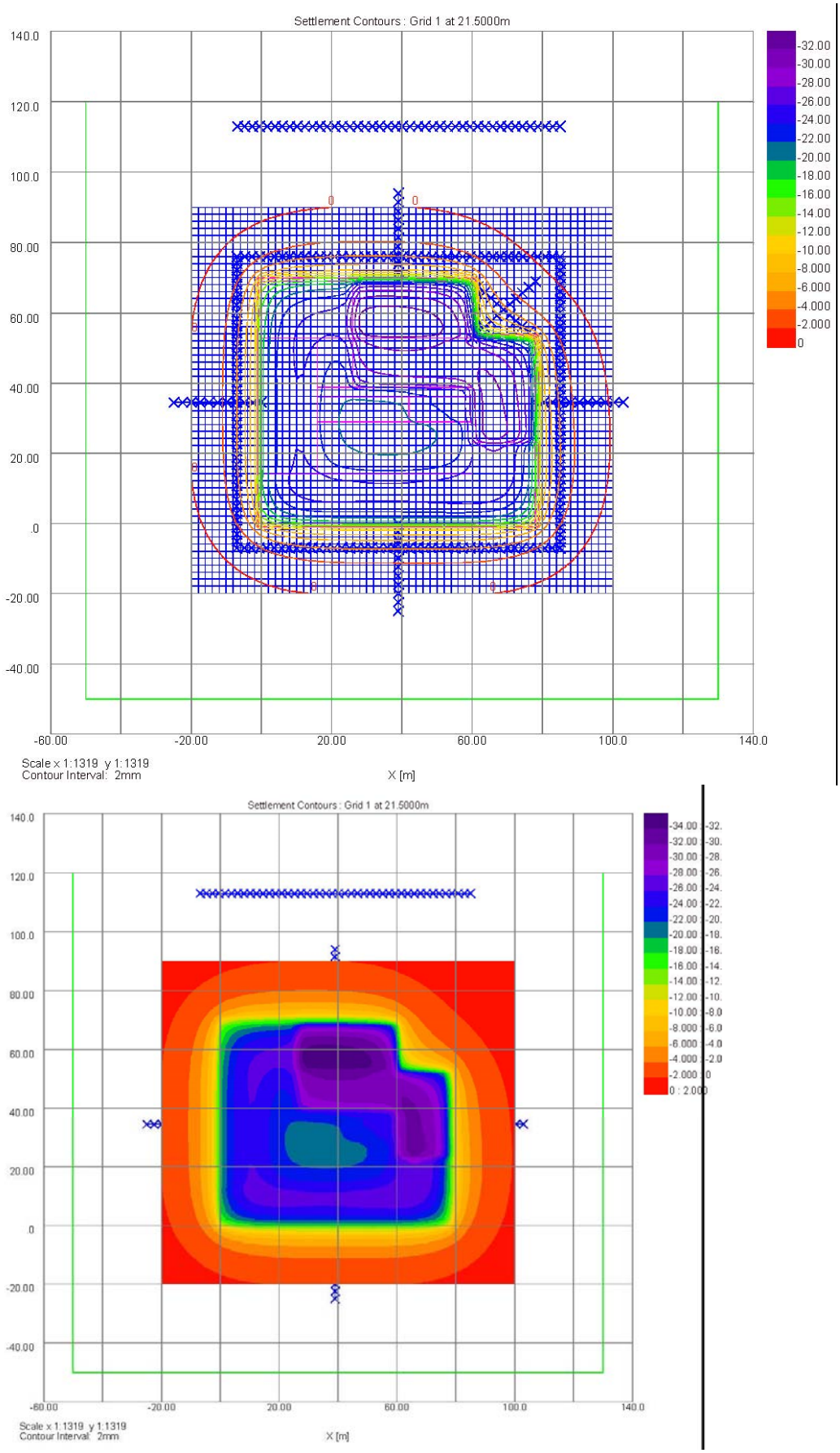

Figure 35 Contours of near surface ground movement following demolition

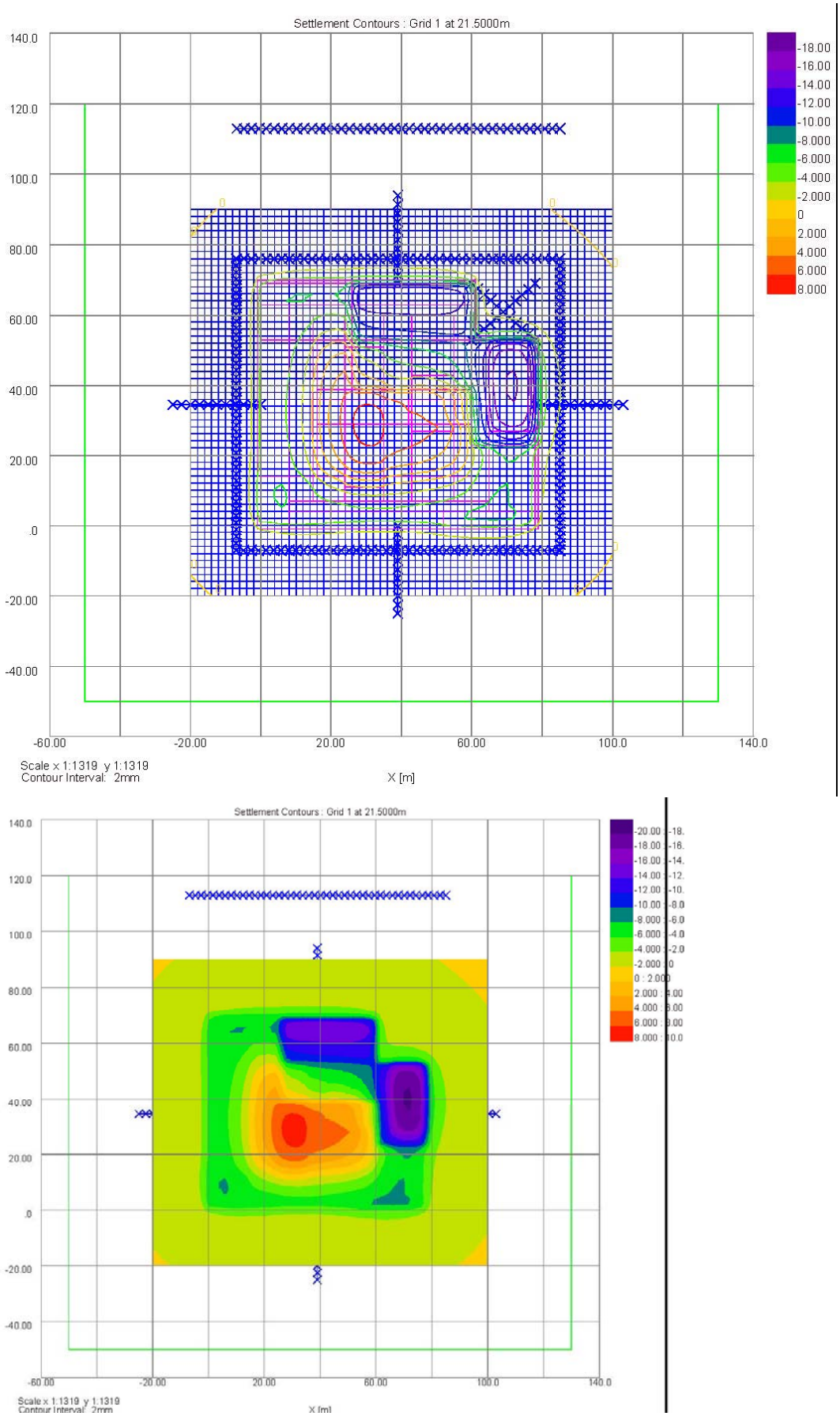

Figure 36 Contours of near surface ground movement in short term under net loading

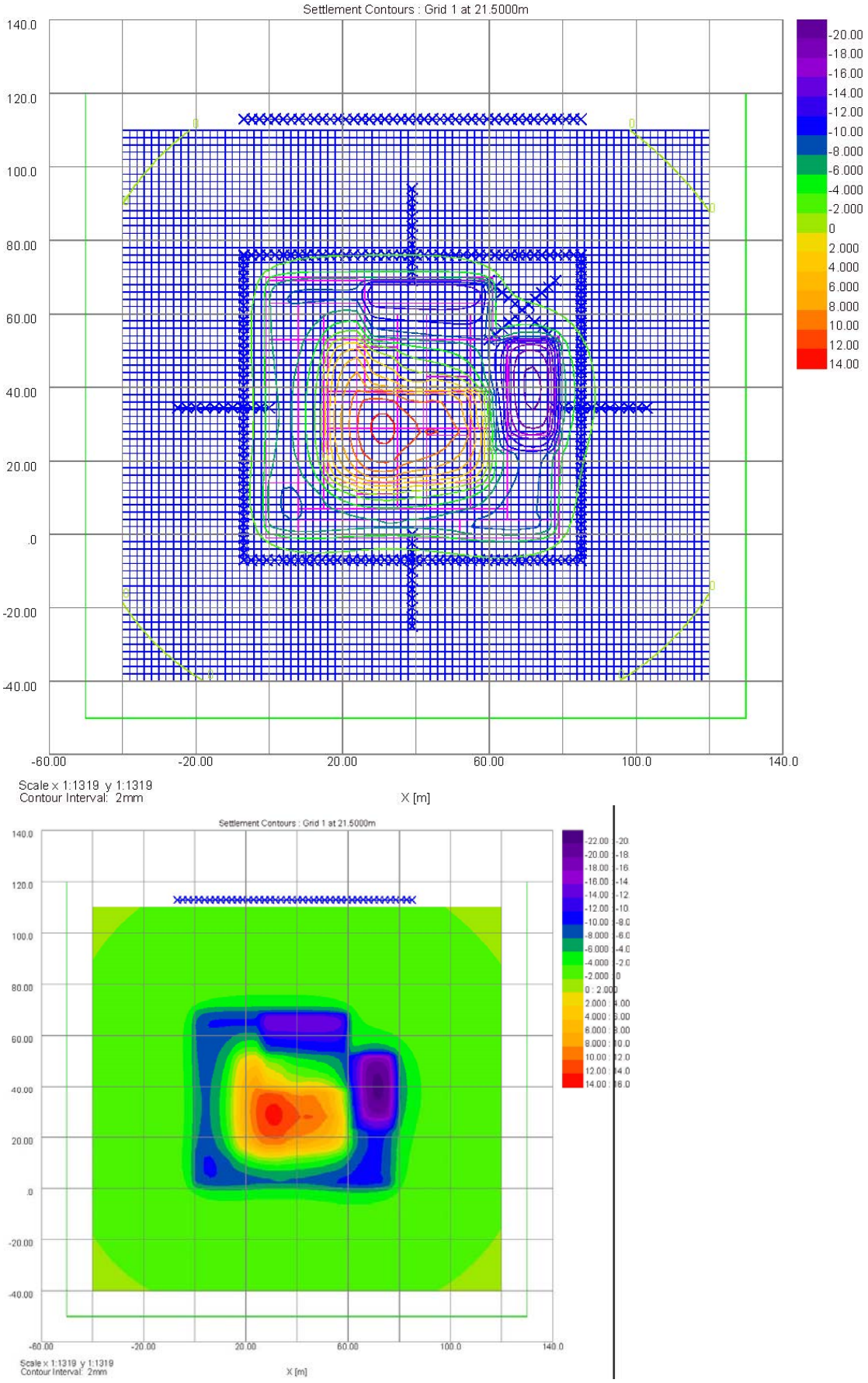

Figure 37 Contours of near surface ground movement in long term under net loading

9.3.2.3 Calculated movements of infrastructure/ structures founded within the depth of excavation

At shallow depth within the depth of excavation, the heave movements due to excavation do not develop, but instead, the settlement trough as observed from empirical data (CIRIA C580) develops behind the walls due to the excavation. Therefore, for those services and structures founded within the depth of the new basement, the PDISP calculated heave due to excavation does not occur.

Predicted movements for structures founded within the depth of excavation are given in Table 15 based on Figures 34 to 37. PDISP predicted movements due to excavation are also tabulated in order to show change in movement upon reloading, required to understand the cumulative movements behind the walls when combined with the settlement trough calculated in 9.3.1.

Location	Vertical displacement Demolition (mm)	Vertical displacement Demolition and Excavation (mm)	Vertical displacement net loading short term / change from end of excavation (mm)	Vertical displacement net loading long term (mm) / change from end of excavation
Adjacent roads taken to start about 1.5m from excavation	-4	-12	-7/ +5	-8/ +4
TW mains, sewers and gas main located at 6m from excavation	-0.5	-4	-2 / +2	-3/ +1
Edge of buildings across Chitty St and Whitfield St at 11m and 12m from excavation	0	-2	-1/ +1	-2/ 0

Note: settlement positive, heave negative

Table 15 Summary of PDISP ground movements for structures potentially founded within depth of excavation

9.3.2.4 Movements of Structures understood to be founded on piles across Charlotte St and Howland St

The structures founded on piles across Charlotte St and Howland St are located approximately 13m from the new basement, so further from the development than the structures on Chitty St and Whitfield St. Movements at shallow depth will therefore be less than shown in Table 15. In addition, because the piles carry the loads from those buildings to depth in the ground where movements will be much smaller, movements of the structures will be significantly less than those given in Table 15.

9.3.2.5 Movements of 67-69 Whitfield St

No 67-69 Whitfield St is founded at +21.5mOD which is below the formation level of the new basement at +32mOD. Therefore movements due to excavation predicted by PDISP are not expected to be significantly affected by the settlement trough behaviour which occurs behind the walls above excavation level. Movements of 67-69 Whitfield St taken along the displacement lines shown in Figure 33 are given in Figure 38.

A maximum of 26mm heave due to demolition and excavation is predicted to occur at the corner located centrally within the site. In the long term a maximum net movement of 7mm heave is predicted.

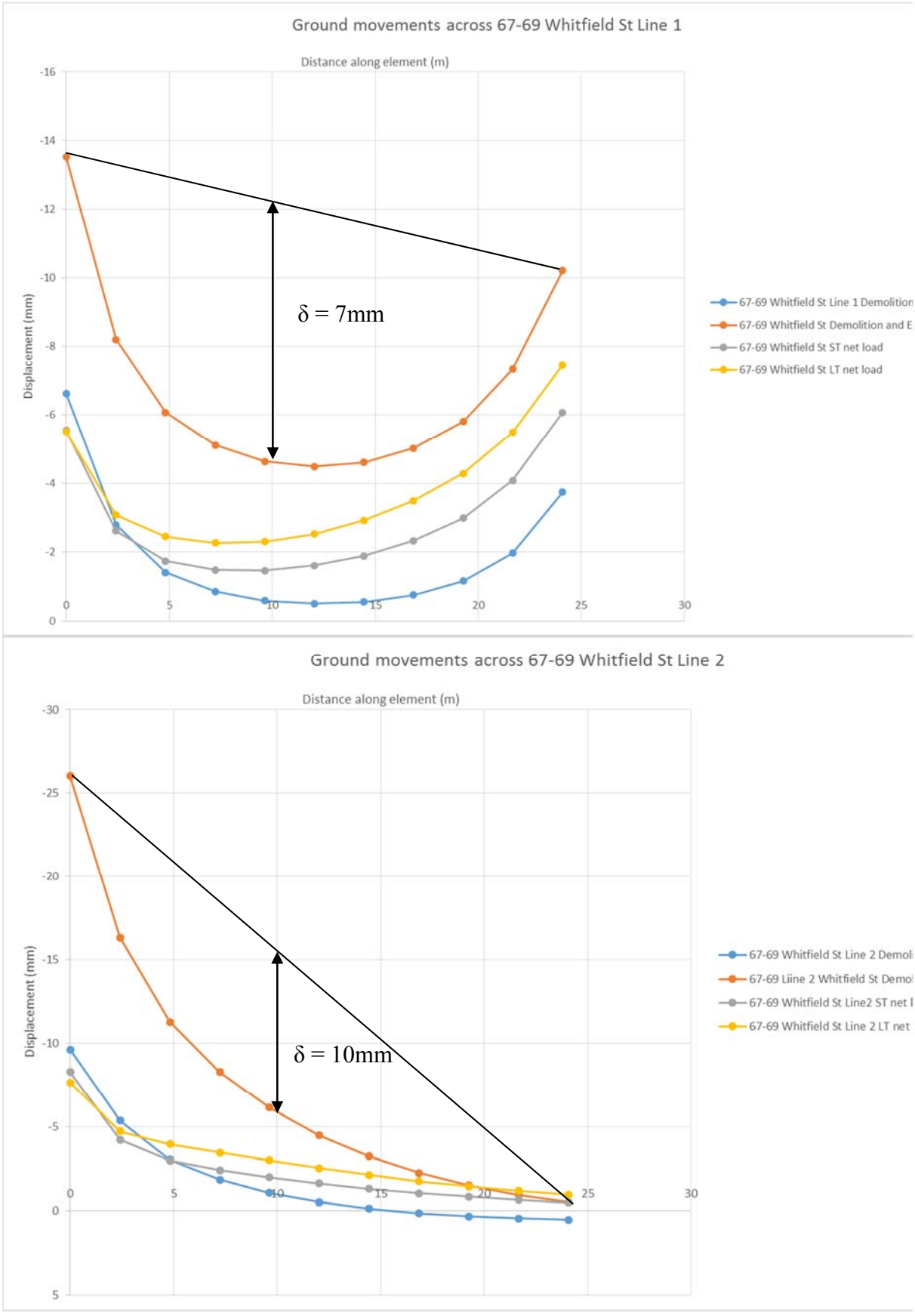

Figure 38 Ground movements beneath 67-69 Whitfield St

9.3.2.6 Movements of BT Tunnel

Movements at crown and invert of the BT tunnel calculated in PDISP are shown in Figure 39. Predicted movements are a maximum of 1.4mm heave at the tunnel crown due to demolition and excavation, and less than 0.2mm heave following construction.

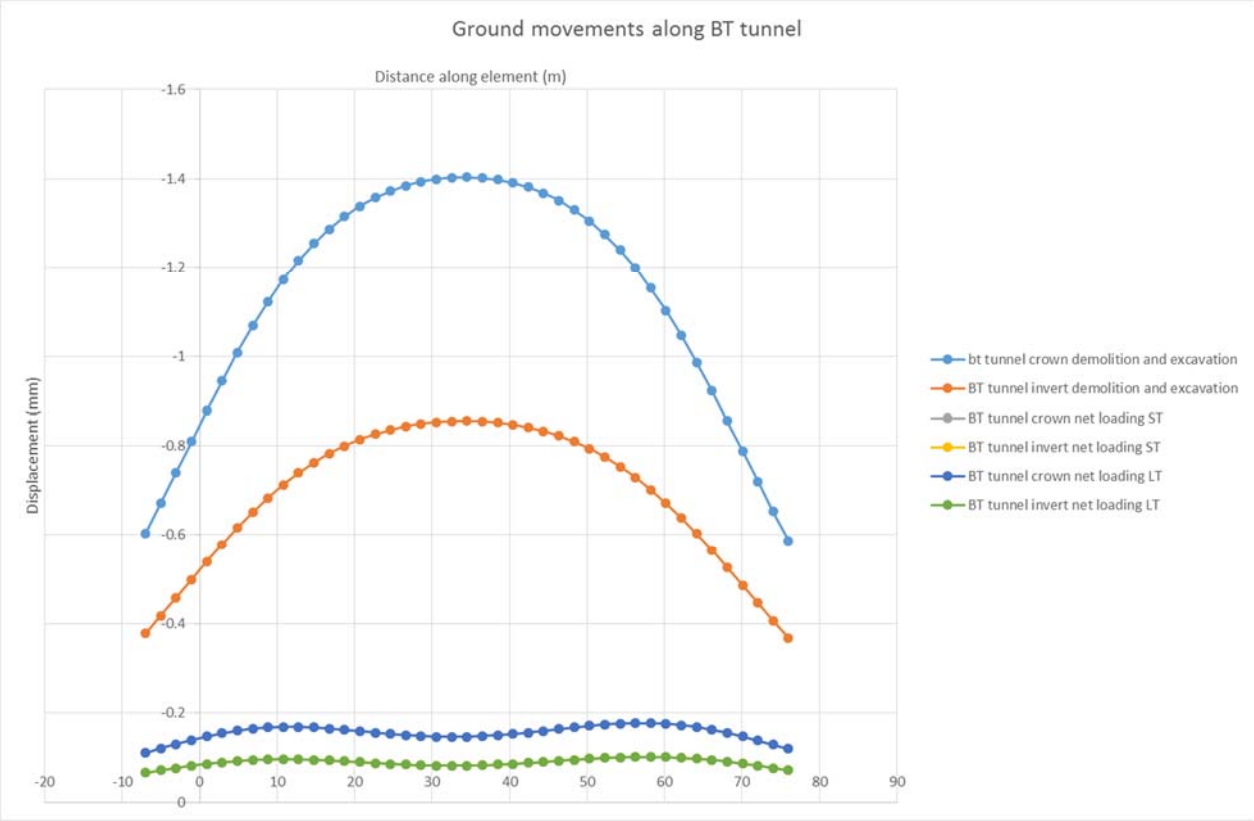

Figure 39 Ground movements along BT tunnel

9.3.3 Cumulative predicted ground movements for structures behind the walls founded within depth of excavation

Cumulative predicted ground movements for structures behind the walls founded within the depth of excavation, taking into account ground movements based on CIRIA C580 due to wall installation and excavation (Table 14) and the PDISP calculated ground movements due to change in load (Table 15), are given in Table 16. In some instances, as shown, the resulting calculated movements were very small and have been adjusted upwards to measurable values.

Location	Maximum vertical displacement demolition (mm)	Maximum vertical displacement demolition and excavation (mm)	Maximum vertical displacement short (mm)	Maximum vertical displacement long term (mm	Maximum horizontal displacement due to wall installation and excavation (mm)
Adjacent roads taken to start about 1.5m from excavation	-4	+8	8 + 5 = +13	8 + 4 = 12	14
TW mains, sewers and gas main located at 6m from excavation	-4[1]	+4	4 + 2 = +6	4 + 1 = +5	10
Edge of buildings across Whitfield St at 12m from excavation	-4[1]	+4[1]	4 + 1 = +5[1]	4 + 1 = +5[1]	4
Edge of buildings across Chitty St and Whitfield St at 11m from excavation	-4[1]	+4[1]	4 + 1 = +5[1]	4 + 1 = +5[1]	5

Notes:

1. Movements adjusted to minimum measurable values
2. Settlement positive, heave negative

Table 16 Summary of cumulative ground movements affecting structures founded within depth of excavation

9.4 Impact of ground movements

The predicted ground movements described in Section 9.3 have been used to carry out an assessment of the potential impact of the predicted ground movements on surrounding infrastructure and buildings.

9.4.1 Damage Assessment Methodology for nearby structures

The damage is assessed based on a categorisation, where 0 is least effect and 5 is the greatest effect. The target is to keep the damage to adjacent properties within Category 1, which can be summarised as:

- Very slight' damage consisting of 'Fine cracks that can easily be treated during normal decoration'.
- Perhaps isolated slight fracture in building.
- Cracks in external brickwork visible on inspection'.
- The approximate crack width is less than 1mm.

Figure 40 shows the relationship between damage category, deflection ratio and horizontal tensile strain (from CIRIA C580).

Predicted vertical ground movements for the structures across the road can be seen from Table 16 to be small and in all cases less than 5mm. At this distance, gradient of change in ground movement is also very low and deflection ratio is negligible. Therefore, the movement with the potential to cause damage is the horizontal ground movement which gives rise to horizontal strain in the walls of the buildings. The structures across the roads which have therefore been selected for damage assessment have been taken on Whitfield St and Chitty St as these buildings are closer to the excavation than on Charlotte St ad Howland St. The pub on the corner of Howland St and Whitfield St has been selected because this has the smallest width, scaled as 6.3m, giving rise to a larger horizontal strain than the other buildings on Whitfield St (height taken as 9m). The building on the corner of Chitty St and Charlotte St has also been selected as this has the smallest width, scaled at 14.4m, of the buildings along Chitty St (height taken as 15m).

A damage assessment has also been carried out for 67-69 Whitfield St which is directly adjacent to the excavation. For this building, wall length perpendicular to the excavation = 18m (height taken as 15m). Conservatively, the worst case deflection of 10mm relative to the ends of the wall from Figure 38 has been taken to calculate deflection ratio along the perpendicular walls. Although a FREW analysis has not been specifically undertaken for the retaining wall at this location, a horizontal ground movement of 4mm has been taken at the founding level of +21.5mOD based on Figure 25.

Damage assessment charts have been prepared assuming a stiffness ration E/G for the building of 2.6 and Poisson's ratio of 0.3. The resulting damage assessment charts are shown in Figure 41, Figure 42 and Figure 43.

It is concluded that damage assessment for structures across the roads is within Category 1 "Very Slight". It is noted that the pub on the corner of Howland St and Whitfield St is not far from the boundary line for Category 1 damage. Measures

will be taken in detailed design of the retaining system and its construction methodology to ensure that damage assessment remains with Category 1.

The damage assessment for No 67-69 Whitfield St is Category 2. This is defined as "slight damage" with crack widths up to 5mm: "Cracks easily filled. Redecoration probably required. 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". No. 67-69 Whitfield St is within the Site and will be redeveloped as part of the approved scheme. Therefore the potential small repair requirements are not an issue.

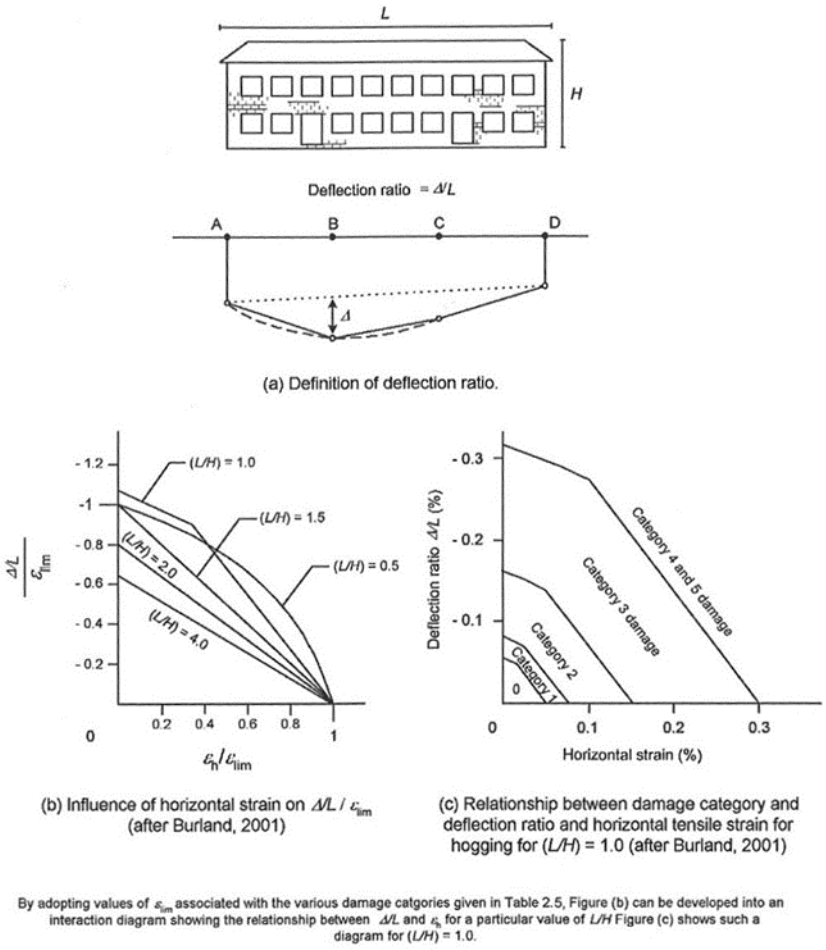

Figure 40 Relationship between damage category, deflection ratio and horizontal tensile strain (from CIRIA C580)

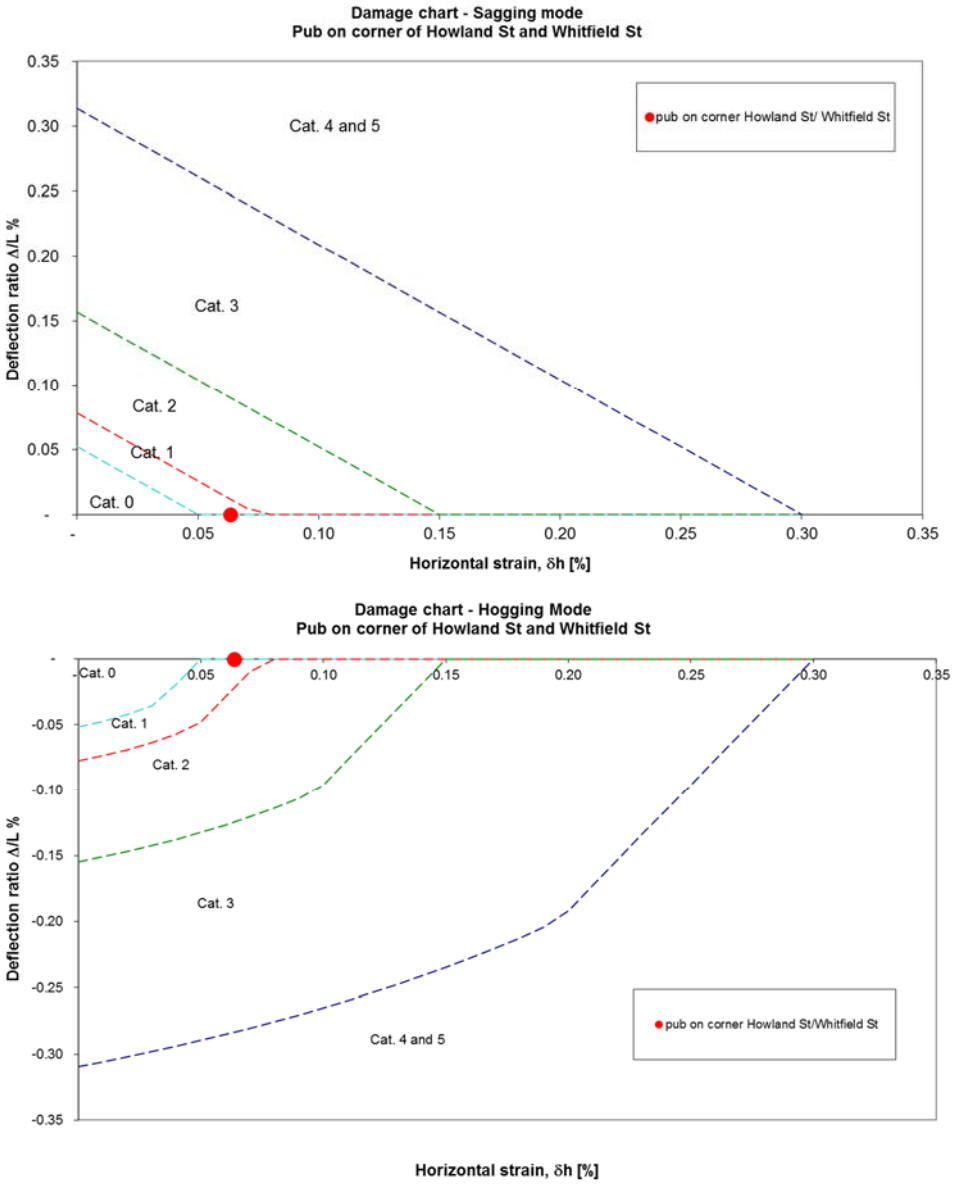

Figure 41 Damage assessment charts for sagging and hogging mode for pub on corner of Howland St and Whitfield St

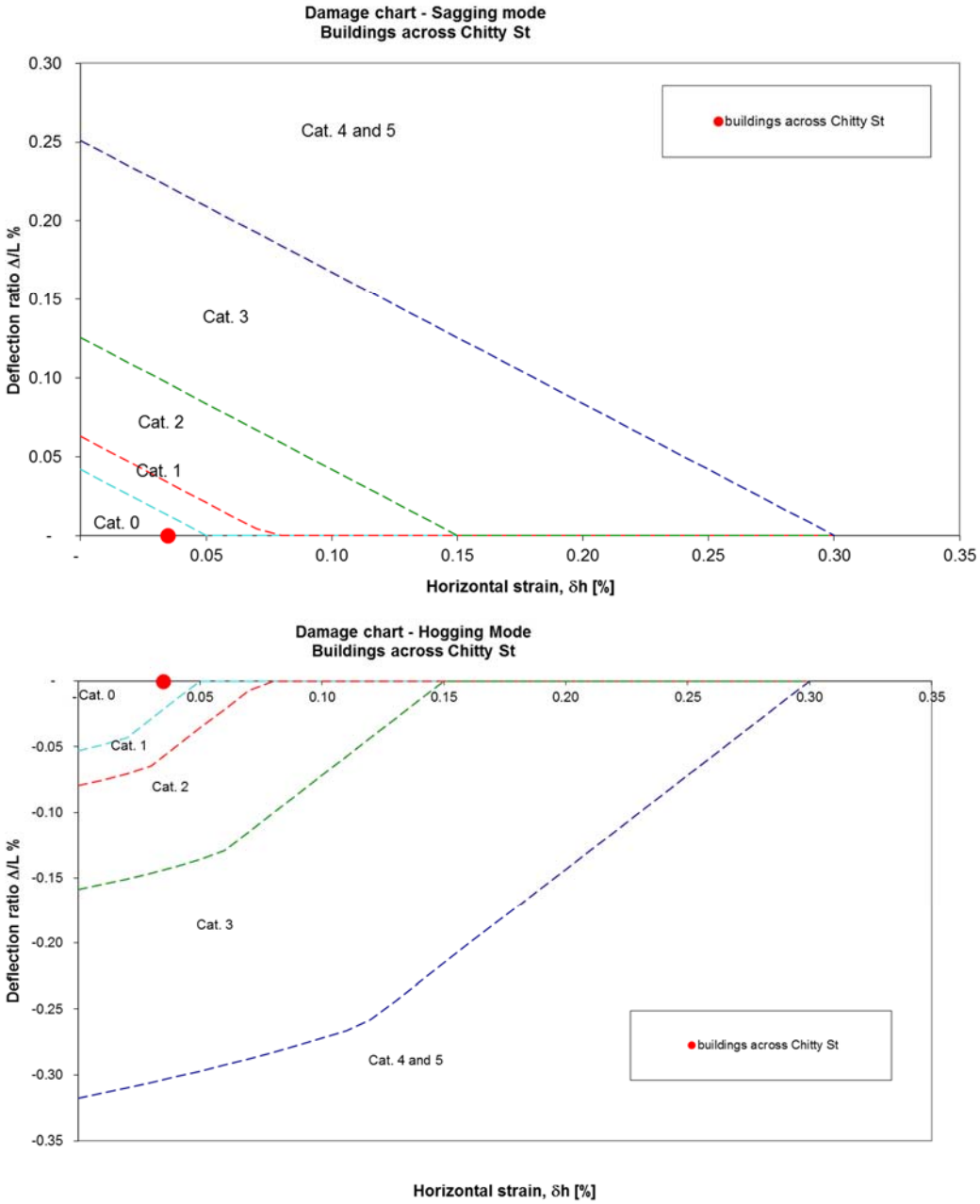

Figure 42 Damage assessment charts for sagging and hogging mode for building on corner of Chitty St and Charlotte St

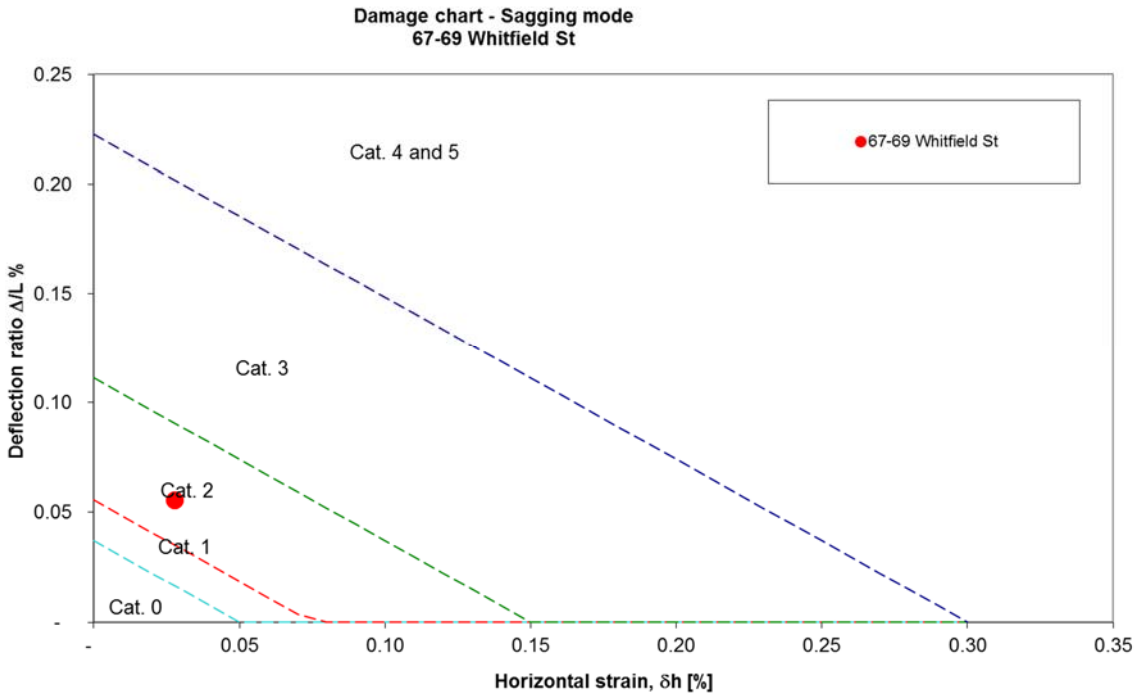

Figure 43 Damage assessment chart for 67-69 Whitfield St

9.4.2 Impact on surrounding roads

Predicted maximum vertical displacement at the nearest edge of the surrounding roads is 13mm of settlement following construction. Predicted maximum horizontal movement at the same location is 14mm. (Refer to Table 16).

These numbers are small and typical of movements experienced by roads adjacent to construction activities. The movements will occur over long lengths in plan parallel to the walls, with a gentle gradient for change in movement, rather than in small pockets.

It is concluded that there will be no significant impact on the performance of the roads.

9.4.3 Impact on surrounding services including TW water mains, sewers and gas mains

Predicted maximum vertical displacements of the TW and gas services at the nearest edge of the surrounding roads is 6mm of settlement following construction. Predicted maximum horizontal movement at the same location is 10mm. (Refer to Table 16).

These numbers are small and typical of movements experienced by services adjacent to construction activities. The movements will occur over long lengths in plan parallel to the walls, with a gentle gradient for change in movement, rather than in small pockets.

It is concluded that there will be no significant impact on these services.

9.4.4 Impact on BT tunnel

Predicted movements are a maximum of 1.4mm heave at the tunnel crown due to demolition and excavation, and less than 0.2mm heave following construction (refer to Figure 39). These movements are very small and there will be no significant impact.

10 Design Considerations for New Internal Load Bearing Piled Foundations

10.1 Piling options for large diameter piles (diameter 600mm and above

The internal pile layout within the amended scheme is currently being developed. The piles may be either rotary bored or constructed using a continuous flight auger (CFA) rig. Considerations in relations to choice of piling method are presented in the following:

10.1.1 Obstructions

It is anticipated that existing pile caps will largely be removed within the dig for the deeper basement.

Some existing piles will require extracting where they clash with proposed new piles.

Although probing and removal of obstructions if necessary will be specified in advance of construction, there is still the possibility of obstructions at greater depth. For instance, where new piles are to be installed in close proximity to existing piles, the existing piles can form obstructions. As the existing piles were probably constructed with tripod rigs, 'banana shaped' piles are possible. This can then be met as an obstruction at depth, even where the pile space at the surface appears adequate.

In some areas of the site, there are known obstructions which may need to be drilled through, rather than removed, such as the buried pad foundations to 71-81 Whitfield Street.

Rotary bored rigs can grind through an obstruction (such as the edge of a pile) if it is encountered. This is a significant advantage over CFA rigs which are ill equipped to deal with obstructions.

10.1.2 Casing

It would not be possible to open bore through the Made Ground and Terrace Gravels using a rotary boring rig. Depending on piling platform level, temporary casing of about 8m length would be required. This casing would not be required using a CFA rig.

10.1.3 Use of support fluid

It is considered that below +5mOD the piles may require support fluid due to the potential for sandy or shelly layers in the base of the London Clay below this level, and for granular layers within the underlying Lambeth Group. Therefore the current advice is to opt for piles ending above this level. If support fluid is required for longer piles it would add to the cost and space requirements.

10.2 Towards Design of New Piled Foundations

The new piled foundations are specified to be designed according to LDSA Guidance (2009).

The LDSA Guidance (2009) gives the following requirements for preliminary or working load tests, depending on FoS overall.

Direction of Loading	Load Test Requirements	Alpha (α)	Factor of Safety Overall	FOS on Shaft Resistance
Compression	none	0.5	2.6	1.2
	working tests only	0.5	2.2	1.2
	Preliminary pile test (s) and working tests	0.5	2	1.2
Tension	none	0.5	-	3

Where working pile tests are required they shall be carried out on 1% of the piles concerned.

Large diameter piles

A provisional pile design chart for pile diameters of 600mm and upwards is shown in Figure 44 based on the following:

- Factor of safety used are

  FoS on shaft only, $F_{su} = 1.2$

  FoS overall, $F_{ou} = 2.6$
- The capacity from 2m thick River Terrace Deposits is included;
- River Terrace Deposits, $\phi = 30^{\circ}$;
- Surface of London Clay is at 18.5mOD;
- $\alpha = 0.5$;
- London Clay $c_u = 100 + 6.5z$ kN/m^2;

  (where z is the depth below the surface of the London clay)

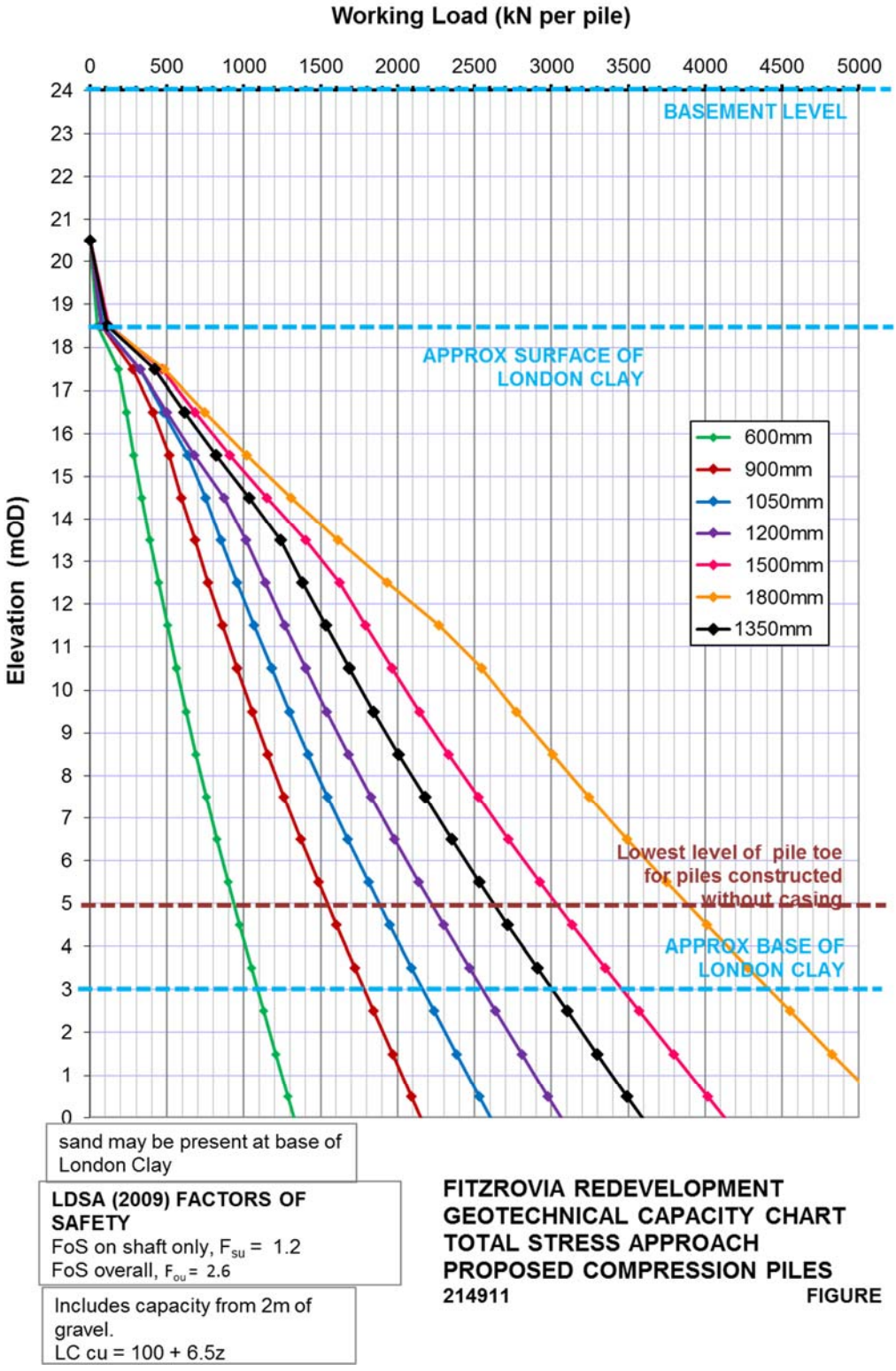

Figure 44 Pile capacity chart for new bearing piles

10.3 Sulphate Class for Concrete

In accordance with BS 8500-1 the Design Chemical Class for the pile concrete shall be DC-3 (as defined in BS 8500-1: 2002 Table A.15).

11 References

Works Cited

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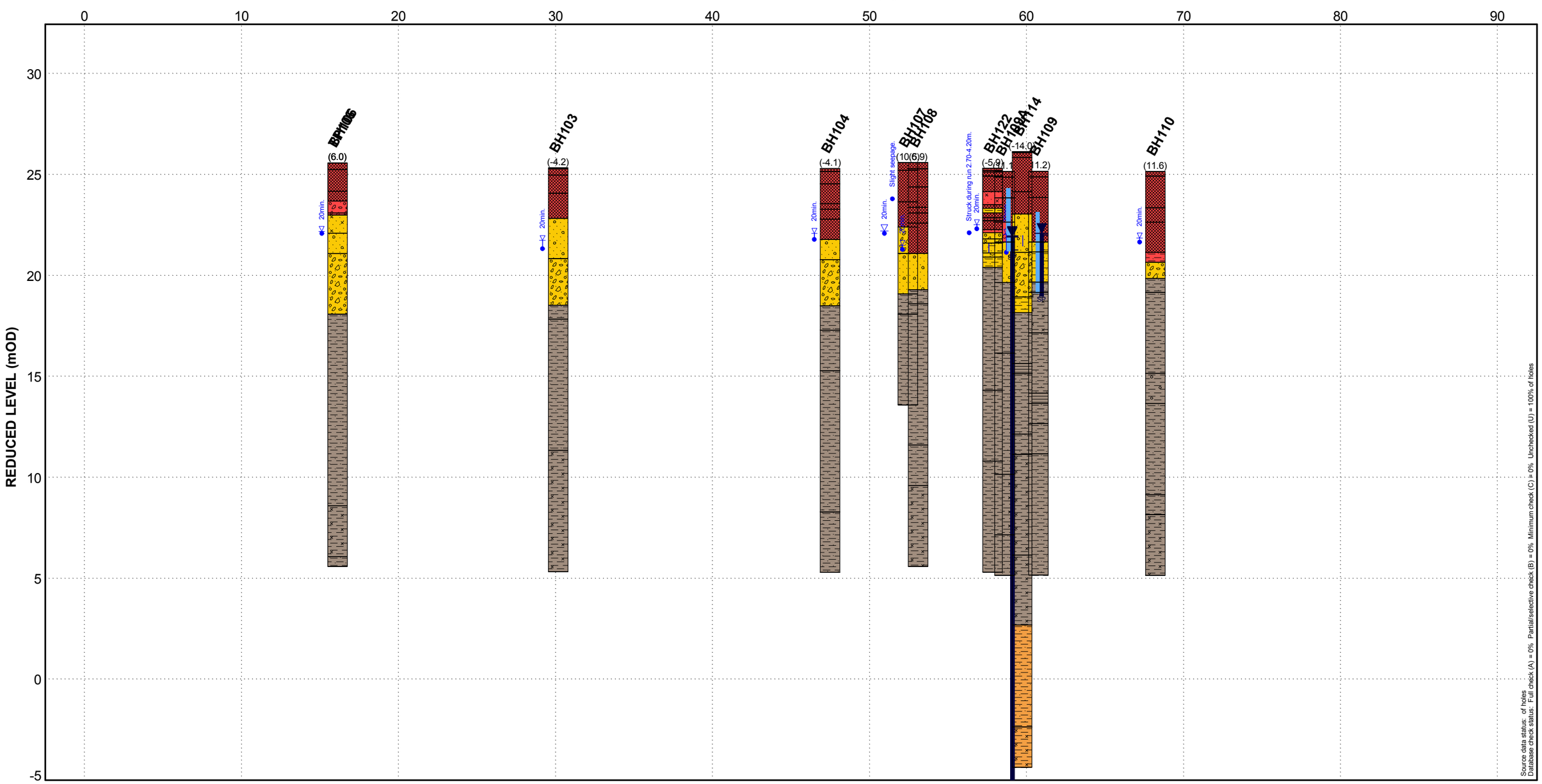
Appendix A

GI Data

DISTANCE ALONG BASELINE (m)

REDUCED LEVEL (mOD)



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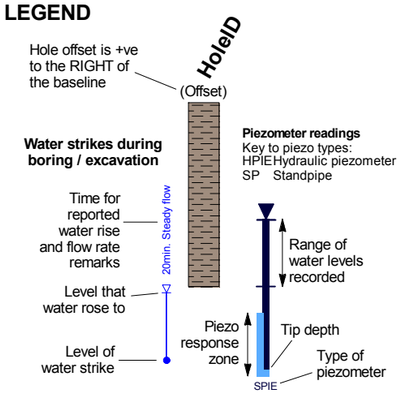

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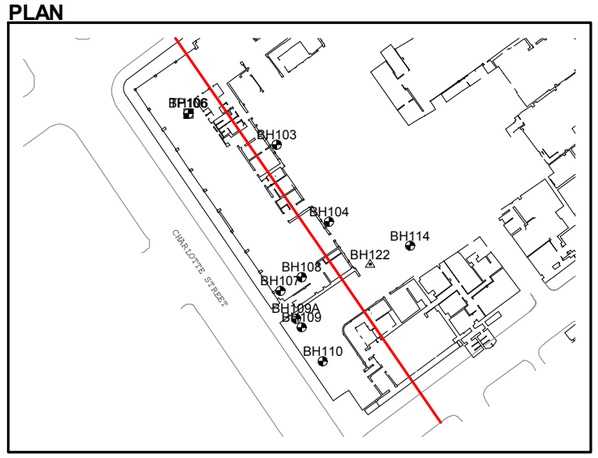

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- RIVER TERRACE DEPOSITS [RTD]
- London Clay [LC]
- Lambeth Group [LMG]
- Bulhead Beds [BUL]
- Thanet Sand Formation [TSF]
- Chalk [CHK]
- Gault Formation [GAUF]
- [HF]
- Headon Formation [HEAF]
- HYTHE BEDS [HB-SC]
- HYTHE BEDS [HB-LST]
- Made Ground - FILL
- Sandy GRAVEL
- Silty Clay
- Clayey SAND
- Gravelly CLAY
- SAND
- Gravelly SAND
- Sandy CLAY
- Silty SAND
- MUDSTONE
- CONCRETE

Fitzrovia Redevelopment
GEOLOGICAL CROSS SECTION WITH GROUNDWATER DATA
N-S CROSS SECTION
80 CHARLOTTE ST.
207329

FIGURE 6

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DISTANCE ALONG BASELINE (m)

REDUCED LEVEL (mOD)

SCALE 1:306V 1:389H @ A3L

LEGEND

Hole offset is +ve to the RIGHT of the baseline

HoleID (Offset)

Water strikes during boring / excavation

Time for reported water rise and flow rate remarks — 20min. Steady flow

Level that water rose to

Level of water strike

Piezometer readings
Key to piezo types:
HPIE Hydraulic piezometer
SP Standpipe

Range of water levels recorded

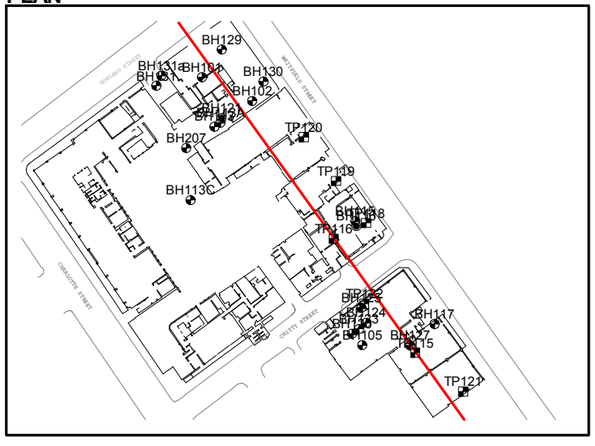
Piezo response zone

Tip depth

Type of piezometer

SPIE

PLAN



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- HYTHE BEDS [HB-SC]
- HYTHE BEDS [HB-LST]
- Made Ground - FILL
- Gravelly SAND
- Silty Clay
- Clayey SAND
- Silty SAND
- CONCRETE
- Sandy GRAVEL
- Sandy CLAY
- CLAY
- SAND
- CHALK
- Gravelly CLAY

Source data status: of holes
Database check status: Full check (A) = 0% Partial/selective check (B) = 0% Minimum check (C) = 0% Unchecked (U) = 100% of holes

Fitzrovia Redevelopment
GEOLOGICAL CROSS SECTION WITH GROUNDWATER DATA
N-S CROSS SECTION

207329

FIGURE 7

<<DrawingFileSpec>>

DISTANCE ALONG BASELINE (m)

REDUCED LEVEL (mOD)

BH106 (-2.0)
BH103 (12.2)
BH113C (21.3)
BH207 (8.5)
BH131 (-10.9)
BH131a (-12.4)
BH113 (8.2)
BH113A (8.3)
BH121 (7.4)
BH101 (-5.4)
BH102 (8.4)
BH129 (-8.6)
BH130 (5.8)

20min.
SP
HPIE
20min. Struck during U100 run 16.50-16.95m.

SCALE 1:306V 1:222H @ A3L

Source data status: of holes
Database check status: Full check (A) = 0% Partial/selective check (B) = 0% Minimum check (C) = 0% Unchecked (U) = 100% of holes

LEGEND

Hole offset is +ve to the RIGHT of the baseline

HoleID (Offset)

Water strikes during boring / excavation

Time for reported water rise and flow rate remarks

20min. Steady flow

Level that water rose to

Level of water strike

Piezometer readings
Key to piezo types:
HPIE Hydraulic piezometer
SP Standpipe

Range of water levels recorded

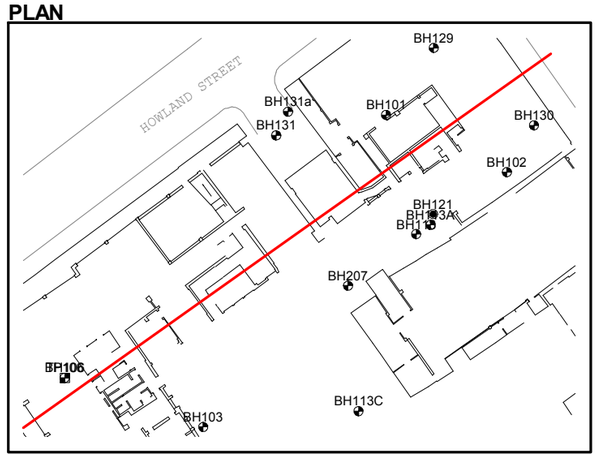
Piezo response zone

Tip depth

Type of piezometer

SPIE

PLAN



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- Lambeth Group [LMG]
- Bulhead Beds [BUL]
- Thanet Sand Formation [TSF]
- Chalk [CHK]
- Gault Formation [GAUF]
- [HF]
- Headon Formation [HEAF]
- HYTHE BEDS [HB-SC]
- HYTHE BEDS [HB-LST]
- Made Ground - FILL
- Gravelly SAND
- Silty Clay
- CLAY
- SAND
- CONCRETE
- Sandy GRAVEL
- Sandy CLAY
- Silty SAND
- Clayey SAND
- CHALK

Fitzrovia Redevelopment
GEOLOGICAL CROSS SECTION WITH GROUNDWATER DATA
E-W CROSS SECTION

207329

FIGURE 8

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DISTANCE ALONG BASELINE (m)

REDUCED LEVEL (mOD)

BH110 (3.9) BH109A (5.6) BH109 (3.6) BH107 (-11.3) BH108 (-11.1) BH104 (-13.4) BH122 (-5.5) BH114 (-3.9) TP116 (8.6) BH115 (9.6) BH116 (9.2) TP118 (-4.3) TP119 (-2.5)

20min.

SP

Source data status: of holes
Database check status: Full check (A) = 0% Partial/selective check (B) = 0% Minimum check (C) = 0% Unchecked (U) = 100% of holes

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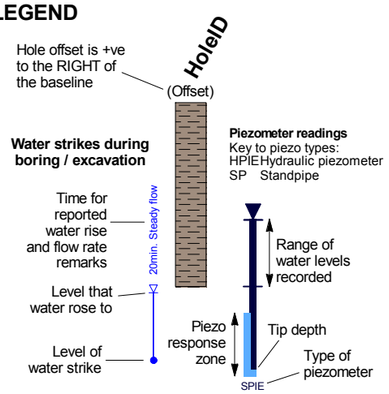

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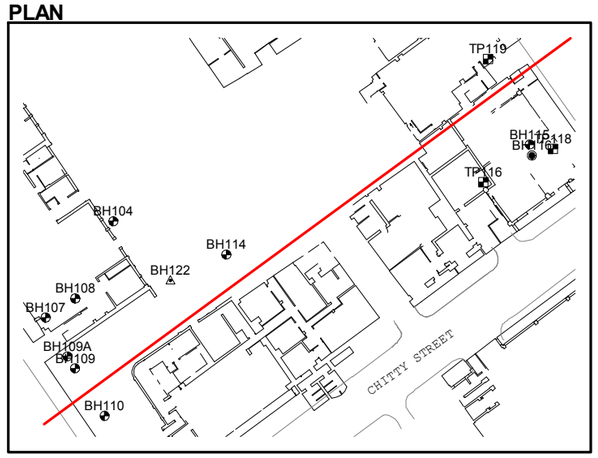

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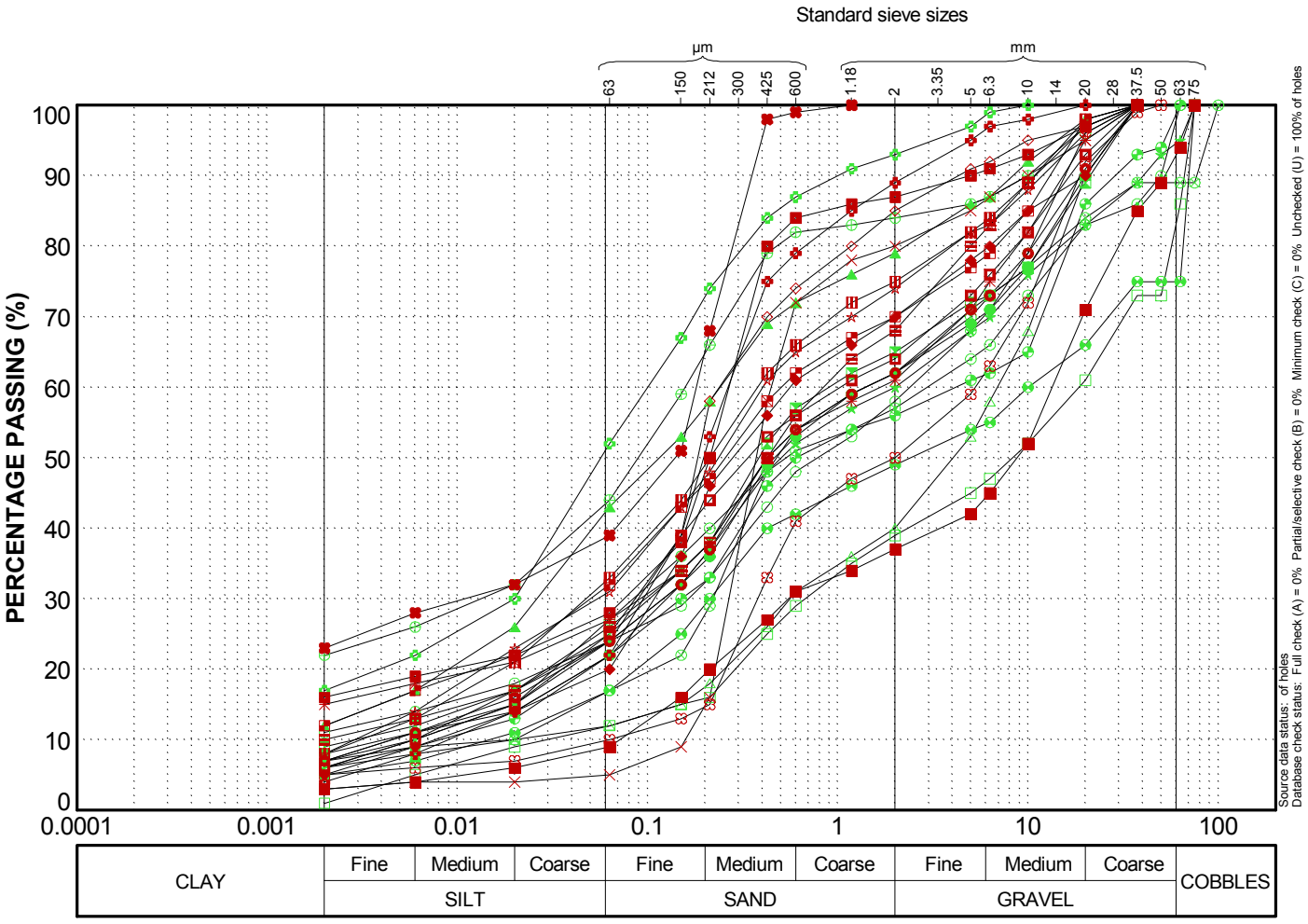
- Made Ground - FILL
- Sandy GRAVEL
- Silty Clay
- MUDSTONE
- CONCRETE
- SAND
- Gravelly SAND
- Sandy CLAY
- Clayey SAND
- Gravelly CLAY
- Silty SAND

Fitzrovia Redevelopment
GEOLOGICAL CROSS SECTION WITH GROUNDWATER DATA
E-W CROSS SECTION

207329

FIGURE 9

<<DrawingFileSpec>>



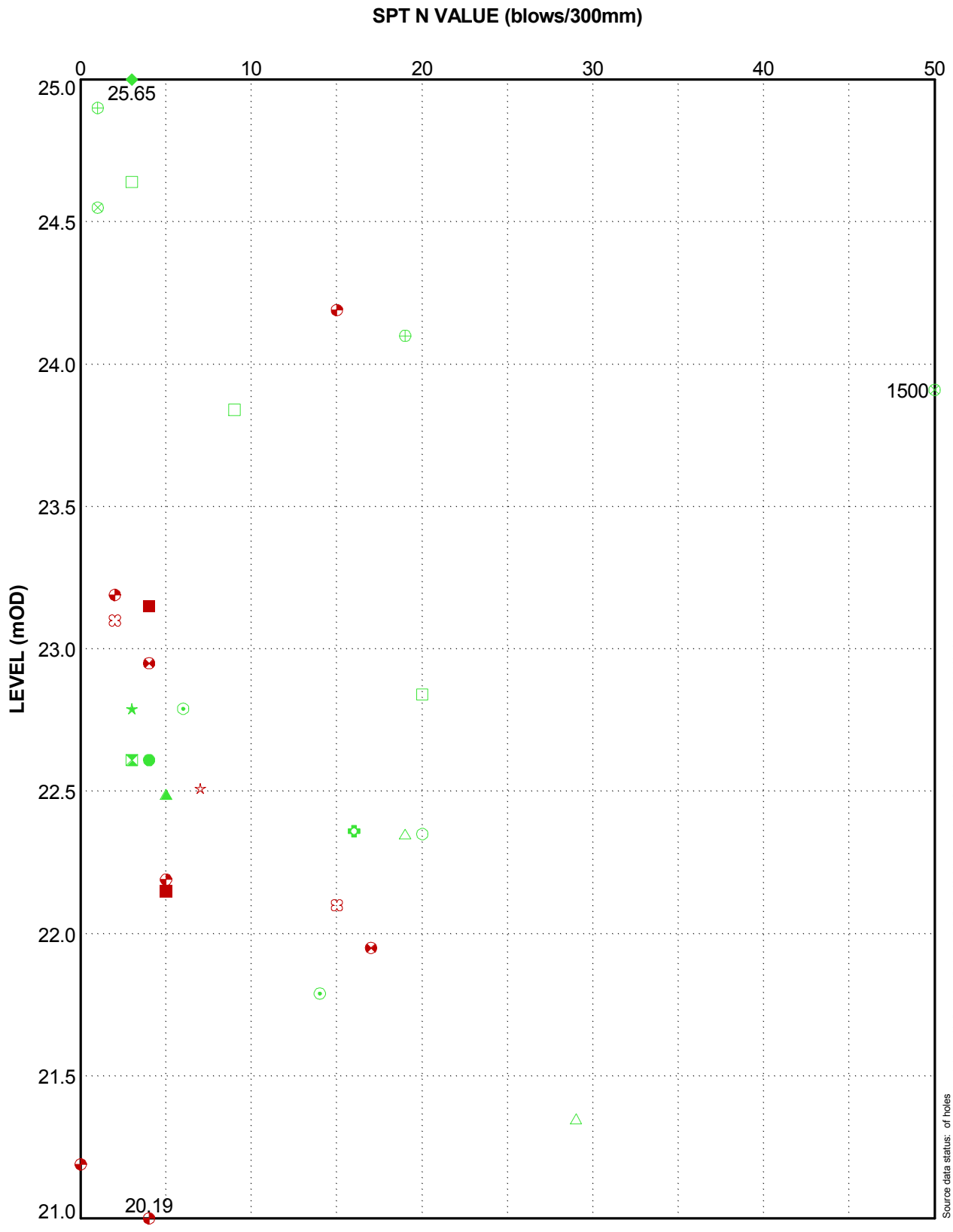
- BH101, 2.00m
- BH102, 2.00m
- BH103, 2.00m
- BH104, 2.00m
- BH107, 2.50m
- BH108, 2.50m
- BH109, 2.10m
- BH109A, 2.00m
- BH110, 1.80m
- BH110, 3.50m
- BH113A, 1.20m
- BH113C, 1.20m
- BH114, 2.00m
- BH115, 1.50m
- BH117, 0.50m
- BH121, 1.50m
- BH121, 3.50m
- BH121, 4.50m
- BH122, 1.20m
- BH122, 2.00m
- BH122, 2.50m
- BH127, 0.50m
- BH129, 1.60m
- BH129, 2.00m
- BH129, 3.00m
- BH130, 2.00m
- BH130, 3.00m
- BH207, 3.50m

- Phase 2 Investigation
- Phase 1 Investigation

Fitzrovia Redevelopment
PARTICLE SIZE DISTRIBUTION
MADE GROUND

207329

FIGURE 10



Phase 2 Investigation
BH101
BH102
BH104
BH107
BH108
BH109
BH109A
BH110
BH113A
BH113C
BH114
BH115
BH121

Phase 1 Investigation
BH122
BH129
BH130
BH131a

Source data status: of holes
Database check status: Full check (A) = 0% Partial/selective check (B) = 0% Minimum check (C) = 0% Unchecked (U) = 100% of holes

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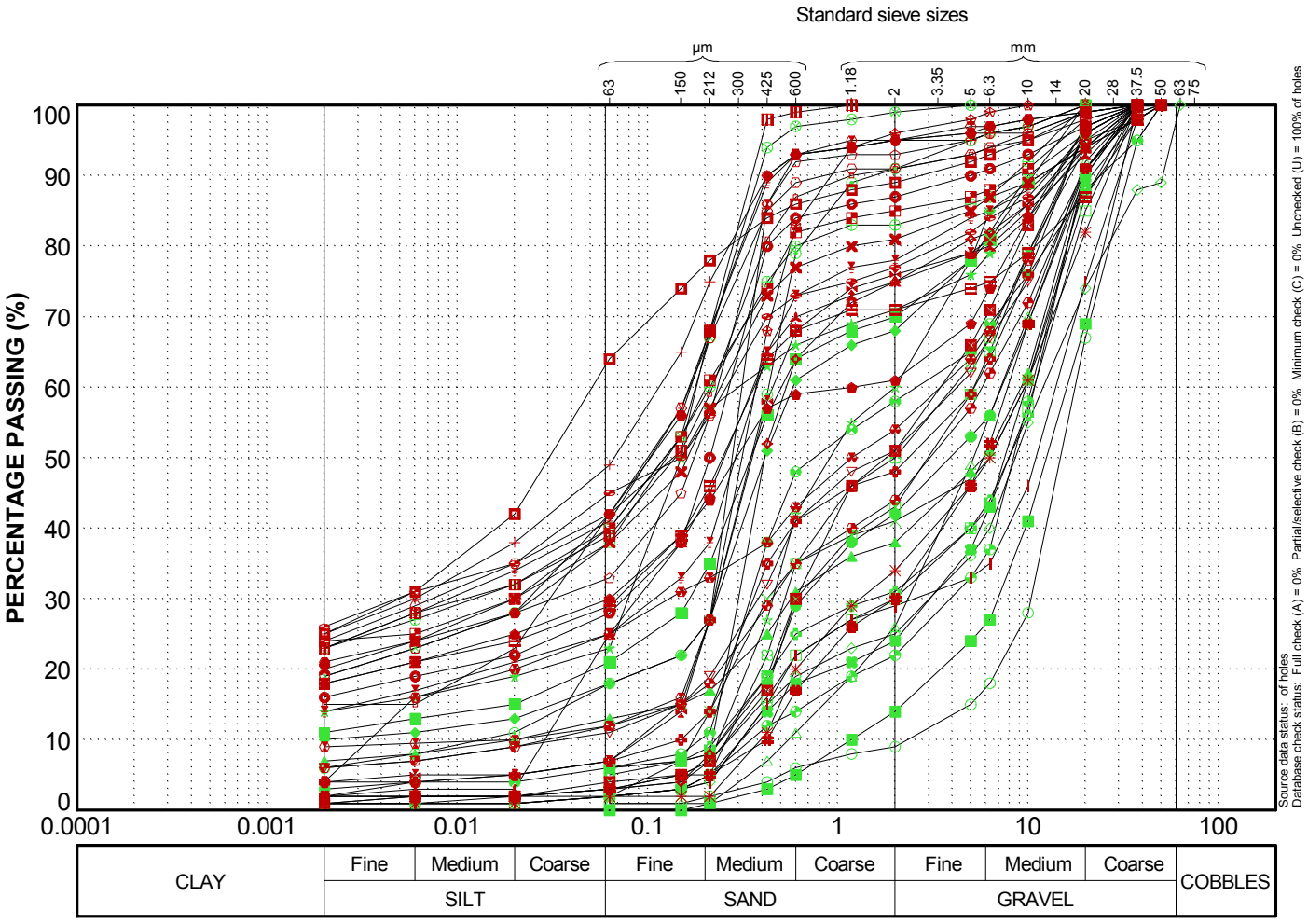
Script file: c:\gint\temp\gsc87988.gsc
Graph: 3.4.01L SPT N VALUE (rev 3Aug11)
gINT output page 1 of 1. Made 1Jul13 11:21

<<DrawingFileSpec>>

Fitzrovia Redevelopment
STANDARD PENETRATION TESTS
MADE GROUND

207329

FIGURE 11

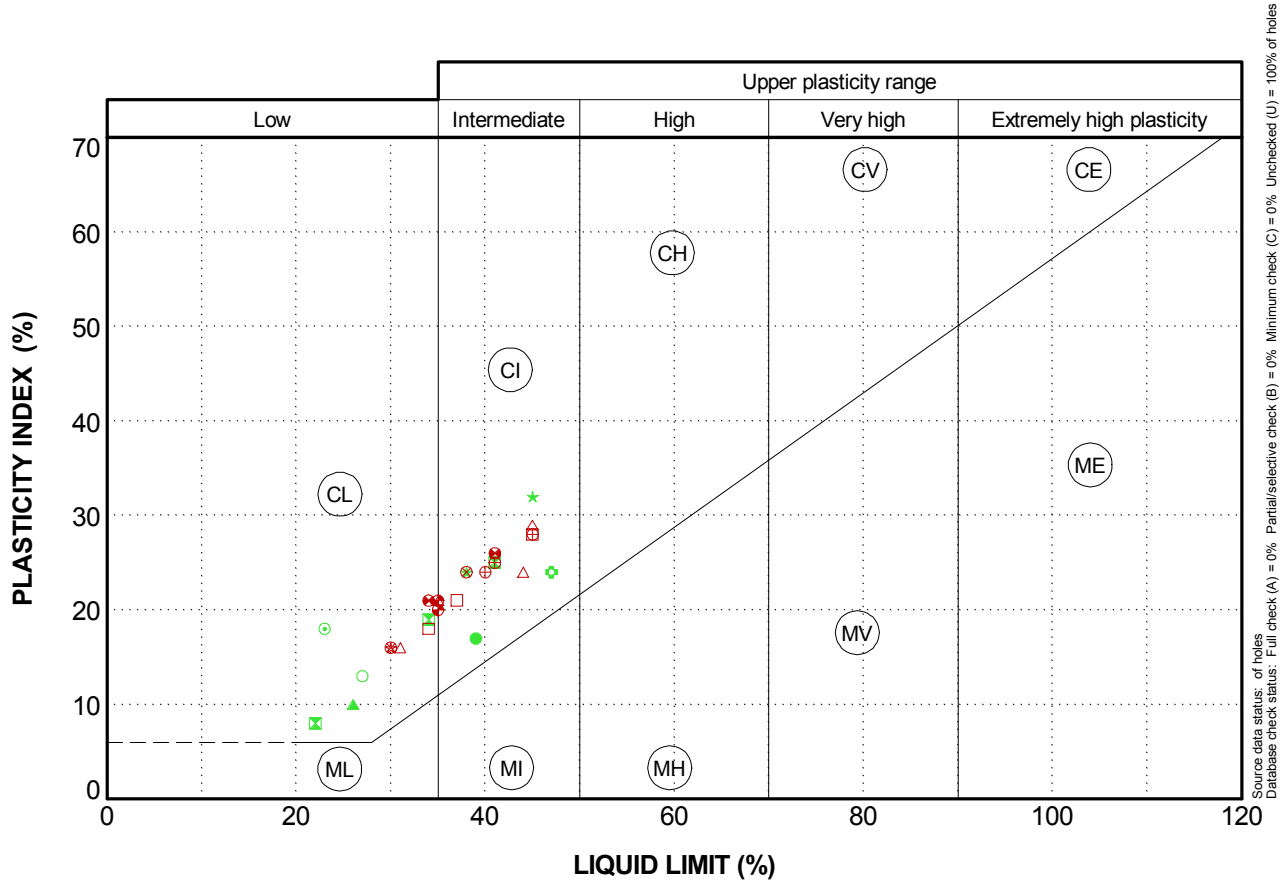


- BH101, 3.50m
- BH102, 3.50m
- BH102, 4.50m
- BH102, 5.50m
- BH103, 3.50m
- BH103, 4.50m
- BH104, 3.50m
- BH104, 6.00m
- BH105, 2.00m
- BH105, 3.00m
- BH105, 4.00m
- BH106, 2.50m
- BH106, 4.50m
- BH107, 4.50m
- BH108, 4.50m
- BH109, 3.50m
- BH109A, 3.50m
- BH113C, 5.00m
- BH114, 4.00m
- BH114, 5.00m
- BH114, 6.50m
- BH115, 4.50m
- BH117, 1.50m
- BH117, 2.50m
- BH117, 3.50m
- BH122, 2.00m
- BH122, 2.50m
- BH122, 3.50m
- BH123, 0.60m
- BH123, 1.40m
- BH123, 1.60m
- BH123, 2.50m
- BH123, 3.50m
- BH124, 1.60m
- BH124, 2.50m
- BH124, 3.50m
- BH125, 1.00m
- BH125, 2.50m
- BH125, 3.50m
- BH126, 0.80m
- BH126, 2.50m
- BH126, 3.50m
- BH127, 1.50m
- BH127, 2.50m
- BH127, 3.50m
- BH129, 5.00m
- BH130, 4.00m
- BH130, 5.00m
- BH207, 5.50m

- Phase 2 Investigation
- Phase 1 Investigation

Fitzrovia Redevelopment
PARTICLE SIZE DISTRIBUTION
TERRACE DEPOSITS

207329 **FIGURE 12**



Phase 2 Investigation
BH101
BH102
BH103
BH105
BH106
BH109
BH109A
BH117
BH122
BH123
BH124
BH125
BH126

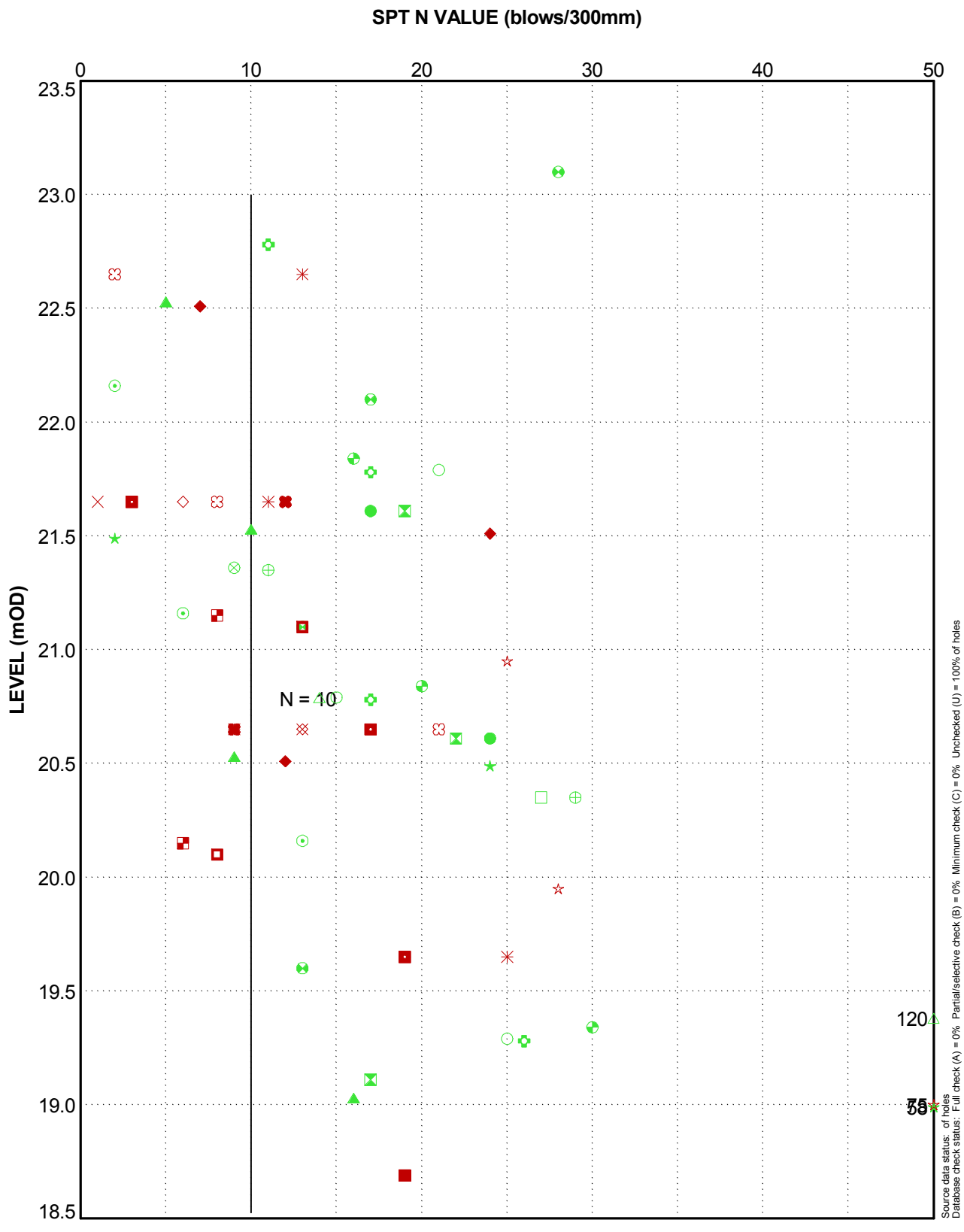
Phase 1 Investigation
BH127

<<DrawingFileSpec>>

Fitzrovia Redevelopment
PLASTICITY CHART
TERRACE DEPOSITS

207329

FIGURE 13



Phase 2 Investigation

BH101
BH102
BH103
BH104
BH105
BH106
BH107
BH108
BH109
BH109A
BH110
BH113C
BH114
BH115
BH117
BH121
BH122
BH123
BH124
BH125
BH126
BH127
BH129
BH130

Phase 1 Investigation

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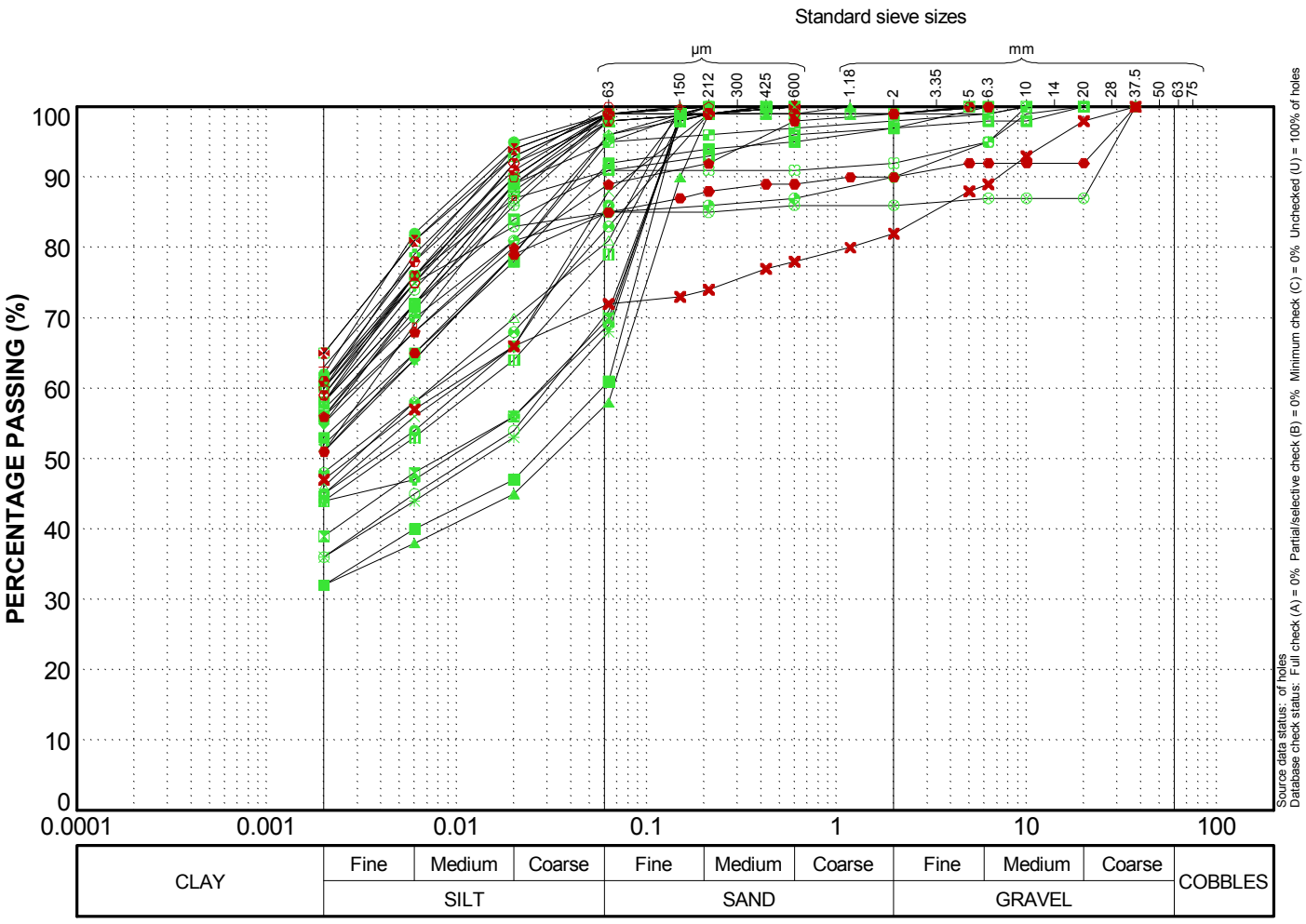
Graph: 3.4.01L SPT N VALUE (rev 3Aug11)
gINT output page 1 of 1. Made 1Jul13 11:21

Fitzrovia Redevelopment
STANDARD PENETRATION TESTS
TERRACE DEPOSITS

207329

FIGURE 14



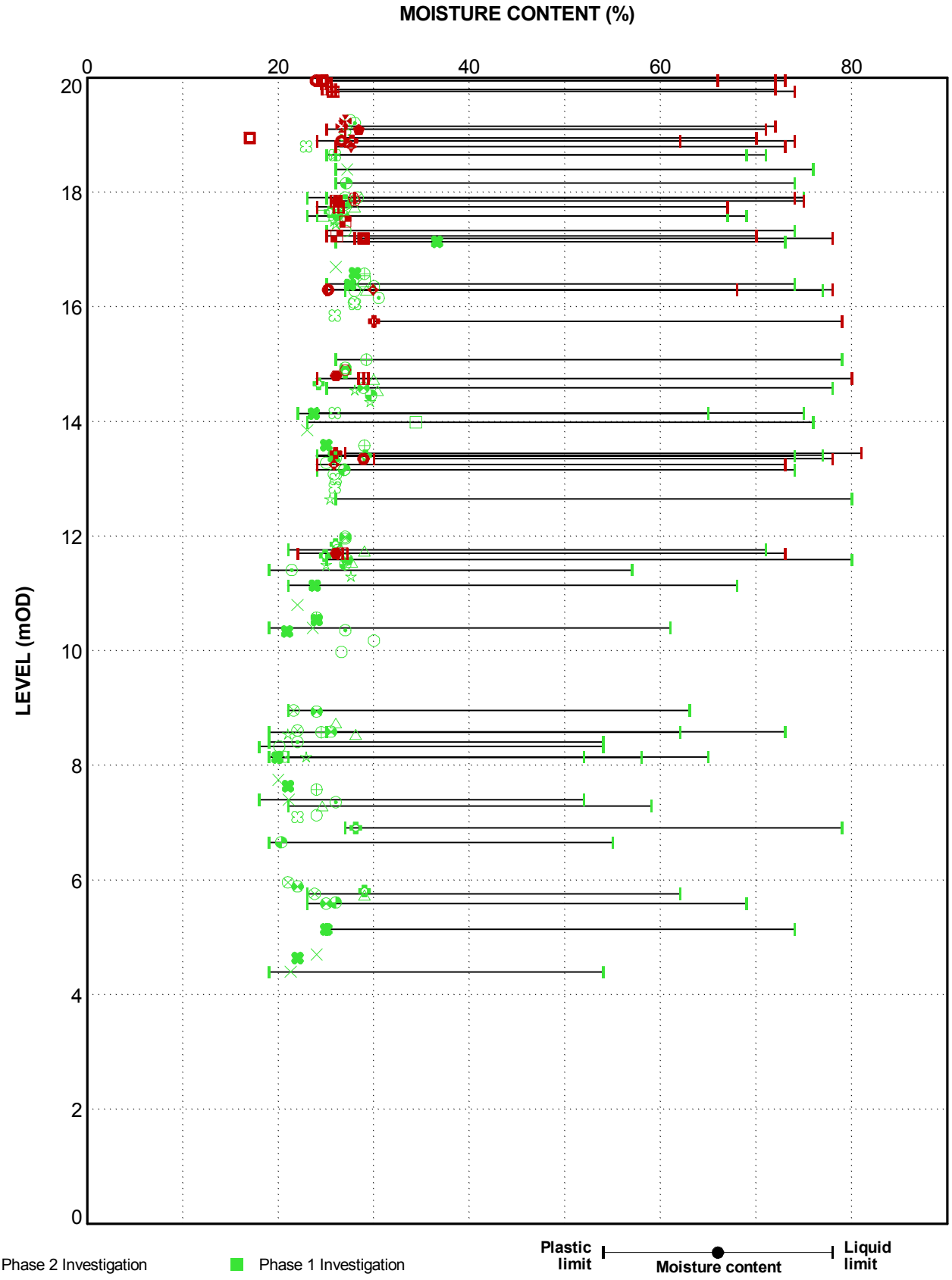
- BH101, 8.00m
- BH101, 14.00m
- BH101, 17.00m
- BH102, 12.00m
- BH102, 18.50m
- BH103, 8.00m
- BH103, 17.00m
- BH104, 18.00m
- BH105, 8.00m
- BH105, 17.00m
- BH106, 10.50m
- BH106, 17.00m
- BH107, 11.60m
- BH109, 7.00m
- BH109, 11.50m
- BH109, 18.50m
- BH109A, 6.50m
- BH109A, 12.50m
- BH109A, 17.00m
- BH110, 6.50m
- BH110, 11.00m
- BH110, 17.00m
- BH113C, 8.00m
- BH113C, 9.00m
- BH114, 9.00m
- BH114, 12.00m
- BH114, 15.00m
- BH114, 18.00m
- BH114, 21.00m
- BH115, 7.50m
- BH121, 8.50m
- BH122, 5.50m
- BH123, 4.50m
- BH125, 4.50m
- BH125, 5.50m
- BH126, 5.50m
- BH129, 7.50m
- BH130, 7.50m
- BH207, 7.50m

- Phase 2 Investigation
- Phase 1 Investigation

Fitzrovia Redevelopment
PARTICLE SIZE DISTRIBUTION
LONDON CLAY

207329

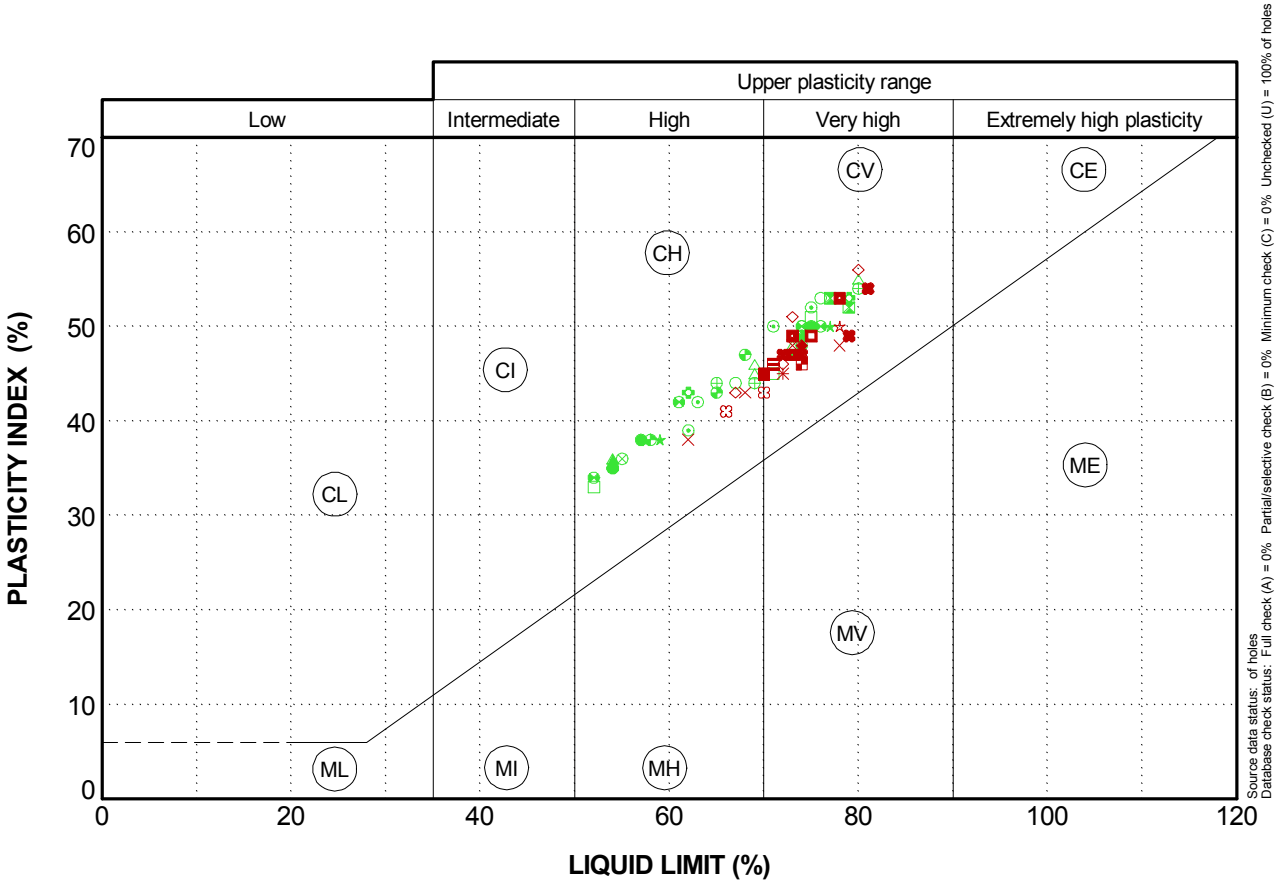
FIGURE 15



Fitzrovia Redevelopment
MC & ATTERBERG LIMITS
LONDON CLAY

207329

FIGURE 16



Phase 2 Investigation

BH101
BH102
BH103
BH104
BH105
BH106
BH107
BH108
BH109
BH109A
BH110
BH113C
BH114
BH115
BH117
BH121
BH122
BH123
BH124
BH125
BH126
BH127
BH129
BH130
BH207

Phase 1 Investigation

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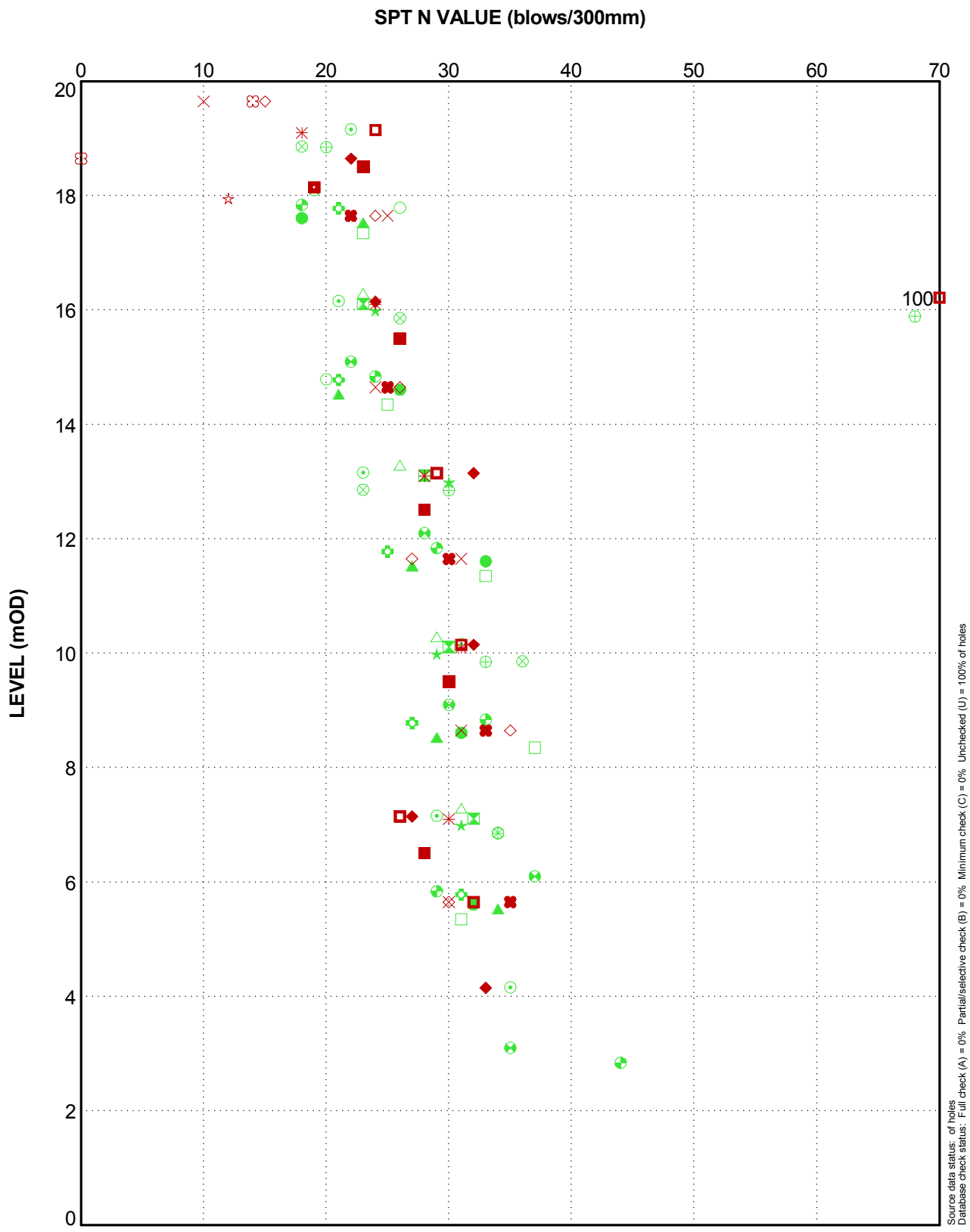
Fitzrovia Redevelopment
PLASTICITY CHART
LONDON CLAY

207329

FIGURE 17



Phase 2 Investigation

- BH101
- BH102
- BH103
- BH104
- BH105
- BH106
- BH107
- BH108
- BH109
- BH109A
- BH110
- BH113C
- BH114
- BH115
- BH117
- BH122
- BH123
- BH124
- BH125
- BH126
- BH127
- BH129
- BH130

Phase 1 Investigation

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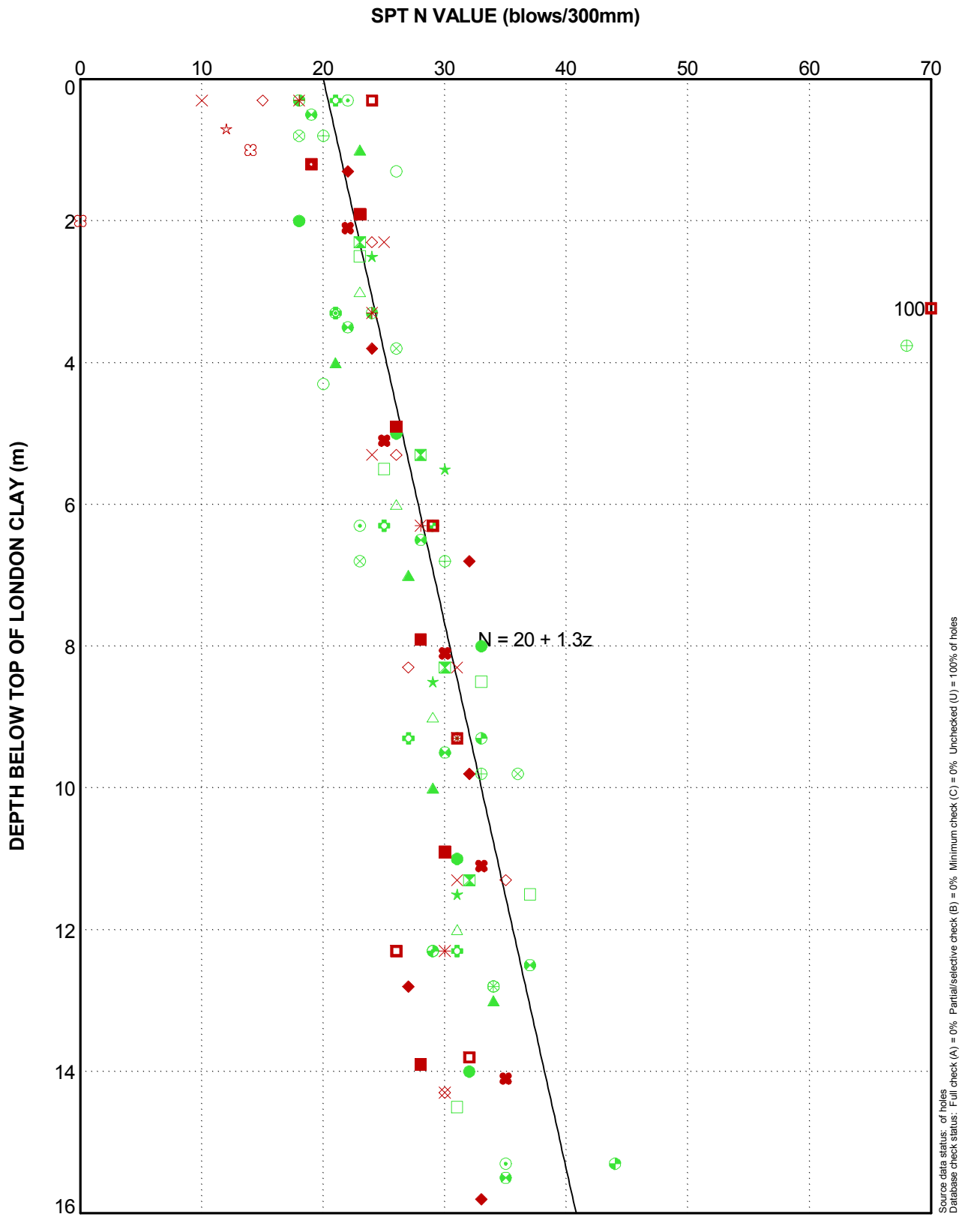
gINT output page 1 of 1. Made 1Jul13 11:21

Fitzrovia Redevelopment
STANDARD PENETRATION TESTS
LONDON CLAY

207329

FIGURE 18



Phase 2 Investigation

- BH101
- BH102
- BH103
- BH104
- BH105
- BH106
- BH107
- BH108
- BH109
- BH109A
- BH110
- BH113C
- BH114
- BH115
- BH117
- BH122
- BH123
- BH124
- BH125
- BH126
- BH127
- BH129
- BH130

Phase 1 Investigation

<<DrawingFileSpec>>

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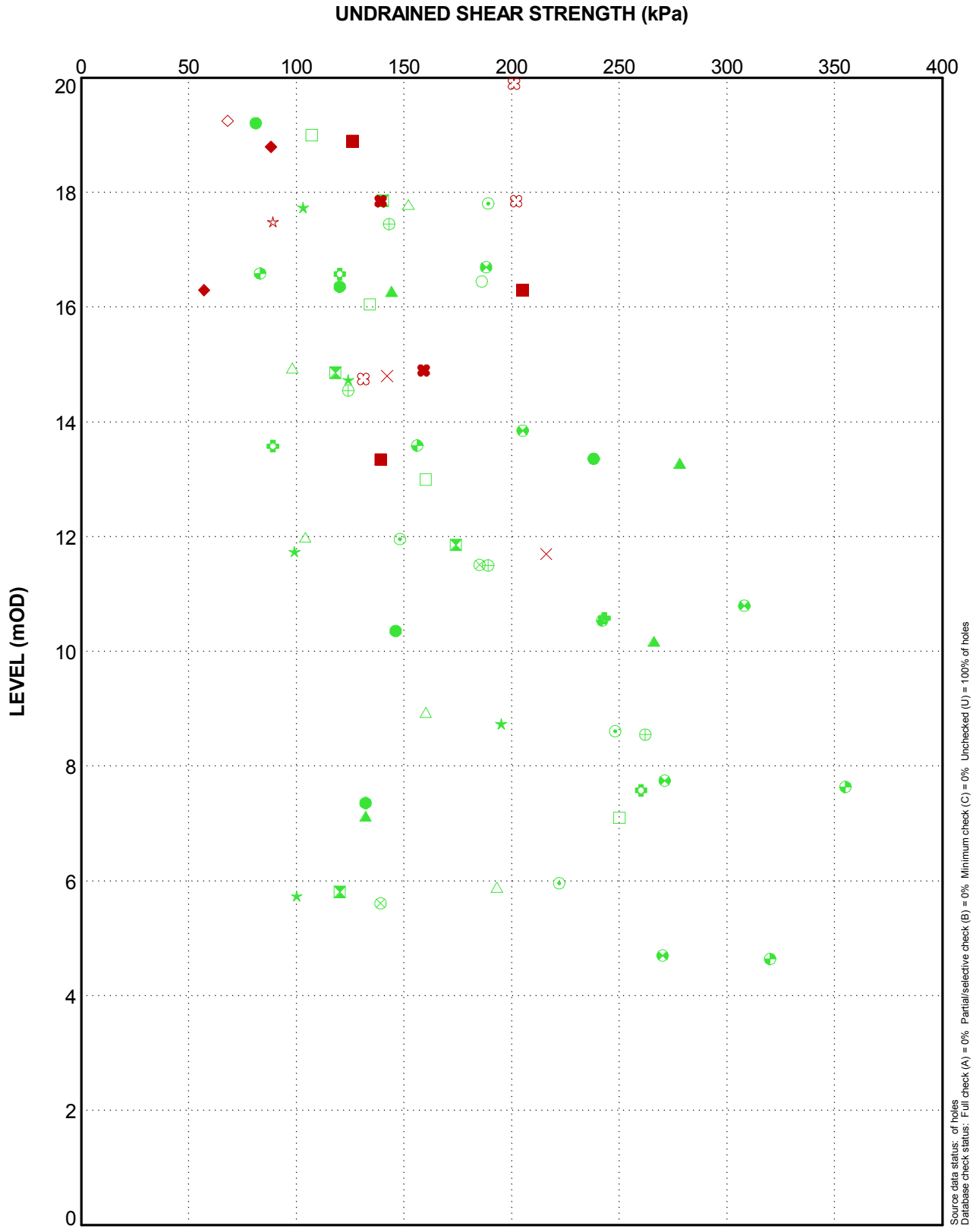
gINT output page 1 of 1. Made 1Jul13 11:22

Fitzrovia Redevelopment
STANDARD PENETRATION TESTS
LONDON CLAY

207329

FIGURE 19



Source data status: of holes
Database check status: Full check (A) = 0% Partial/selective check (B) = 0% Minimum check (C) = 0% Unchecked (U) = 100% of holes

Phase 2 Investigation
- BH101
- BH102
- BH103
- BH104
- BH105
- BH106
- BH107
- BH108
- BH109
- BH109A
- BH110
- BH113C
- BH114

Phase 1 Investigation
- BH121
- BH123
- BH124
- BH126
- BH127
- BH129
- BH130

<<DrawingFileSpec>>

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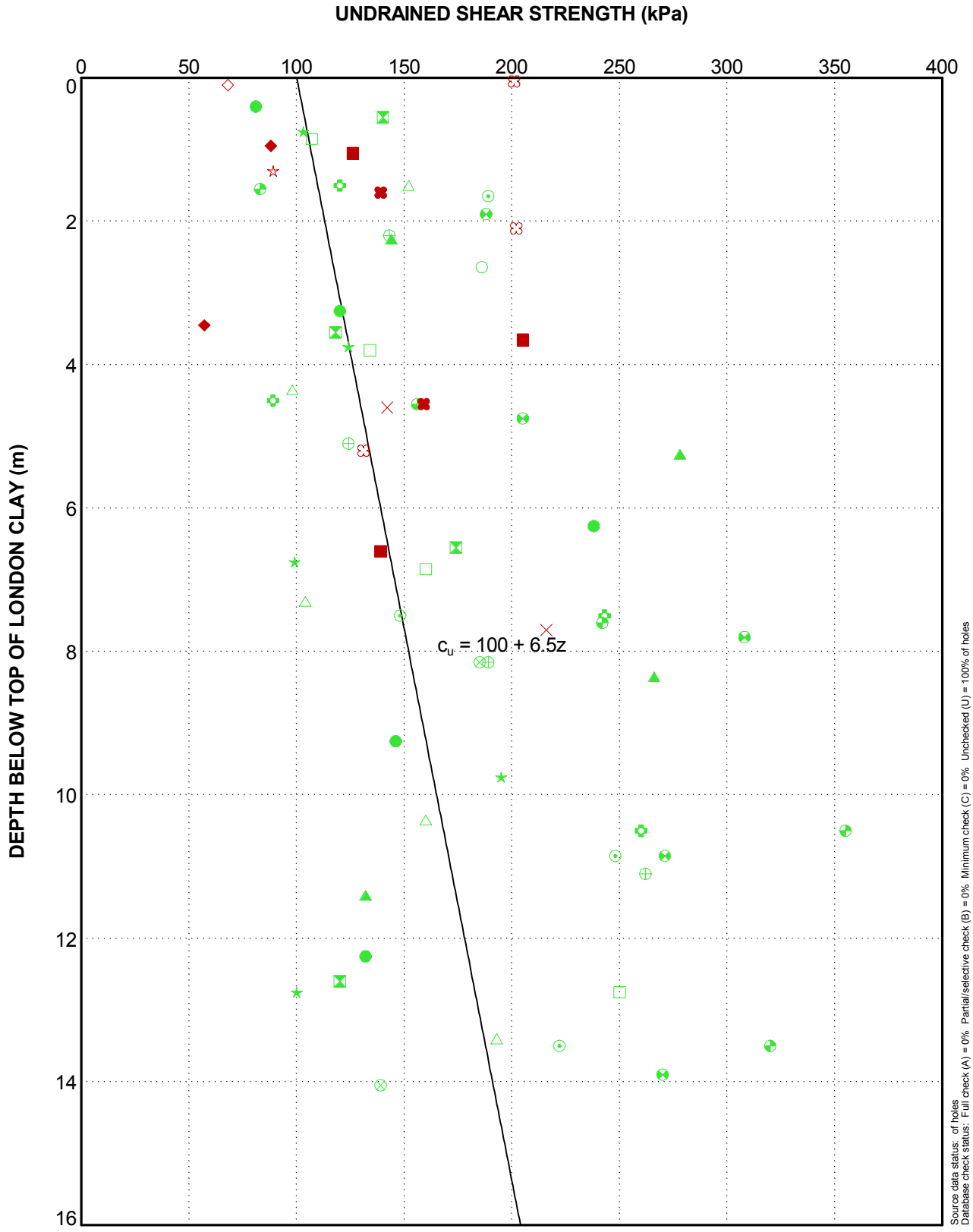
Graph: 3.4.10.L TRIAXIAL CU (rev 23Jan08)
gINT output page 1 of 1. Made 1Jul13 11:22

Fitzrovia Redevelopment
UNDRAINED SHEAR STRENGTH
LONDON CLAY

207329

FIGURE 20



Phase 2 Investigation

- BH101
- BH102
- BH103
- BH104
- BH105
- BH106
- BH107
- BH108
- BH109
- BH109A
- BH110
- BH113C
- BH114

Phase 1 Investigation

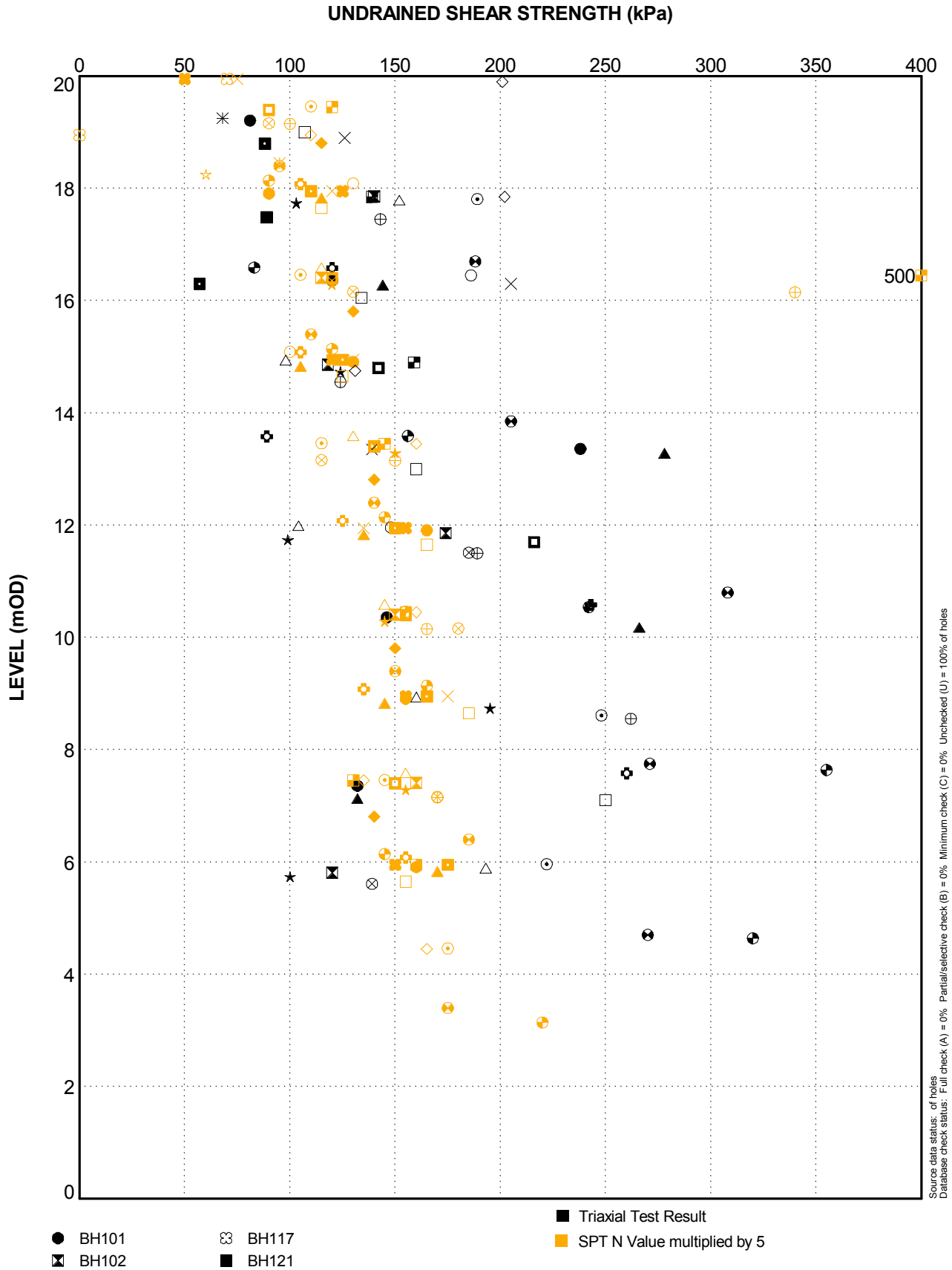
- BH121
- BH123
- BH124
- BH126
- BH127
- BH129
- BH130

<<DrawingFileSpec>>

Fitzrovia Redevelopment
UNDRAINED SHEAR STRENGTH
LONDON CLAY

207329

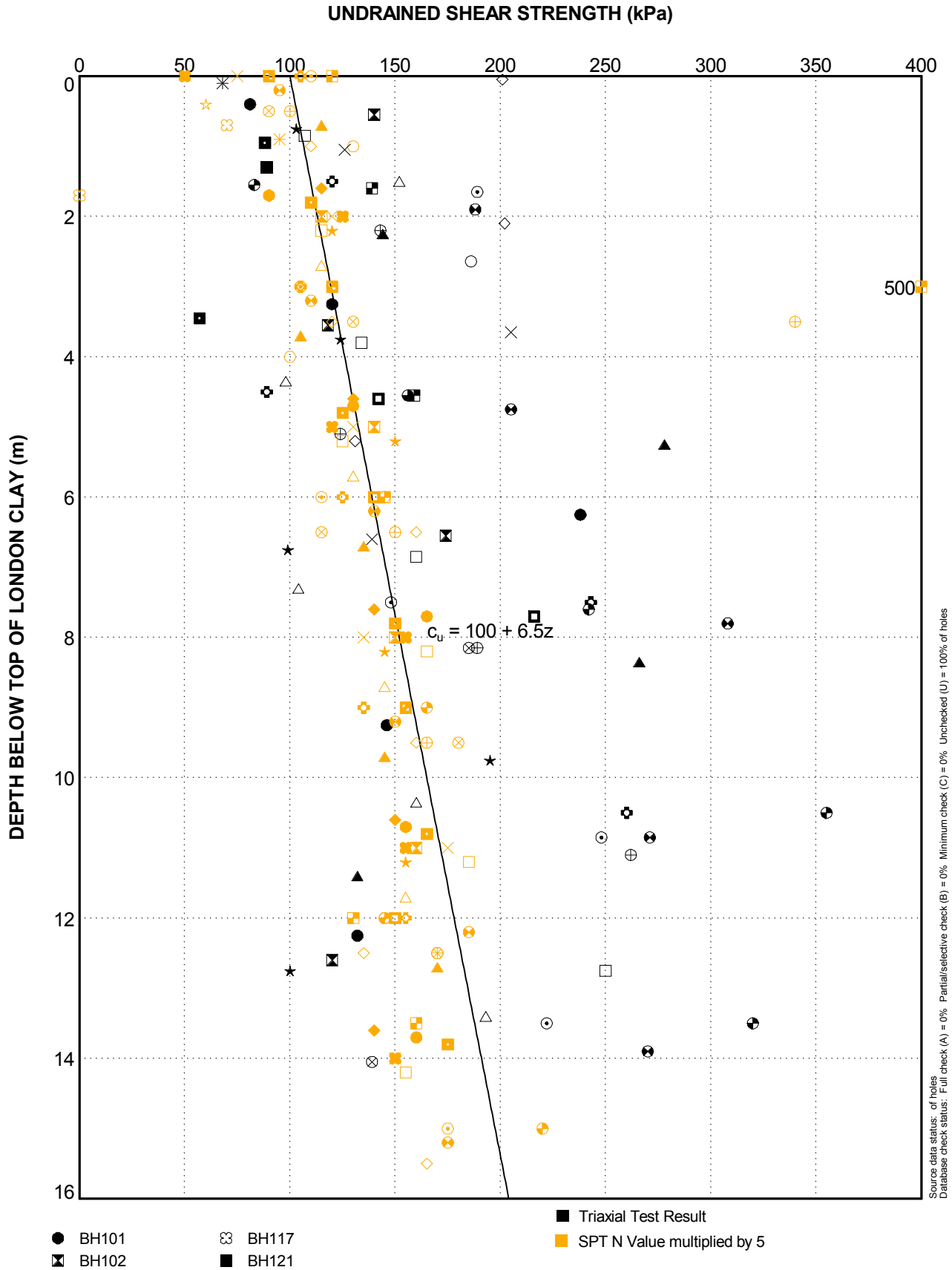
FIGURE 21



Fitzrovia Redevelopment
UNDRAINED SHEAR STRENGTH
TRIXIAL TEST AND FACTORED SPT
LONDON CLAY

207329

FIGURE 22

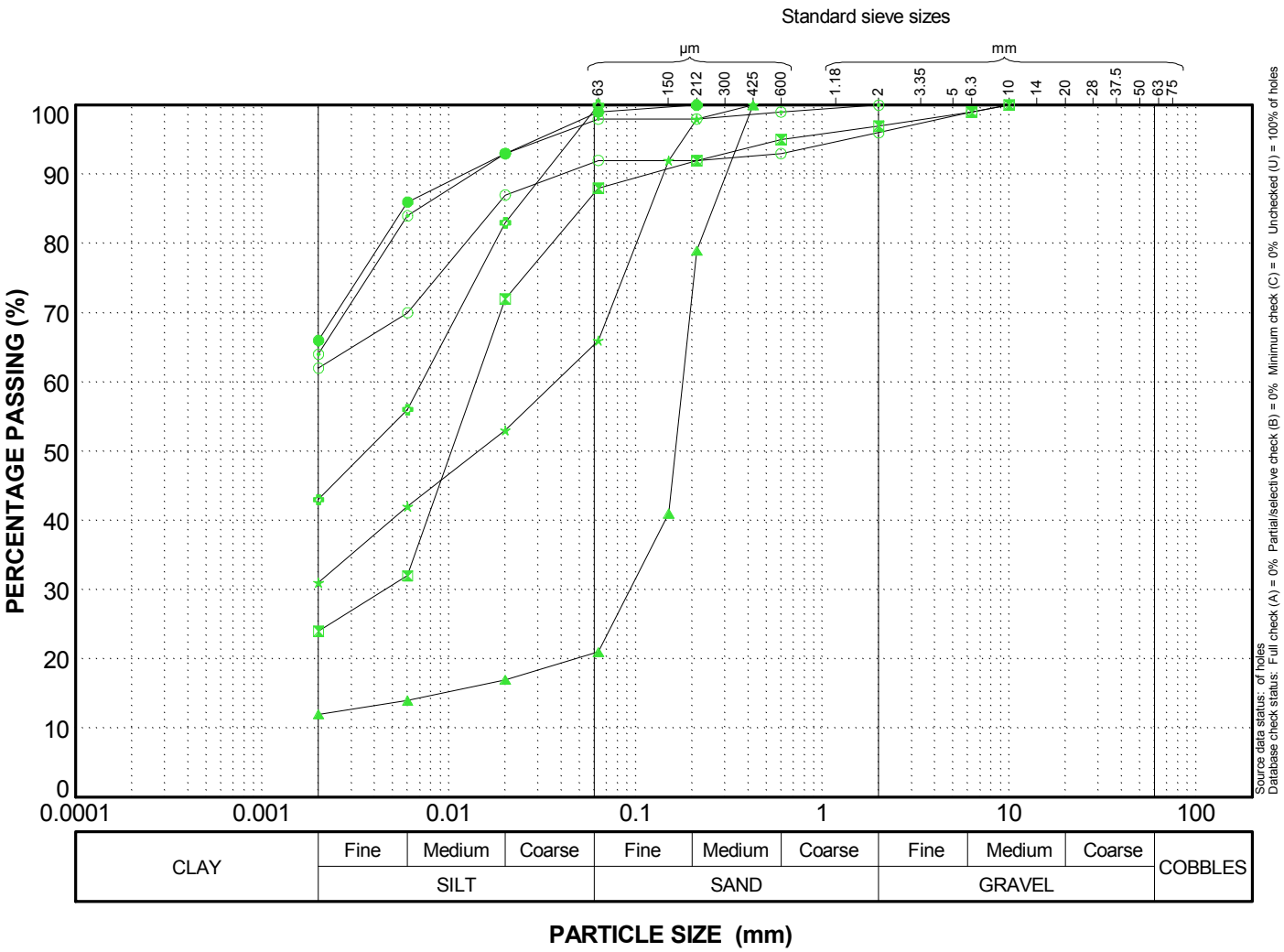


Fitzrovia Redevelopment
UNDRAINED SHEAR STRENGTH
TRIXIAL TEST AND FACTORED SPT
LONDON CLAY

207329

FIGURE 23

<<DrawingFileSpec>>



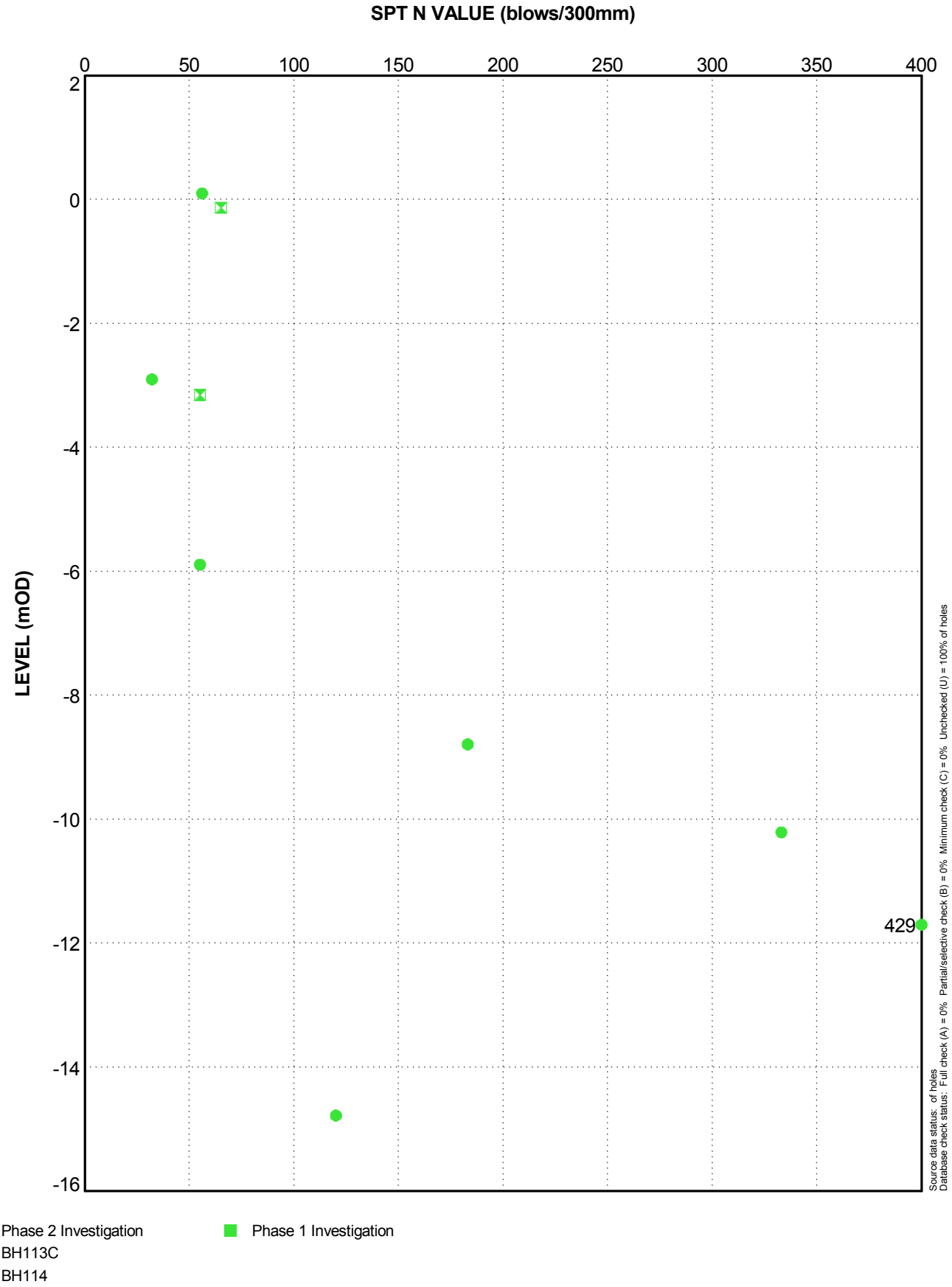
- BH113C, 23.50m
- BH113C, 31.00m
- BH113C, 35.00m
- BH113C, 39.85m
- BH114, 23.50m
- BH114, 27.00m
- BH114, 30.50m

- Phase 2 Investigation
- Phase 1 Investigation

Fitzrovia Redevelopment
PARTICLE SIZE DISTRIBUTION
LAMBETH GROUP

207329

FIGURE 24



Fitzrovia Redevelopment
STANDARD PENETRATION TESTS
LAMBETH GROUP

207329

FIGURE 25

Appendix B

Frew Analysis

ARUP

Subject	BIA Appendix B FREW Analysis		
Date	7 December 2015	Job No/Ref	207329 BIA 80 Charlotte St Amended Scheme

PRELIMINARY FREW ANALYSIS

Design approach and load combinations

According to Design Approach 1 of the Eurocode 7 (BS EN 1997) the calculations have been carried out by considering the following combinations:

- **SLS** (Serviceability Limit State). The loads and the geotechnical parameters are applied with their characteristic values.

- **ULS, DA1C1** (Ultimate Limit State, combination 1). The loads and the geotechnical parameters are applied with their characteristic values. The road surcharge of 20kPa is multiplied by a factor 1.5/1.35 = 22 kPa. The resulting bending moments, shear forces in the walls and horizontal reactions in the slabs are multiplied by 1.35 (ref. Table A.3 EC7 – Partial factors on actions or the effects of actions – Column "A1").

- **ULS, DA1C2** (Ultimate Limit State, combination 2). The bending moments, shear forces in the walls and horizontal reactions in the slabs are obtained by applying partial factors on the soil parameters (ref. Table A.4 EC7 – Column "M2") and partial factors on loads (ref. Table A.3 - Column "A2"). In addition to this an over-dig equal to 0.3m has been taken into account and an accidental water case has been considered.

Retaining wall analyses in FREW

Soil Parameters

Soil parameters used in the FREW analyses are given in Section 3 of main BIA report.

Construction sequences

An analysis of the lateral stability, shear forces, bending moments and anticipated deflections of the wall is carried out using the Oasys retaining wall analysis program FREW. The analyses adopt as strategy a multi-stage calculation that replicates the potential excavation and propping sequence to be followed after the wall installation. The analysed construction sequence varies is summarised in the following tables in which the stages have been listed and commented by highlighting the salient points of the modelling.

The SLS, DA1C1 and DA1C2 outputs are provided after this summary.

280mm diameter piles at 400 centres

Stage	Notes
0. Initial Condition	Ground at ground level +27mOD both sides of existing lightwell wall
1. Add retaining wall and switch to undrained parameters in London Clay	Model installation of contiguous piled wall and new 400mm thick insitu wall above
2. Add road surcharge and props at ground level and existing lightwell slab level	Before there is any excavation in reality, no movements of piled wall are expected. This stage, with propping in place when surcharge applied ensures that there are no significant wall deflections built in at this stage.
3. Remove ground level prop and take out ground in FREW to existing lightwell level (+25.4mOD)	This models new wall propped at existing lightwell level and with ground level prop now able to be removed.
4. Excavate to formation level (+23mOD)	
5. Add base slab	
6. Add ground floor level permanent support and take out temporary prop at +25.4mOD	
7. Long term	Switch to drained parameters in London Clay and 50% wall relaxation applied in FREW

600mm diameter piles at 750 centres

Stage	Notes
0. Initial Condition	Ground at ground level +27mOD both sides of existing lightwell wall. To take into account that Made Ground supporting the road will be stronger than found at greater depth, adopt angle of friction 30 degrees and E' = 20MPa over depth of existing lightwell. Since insitu stresses will also have fallen towards active due to the existing cantilever wall support, take K0 in FREW = (K0+Ka)/2 over depth of existing lightwell.
1. Add retaining wall and switch to undrained parameters in London Clay	Model installation of contiguous piled wall and new 400mm thick insitu wall above
2. Add road surcharge and props at ground level and existing lightwell slab level	Before there is any excavation in reality, no movements of piled wall are expected. This stage, with propping in place when surcharge applied ensures that there are no significant wall deflections built in at this stage.
4. Excavate to formation level (+23mOD) with wall propped at ground level and existing lightwell level	
5. Add base slab	
6. Remove props	
7. Long term	Switch to drained parameters in London Clay and 50% wall relaxation applied in FREW

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

INITIAL DATA

Notes
280/234 @ 400c/c

Soil properties

No.	Description	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
2	London Clay - Und	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
3	London Clay - Drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
4	RiverTerrace	19.00	0.50	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	0.00	0.00	0.00	10000.	0.00	Drained
2	100.00	18.50	6.50	100000.	6500.00	Undrained
3	0.00	18.50	0.00	80000.	5200.00	Drained
4	0.00	0.00	0.00	20000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	25.00	0.67	0.00	0.00
2	0.00	0.67	0.00	0.50
3	24.00	0.67	0.00	0.00
4	33.00	0.67	0.00	0.00

Soil Strength Partial Factors

Document and case:	tan Phi'	c'	Cu	E
EC7 DA1 Combination 1 (2011)	1.00	1.00	1.00	1.00

Note: Only the parameters in bold have been affected by Partial Factors,
No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	19.00	0.58	**0.35**	**3.42**	**1.19**	**3.70**	0.25	Calculated
2	20.00	1.00	**1.00**	**1.00**	**2.45**	**2.45**	1.00	Calculated
3	20.00	1.00	**0.37**	**3.22**	**1.21**	**3.59**	0.25	Calculated
4	19.00	0.50	**0.25**	**5.66**	**1.00**	**4.76**	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	**0.00**	0.00	**0.00**	**10000.**	**0.00**	Drained
2	**100.00**	18.50	**6.50**	**100000.**	**6500.00**	Undrained
3	**0.00**	18.50	**0.00**	**80000.**	**5200.00**	Drained
4	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	**25.00**	0.67	0.00	0.00
2	**0.00**	0.67	0.00	0.50
3	**24.00**	0.67	0.00	0.00
4	**33.00**	0.67	0.00	0.00

Surcharge properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure Factor [kN/m²]	Partial	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	20.00		1.00		
2	5	-	Right	23.00	0.00		1.00		

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

Surcharge Design properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	20.00			
2	5	-	Right	23.00	0.00			

Strut properties

No.	Stage In	Stage Out	Node	Level [m]	Prestress [kN/m]	Stiffness [kN/m/m]	Angle [°]	Lever arm [m]
1	2	3	2	27.40	0.00	50000.00	0.00	0.00
2	-	-	3	27.10	0.00	50000.00	0.00	0.00
3	-	-	4	26.80	0.00	50000.00	0.00	0.00
4	-	-	5	26.45	0.00	50000.00	0.00	0.00
5	-	-	6	26.10	0.00	50000.00	0.00	0.00
6	-	-	7	25.75	0.00	50000.00	0.00	0.00
7	-	-	9	25.00	0.00	50000.00	0.00	0.00
8	5	-	13	23.50	0.00	194444.00	0.00	0.00
9	6	-	4	26.80	0.00	50000.00	0.00	0.00
10	2	6	8	25.40	0.00	50000.00	0.00	0.00

STAGE 0 : INITIAL CONDITION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	1	50.00	50.00	149330.
2	27.40	1	1	50.00	50.00	149330.
3	27.10	1	1	50.00	50.00	149330.
4	26.80	1	1	50.00	50.00	149330.
5	26.45	1	1	50.00	50.00	149330.
6	26.10	1	1	50.00	50.00	149330.
7	25.75	1	1	50.00	50.00	149330.
8	25.40	1	1	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	3	3	50.00	50.00	21120.
30	18.00	3	3	50.00	50.00	21120.
31	17.65	3	3	50.00	50.00	10479.
32	17.35	3	3	50.00	50.00	10479.
33	17.02	3	3	50.00	50.00	10479.
34	16.67	3	3	50.00	50.00	10479.
*	***35 16.33***	***3***	***3***	***50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00

Convergence control parameters

Maximum number of iterations : 9000
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 0 : Initial condition

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.83	0.83	0.00	1	1	1.43	1.43	0.83	0.83	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	3.31	3.31	0.00	1	1	5.70	5.70	3.31	3.31	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	6.61	6.61	0.00	1	1	11.40	11.40	6.61	6.61	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	9.92	9.92	0.00	1	1	17.10	17.10	9.92	9.92	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	13.78	13.78	0.00	1	1	23.75	23.75	13.78	13.78	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	17.63	17.63	0.00	1	1	30.40	30.40	17.63	17.63	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	21.49	21.49	0.00	1	1	37.05	37.05	21.49	21.49	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	25.35	25.35	0.00	1	1	43.70	43.70	25.35	25.35	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	36.75	3	3	178.30	141.55	178.30	141.55	36.75	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	40.00	3	3	184.80	144.80	184.80	144.80	40.00	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	43.50	3	3	191.80	148.30	191.80	148.30	43.50	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	46.50	3	3	197.80	151.30	197.80	151.30	46.50	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	49.75	3	3	204.30	154.55	204.30	154.55	49.75	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	53.25	3	3	211.30	158.05	211.30	158.05	53.25	**0.00**	**0.00**
35	16.33	0.00	218.30	161.55	218.30	161.55	56.75	3	3	218.30	161.55	218.30	161.55	56.75	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	60.75	3	3	226.30	165.55	226.30	165.55	60.75	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	64.75	3	3	234.30	169.55	234.30	169.55	64.75	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	68.75	3	3	242.30	173.55	242.30	173.55	68.75	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	72.75	3	3	250.30	177.55	250.30	177.55	72.75	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	76.75	3	3	258.30	181.55	258.30	181.55	76.75	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	80.75	3	3	266.30	185.55	266.30	185.55	80.75	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	84.75	3	3	274.30	189.55	274.30	189.55	84.75	**0.00**	**0.00**

NOTE: Displacements from STAGE 0 are disregarded in later stages

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

STAGE 1 : ADD RETAINING WALL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	1	50.00	50.00	149330.
2	27.40	1	1	50.00	50.00	149330.
3	27.10	1	1	50.00	50.00	149330.
4	26.80	1	1	50.00	50.00	149330.
5	26.45	1	1	50.00	50.00	149330.
6	26.10	1	1	50.00	50.00	149330.
7	25.75	1	1	50.00	50.00	149330.
8	25.40	1	1	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

** Wall toe level: 16.33*

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 1 : Add retaining wall

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	1	0.00	1
2	0.0	1	0.0000	1	0.00	1
3	0.0	1	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.83	0.83	0.00	1	1	1.43	1.43	0.83	0.83	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	3.31	3.31	0.00	1	1	5.70	5.70	3.31	3.31	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	6.61	6.61	0.00	1	1	11.40	11.40	6.61	6.61	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	9.92	9.92	0.00	1	1	17.10	17.10	9.92	9.92	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	13.78	13.78	0.00	1	1	23.75	23.75	13.78	13.78	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	17.63	17.63	0.00	1	1	30.40	30.40	17.63	17.63	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	21.49	21.49	0.00	1	1	37.05	37.05	21.49	21.49	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	25.35	25.35	0.00	1	1	43.70	43.70	25.35	25.35	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	*36.75*	2	2	178.30	141.55	178.30	141.55	*36.75*	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	*40.00*	2	2	184.80	144.80	184.80	144.80	*40.00*	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	*43.50*	2	2	191.80	148.30	191.80	148.30	*43.50*	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	*46.50*	2	2	197.80	151.30	197.80	151.30	*46.50*	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	*49.75*	2	2	204.30	154.55	204.30	154.55	*49.75*	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	*53.25*	2	2	211.30	158.05	211.30	158.05	*53.25*	**0.00**	**0.00**
***35**	16.33	0.00	218.30	161.55	218.30	161.55	*56.75*	2	2	218.30	161.55	218.30	161.55	*56.75*	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	*60.75*	2	2	226.30	165.55	226.30	165.55	*60.75*	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	*64.75*	2	2	234.30	169.55	234.30	169.55	*64.75*	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	*68.75*	2	2	242.30	173.55	242.30	173.55	*68.75*	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	*72.75*	2	2	250.30	177.55	250.30	177.55	*72.75*	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	*76.75*	2	2	258.30	181.55	258.30	181.55	*76.75*	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	*80.75*	2	2	266.30	185.55	266.30	185.55	*80.75*	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	*84.75*	2	2	274.30	189.55	274.30	189.55	*84.75*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

** Wall toe level: 16.33*

**Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.**

**Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-1.55	7.80	-50.44	38.48	-81.60	53.35

STAGE 2 : PROP AND SURCHARGE

Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max

Minimum equivalent fluid pressure parameters

Material	Left a	Left yo	Left b	Right a	Right yo	Right b
	[kN/m²/m]	[m]	[kN/m²]	[kN/m²/m]	[m]	[kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 2 : prop and surcharge

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 1 inserted at this stage
Strut no 10 inserted at this stage
Surcharge no. 1 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.0727	18	1.73	1
2	1.1	18	0.0002	1	0.30	2
3	1.1	18	0.0001	1	0.57	1
4	1.1	18	0.0002	1	0.13	2
5	1.1	18	0.0001	1	0.01	2

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.04	21.43	21.43	7.55	7.55	0.00	A 1	1	a	1.43	1.43	0.50	0.50	0.00	**0.00**	**0.00**
2	27.40	0.09	25.70	25.70	9.07	9.07	0.00	A 1	1		5.70	5.70	2.89	2.89	0.00	**-0.32**	**1.99**
	27.40															**-0.32**	**-2.50**
3	27.10	0.14	31.40	31.40	11.36	11.36	0.00	1	1		11.40	11.40	6.21	6.21	0.00	**0.16**	**-0.80**
4	26.80	0.18	37.10	37.10	15.30	15.30	0.00	1	1		17.10	17.10	9.47	9.47	0.00	**0.17**	**0.91**
5	26.45	0.23	43.75	43.75	19.23	19.23	0.00	1	1		23.75	23.75	13.28	13.28	0.00	**-0.49**	**2.90**
6	26.10	0.29	50.40	50.40	23.17	23.17	0.00	1	1		30.40	30.40	17.08	17.08	0.00	**-1.87**	**5.01**
7	25.75	0.34	57.05	57.05	27.10	27.10	0.00	1	1		37.05	37.05	20.87	20.87	0.00	**-3.99**	**7.16**
8	25.40	0.40	63.70	63.70	31.14	31.14	0.00	1	1		43.70	43.70	24.55	24.55	0.00	**-6.88**	**9.49**
	25.40															**-6.88**	**-10.50**
9	25.00	0.49	71.30	71.30	35.42	35.42	0.00	1	1		51.30	51.30	29.09	29.09	0.00	**-3.18**	**-8.00**
10	24.60	0.61	78.90	78.90	39.37	39.37	0.00	1	1		58.90	58.90	33.95	33.95	0.00	**-0.49**	**-5.65**
11	24.20	0.73	86.50	86.50	43.23	43.23	0.00	1	1		66.50	66.50	38.91	38.91	0.00	**1.34**	**-3.75**
12	23.85	0.83	93.15	93.15	46.66	46.66	0.00	1	1		73.15	73.15	43.19	43.19	0.00	**2.37**	**-2.34**
13	23.50	0.91	99.80	99.80	50.15	50.15	0.00	1	1		79.80	79.80	47.41	47.41	0.00	**2.97**	**-1.27**
14	23.17	0.98	105.98	105.98	53.43	53.43	0.00	1	1		85.98	85.98	51.30	51.30	0.00	**3.24**	**-0.45**
15	22.83	1.03	112.63	112.63	57.07	57.07	0.00	1	1		92.63	92.63	55.37	55.37	0.00	**3.27**	**0.19**
16	22.52	1.05	118.33	118.33	60.28	60.28	0.00	1	1		98.33	98.33	58.78	58.78	0.00	**3.13**	**0.71**
17	22.17	1.07	124.98	124.98	63.88	63.88	0.00	1	1		104.98	104.98	62.89	62.89	0.00	**2.79**	**1.13**
18	21.83	1.07	131.63	129.88	68.78	67.03	1.75	1	1		111.63	109.88	67.18	65.43	1.75	**2.34**	**1.52**
19	21.62	1.07	135.52	131.72	72.18	68.38	3.80	1	1		115.52	111.72	70.01	66.21	3.80	**1.98**	**1.99**
20	21.38	1.05	140.08	133.88	64.83	58.63	6.20	4	4		120.08	113.88	66.45	60.25	6.20	**1.45**	**2.02**
21	21.10	1.04	145.40	136.40	68.47	59.47	9.00	4	4		125.40	116.40	70.93	61.93	9.00	**0.94**	**1.45**
22	20.80	1.01	151.10	139.10	73.20	61.20	12.00	4	4		131.10	119.10	74.90	62.90	12.00	**0.61**	**0.82**
23	20.45	0.98	157.75	142.25	78.51	63.01	15.50	4	4		137.75	122.25	79.74	64.24	15.50	**0.42**	**0.31**
24	20.05	0.94	165.35	145.85	84.53	65.03	19.50	4	4		145.35	125.85	85.32	65.82	19.50	**0.39**	**-0.08**
25	19.65	0.90	172.95	149.45	90.65	67.15	23.50	4	4		152.95	129.45	90.80	67.30	23.50	**0.49**	**-0.27**
26	19.30	0.86	179.60	152.60	96.20	69.20	27.00	4	4		159.60	132.60	95.40	68.40	27.00	**0.59**	**-0.16**
27	18.98	0.82	185.78	155.53	101.56	71.31	30.25	4	4		165.78	135.53	99.48	69.23	30.25	**0.60**	**0.30**
28	18.67	0.78	191.48	158.23	104.25	71.00	33.25	4	4		171.48	138.23	105.46	72.21	33.25	**0.42**	**0.43**
29	18.33	0.73	198.30	145.71	190.11	137.52	*52.59*	2	2		178.30	137.52	186.46	145.68	*40.78*	**0.33**	**0.85**
30	18.00	0.68	204.80	150.50	193.65	139.35	*54.30*	2	2		184.80	139.32	195.94	150.46	*45.48*	**-0.14**	**1.08**
31	17.65	0.63	211.80	154.11	200.43	142.74	*57.69*	2	2		191.80	142.71	203.16	154.08	*49.09*	**-0.39**	**0.25**
32	17.35	0.59	217.80	156.58	207.44	146.23	*61.22*	2	2		197.80	146.20	208.15	156.55	*51.60*	**-0.33**	**-0.30**
33	17.02	0.55	224.30	159.58	214.43	149.71	*64.73*	2	2		204.30	149.69	214.16	159.55	*54.61*	**-0.19**	**-0.37**
34	16.67	0.51	231.30	163.07	221.44	153.21	*68.23*	2	2		211.30	153.19	221.16	163.04	*58.11*	**-0.08**	**-0.27**
***35**	16.33	0.47	238.30	166.49	228.60	156.78	*71.81*	2	2		218.30	156.76	228.00	166.46	*61.54*	**0.00**	**0.00**
36	15.93	0.42	246.30	170.64	236.30	160.64	*75.66*	2	2		226.30	160.62	236.30	170.61	*65.68*	**0.00**	**0.00**
37	15.52	0.37	254.30	174.64	244.30	164.64	*79.66*	2	2		234.30	164.61	244.30	174.61	*69.69*	**0.00**	**0.00**
38	15.13	0.32	262.30	178.63	252.30	168.63	*83.67*	2	2		242.30	168.61	252.30	178.61	*73.69*	**0.00**	**0.00**
39	14.73	0.26	270.30	182.63	260.30	172.63	*87.67*	2	2		250.30	172.61	260.30	182.61	*77.69*	**0.00**	**0.00**
40	14.32	0.20	278.30	186.63	268.30	176.63	*91.67*	2	2		258.30	176.61	268.30	186.61	*81.69*	**0.00**	**0.00**
41	13.93	0.12	286.30	190.63	276.30	180.63	*95.67*	2	2		266.30	180.61	276.30	190.61	*85.69*	**0.00**	**0.00**
42	13.52	0.00	294.30	194.63	284.30	184.63	*99.67*	2	2		274.30	184.61	284.30	194.61	*89.69*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far
Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max
-1.55 7.80 -50.44 38.48 -81.60 53.35
Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	4.49	4.49	0.00	4.49
10	8	19.99	19.99	0.00	19.99

STAGE 3 : TAKE OUT PROP AT GROUND LEVEL

Geometry

Node	Level [m]	Soil	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0 50.00	50.00	149330.

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
***35**	***16.33**	***2**	***2**	***50.00**	***50.00**	***0.0**
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

Wall toe level: 16.33

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 3 : take out prop at ground level

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes

Strut no. 1 removed at this stage

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 120430. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	2.5115	18	4.23	9
2	2.5	18	0.0511	1	2.82	1
3	2.5	18	0.0311	1	1.56	2
4	2.5	18	0.0210	1	1.09	3
5	2.5	18	0.0145	1	0.59	3
10	2.5	18	0.0015	1	0.03	4

Ground level left = 27.70 Ground level right = 25.20

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right		Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	2.04	21.43	21.43	7.55	7.55	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	1.99	25.70	25.70	9.07	9.07	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-0.34**	**2.49**
3	27.10	1.93	31.40	31.40	11.08	11.08	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-1.50**	**5.51**
4	26.80	1.88	37.10	37.10	13.04	13.04	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-3.65**	**9.30**
5	26.45	1.82	43.75	43.75	17.73	17.73	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-7.64**	**14.52**
6	26.10	1.77	50.40	50.40	22.81	22.81	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-13.81**	**21.61**
7	25.75	1.73	57.05	57.05	27.51	27.51	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-22.77**	**30.42**
8	25.40	1.70	63.70	63.70	32.91	32.91	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-35.11**	**41.40**
	25.40																**-35.11**	**-43.73**
9	25.00	1.81	71.30	71.30	37.76	37.76	0.00		1	1	p	3.80	3.80	12.98	12.98	0.00	**-20.08**	**-32.60**
10	24.60	2.07	78.90	78.90	40.94	40.94	0.00		1	1		11.40	11.40	24.00	24.00	0.00	**-9.02**	**-24.26**
11	24.20	2.40	86.50	86.50	43.54	43.54	0.00		1	1		19.00	19.00	26.69	26.69	0.00	**-0.67**	**-17.71**
12	23.85	2.70	93.15	93.15	45.86	45.86	0.00		1	1		25.65	25.65	31.29	31.29	0.00	**4.42**	**-12.00**
13	23.50	2.97	99.80	99.80	48.34	48.34	0.00		1	1		32.30	32.30	36.49	36.49	0.00	**7.73**	**-7.45**
14	23.17	3.19	105.98	105.98	50.73	50.73	0.00		1	1		38.48	38.48	41.25	41.25	0.00	**9.50**	**-3.85**
15	22.83	3.37	112.63	112.63	53.71	53.71	0.00		1	1		45.12	45.12	46.12	46.12	0.00	**10.29**	**-1.02**
16	22.52	3.48	118.33	118.33	56.52	56.52	0.00		1	1		50.83	50.83	50.02	50.02	0.00	**10.22**	**1.27**
17	22.17	3.55	124.98	124.98	59.39	59.39	0.00		1	1		57.48	57.48	54.99	54.99	0.00	**9.41**	**3.10**
18	21.83	3.57	131.63	129.88	64.76	63.01	1.75		1	1		64.12	62.37	59.42	57.67	1.75	**8.06**	**4.60**
19	21.62	3.55	135.52	131.72	68.62	64.82	3.80		1	1		68.02	64.22	61.66	57.86	3.80	**6.96**	**6.12**
20	21.38	3.52	140.08	133.88	57.11	50.91	6.20		4	4		72.58	66.38	61.63	55.43	6.20	**5.31**	**6.30**
21	21.10	3.47	145.40	136.40	59.99	50.99	9.00		4	4		77.90	68.90	67.10	58.10	9.00	**3.71**	**4.69**
22	20.80	3.40	151.10	139.10	65.43	53.43	12.00		4	4		83.60	71.60	70.69	58.69	12.00	**2.61**	**2.80**
23	20.45	3.30	157.75	142.25	71.14	55.64	15.50		4	4		90.25	74.75	74.97	59.47	15.50	**1.93**	**1.22**
24	20.05	3.17	165.35	145.85	77.61	58.11	19.50		4	4		97.85	78.35	80.22	60.72	19.50	**1.73**	**-0.02**
25	19.65	3.03	172.95	149.45	84.48	60.98	23.50		4	4		105.45	81.95	85.10	61.60	23.50	**1.94**	**-0.65**
26	19.30	2.89	179.60	152.60	91.18	64.18	27.00		4	4		112.10	85.10	88.27	61.27	27.00	**2.21**	**-0.28**
27	18.98	2.75	185.78	155.53	98.22	67.97	30.25		4	4		118.27	88.02	90.66	60.41	30.25	**2.14**	**1.40**
28	18.67	2.61	191.48	158.23	97.18	63.93	33.25		4	4		123.98	90.73	101.19	67.94	33.25	**1.37**	**1.93**
29	18.33	2.45	198.30	155.93	171.07	128.70	*42.37*		2	2		130.80	127.80	159.56	156.56	*3.00*	**0.92**	**3.22**
30	18.00	2.29	204.80	164.74	167.70	127.64	*40.06*		2	2		137.30	126.29	176.63	165.63	*11.01*	**-0.76**	**3.65**
31	17.65	2.12	211.80	168.56	174.09	130.85	*43.24*		2	2		144.30	129.79	183.58	169.07	*14.51*	**-1.51**	**0.60**
32	17.35	1.99	217.80	169.59	183.50	135.29	*48.21*		2	2		150.30	134.51	185.67	169.88	*15.79*	**-1.23**	**-1.28**
33	17.02	1.85	224.30	171.95	191.52	139.18	*52.35*		2	2		156.80	138.55	190.37	172.12	*18.25*	**-0.70**	**-1.42**
34	16.67	1.72	231.30	175.51	198.38	142.59	*55.79*		2	2		163.80	142.16	197.10	175.46	*21.64*	**-0.27**	**-1.00**
***35**	16.33	1.59	238.30	178.82	205.68	146.20	*59.48*		2	2		170.80	145.87	203.60	178.67	*24.93*	**0.00**	**0.00**
36	15.93	1.43	246.30	183.44	212.53	149.67	*62.86*		2	2		178.80	149.42	212.53	183.16	*29.38*	**0.00**	**0.00**
37	15.52	1.26	254.30	187.51	220.37	153.57	*66.79*		2	2		186.80	153.48	220.37	187.05	*33.32*	**0.00**	**0.00**
38	15.13	1.09	262.30	191.56	228.24	157.49	*70.74*		2	2		194.80	157.52	228.24	190.96	*37.28*	**0.00**	**0.00**
39	14.73	0.89	270.30	195.58	236.15	161.43	*74.72*		2	2		202.80	161.55	236.15	194.90	*41.25*	**0.00**	**0.00**
40	14.32	0.67	278.30	199.65	243.99	165.34	*78.65*		2	2		210.80	165.61	243.99	198.79	*45.19*	**0.00**	**0.00**
41	13.93	0.41	286.30	203.69	251.88	169.27	*82.61*		2	2		218.80	169.64	251.88	202.72	*49.16*	**0.00**	**0.00**
42	13.52	0.00	294.30	207.26	260.63	173.58	*87.04*		2	2		226.80	173.28	260.63	207.11	*53.52*	**0.00**	**0.00**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

Wall toe level: 16.33

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min		Max	Min	Max	Min	Max
-1.55		7.80	-50.44	38.48	-81.60	53.35

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.49
10	8	85.13	85.13	0.00	85.13

STAGE 4 : BASEMENT EXCAVATION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	149330.
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	0	50.00	50.00	21120.
10	24.60	1	0	50.00	50.00	21120.
11	24.20	1	0	50.00	50.00	21120.
12	23.85	1	0	50.00	50.00	21120.
13	23.50	1	0	50.00	50.00	21120.
14	23.17	1	0	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
***35**	***16.33**	***2**	***2**	***50.00**	***50.00**	***0.0**
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

Wall toe level: 16.33

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	25.40	0.00	5.00	25.40	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	0.00	0.00	0.00	0.00	0.00	0.00

RESULTS FOR STAGE 4 : basement excavation

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	4.1789	15	24.31	15
2	4.2	15	0.0948	14	24.62	16
3	4.3	15	0.0673	14	14.40	4
4	4.3	15	0.0387	14	7.58	17
5	4.4	15	0.0190	15	4.17	17
10	4.4	15	0.0001	13	0.13	16
11	4.4	15	0.0003	14	0.06	17

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.24	21.43	21.43	17.45	17.45	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.74	25.70	25.70	13.77	13.77	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-0.79**	**4.68**
3	27.10	-0.24	31.40	31.40	16.87	16.87	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-2.81**	**9.28**
4	26.80	0.26	37.10	37.10	18.64	18.64	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-6.35**	**14.84**
5	26.45	0.84	43.75	43.75	23.09	23.09	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-12.60**	**21.90**
6	26.10	1.44	50.40	50.40	27.54	27.54	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-21.68**	**30.76**
7	25.75	2.05	57.05	57.05	31.42	31.42	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-34.14**	**41.08**
8	25.40	2.70	63.70	63.70	36.13	36.13	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-50.44**	**53.35**

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
	25.40															**-50.44**	**-81.60**
9	25.00	3.61	71.30	71.30	38.62	38.62	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-20.51**	**-67.10**
10	24.60	4.68	78.90	78.90	38.45	38.45	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**3.24**	**-51.69**
11	24.20	5.74	86.50	86.50	37.55	37.55	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**20.84**	**-36.96**
12	23.85	6.54	93.15	93.15	37.43	37.43	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**31.31**	**-23.37**
13	23.50	7.17	99.80	99.80	38.17	38.17	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**37.20**	**-10.38**
14	23.17	7.57	105.98	105.98	39.50	39.50	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**38.48**	**2.73**
15	22.83	7.78	112.63	112.63	42.66	42.66	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	**35.19**	**14.48**
16	22.52	7.80	118.33	118.33	46.35	46.35	0.00	1	1	P	9.03	9.03	30.79	30.79	0.00	**29.32**	**22.10**
17	22.17	7.67	124.98	124.98	49.96	49.96	0.00	1	1	P	15.68	15.68	53.49	53.49	0.00	**20.70**	**24.01**
18	21.83	7.42	131.63	129.88	59.25	57.50	1.75	1	1	P	22.32	20.57	72.01	70.26	1.75	**12.51**	**21.62**
19	21.62	7.24	135.52	131.72	65.73	61.93	3.80	1	1		26.22	22.42	66.39	62.59	3.80	**8.44**	**19.77**
20	21.38	7.00	140.08	133.88	45.39	39.19	6.20	4	4		30.78	24.58	69.29	63.09	6.20	**3.72**	**16.60**
21	21.10	6.72	145.40	136.40	46.89	37.89	9.00	4	4		36.10	27.10	70.88	61.88	9.00	**-0.06**	**10.01**
22	20.80	6.41	151.10	139.10	55.51	43.51	12.00	4	4		41.80	29.80	69.79	57.79	12.00	**-2.02**	**4.21**
23	20.45	6.06	157.75	142.25	63.51	48.01	15.50	4	4		48.45	32.95	72.44	56.94	15.50	**-2.68**	**0.22**
24	20.05	5.67	165.35	145.85	71.79	52.29	19.50	4	4		56.05	36.55	76.89	57.39	19.50	**-2.10**	**-2.48**
25	19.65	5.31	172.95	149.45	80.41	56.91	23.50	4	4		63.65	40.15	80.75	57.25	23.50	**-0.70**	**-3.56**
26	19.30	4.99	179.60	152.60	88.84	61.84	27.00	4	4		70.30	43.30	82.86	55.86	27.00	**0.57**	**-2.61**
27	18.98	4.69	185.78	155.53	97.73	67.48	30.25	4	4		76.48	46.23	81.49	51.24	30.25	**1.09**	**0.93**
28	18.67	4.41	191.48	158.23	91.76	58.51	33.25	4	4		82.18	48.93	94.33	61.08	33.25	**0.05**	**3.05**
29	18.33	4.09	198.30	165.82	153.86	121.38	*32.48*	2	2		89.00	118.45	139.08	168.52	*-29.45*	**-0.88**	**5.13**
30	18.00	3.79	204.80	178.79	144.29	118.28	*26.01*	2	2		95.50	114.78	162.32	181.60	*-19.28*	**-3.36**	**4.58**
31	17.65	3.49	211.80	182.13	151.40	121.73	*29.67*	2	2		102.50	119.30	166.56	183.36	*-16.80*	**-3.89**	**-0.92**
32	17.35	3.26	217.80	181.33	163.48	127.01	*36.47*	2	2		108.50	125.16	165.44	182.11	*-16.66*	**-2.88**	**-3.69**
33	17.02	3.03	224.30	183.06	172.39	131.16	*41.24*	2	2		115.00	129.65	168.89	183.54	*-14.65*	**-1.58**	**-3.41**
34	16.67	2.81	231.30	186.90	178.74	134.34	*44.40*	2	2		122.00	133.26	175.52	186.78	*-11.26*	**-0.59**	**-2.25**
***35**	16.33	2.59	238.30	190.16	186.04	137.90	*48.14*	2	2		129.00	137.14	181.53	189.66	*-8.14*	**0.00**	**0.00**
36	15.93	2.34	246.30	195.58	191.55	140.83	*50.72*	2	2		137.00	140.22	191.55	194.77	*-3.22*	**0.00**	**0.00**
37	15.52	2.07	254.30	199.74	199.18	144.62	*54.56*	2	2		145.00	144.33	199.18	198.51	*0.67*	**0.00**	**0.00**
38	15.13	1.78	262.30	203.84	206.90	148.44	*58.46*	2	2		153.00	148.41	206.90	202.31	*4.59*	**0.00**	**0.00**
39	14.73	1.46	270.30	207.90	214.71	152.30	*62.40*	2	2		161.00	152.45	214.71	206.15	*8.55*	**0.00**	**0.00**
40	14.32	1.10	278.30	212.02	222.41	156.12	*66.28*	2	2		169.00	156.54	222.41	209.95	*12.46*	**0.00**	**0.00**
41	13.93	0.67	286.30	216.14	230.09	159.94	*70.16*	2	2		177.00	160.64	230.09	213.73	*16.36*	**0.00**	**0.00**
42	13.52	0.00	294.30	219.05	239.88	164.62	*75.25*	2	2		185.00	163.82	239.88	218.70	*21.18*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.55	7.80	-50.44	38.48	-81.60	53.35

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.49
10	8	134.95	134.95	0.00	134.95

STAGE 5 : ADD B1 BASE SLAB

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 5 : Add B1 base slab

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 8 inserted at this stage
Surcharge no. 2 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	1	0.00	1
2	0.0	1	0.0000	1	0.00	1
3	0.0	1	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.24	21.43	21.43	17.45	17.45	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.74	25.70	25.70	13.77	13.77	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-0.79**	**4.68**
3	27.10	-0.24	31.40	31.40	16.87	16.87	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-2.81**	**9.28**
4	26.80	0.26	37.10	37.10	18.64	18.64	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-6.35**	**14.84**
5	26.45	0.84	43.75	43.75	23.09	23.09	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-12.60**	**21.90**
6	26.10	1.44	50.40	50.40	27.54	27.54	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-21.68**	**30.76**
7	25.75	2.05	57.05	57.05	31.42	31.42	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-34.14**	**41.08**
8	25.40	2.70	63.70	63.70	36.13	36.13	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-50.44**	**53.35**
	25.40															**-50.44**	**-81.60**
9	25.00	3.61	71.30	71.30	38.62	38.62	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-20.51**	**-67.10**
10	24.60	4.68	78.90	78.90	38.45	38.45	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**3.24**	**-51.69**
11	24.20	5.74	86.50	86.50	37.55	37.55	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**20.84**	**-36.96**
12	23.85	6.54	93.15	93.15	37.43	37.43	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**31.31**	**-23.37**
13	23.50	7.17	99.80	99.80	38.17	38.17	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**37.20**	**-10.38**
	23.50															**37.20**	**-10.38**
14	23.17	7.57	105.98	105.98	39.50	39.50	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**38.48**	**2.73**
15	22.83	7.78	112.63	112.63	42.66	42.66	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	**35.19**	**14.48**
16	22.52	7.80	118.33	118.33	46.35	46.35	0.00	1	1	P	9.03	9.03	30.79	30.79	0.00	**29.32**	**22.10**

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
17	22.17	7.67	124.98	124.98	49.96	49.96	0.00	1	1	P	15.68	15.68	53.49	53.49	0.00	**20.70**	**24.01**
18	21.83	7.42	131.63	129.88	59.25	57.50	1.75	1	1	P	22.32	20.57	72.01	70.26	1.75	**12.51**	**21.62**
19	21.62	7.24	135.52	131.72	65.73	61.93	3.80	1	1		26.22	22.42	66.39	62.59	3.80	**8.44**	**19.77**
20	21.38	7.00	140.08	133.88	45.39	39.19	6.20	4	4		30.78	24.58	69.29	63.09	6.20	**3.72**	**16.60**
21	21.10	6.72	145.40	136.40	46.89	37.89	9.00	4	4		36.10	27.10	70.88	61.88	9.00	**-0.06**	**10.01**
22	20.80	6.41	151.10	139.10	55.51	43.51	12.00	4	4		41.80	29.80	69.79	57.79	12.00	**-2.02**	**4.21**
23	20.45	6.06	157.75	142.25	63.51	48.01	15.50	4	4		48.45	32.95	72.44	56.94	15.50	**-2.68**	**0.22**
24	20.05	5.67	165.35	145.85	71.79	52.29	19.50	4	4		56.05	36.55	76.89	57.39	19.50	**-2.10**	**-2.48**
25	19.65	5.31	172.95	149.45	80.41	56.91	23.50	4	4		63.65	40.15	80.75	57.25	23.50	**-0.70**	**-3.56**
26	19.30	4.99	179.60	152.60	88.84	61.84	27.00	4	4		70.30	43.30	82.86	55.86	27.00	**0.57**	**-2.61**
27	18.98	4.69	185.78	155.53	97.73	67.48	30.25	4	4		76.48	46.23	81.49	51.24	30.25	**1.09**	**0.93**
28	18.67	4.41	191.48	158.23	91.76	58.51	33.25	4	4		82.18	48.93	94.33	61.08	33.25	**0.05**	**3.05**
29	18.33	4.09	198.30	165.82	153.86	121.38	*32.48*	2	2		89.00	118.45	139.08	168.52	*-29.45*	**-0.88**	**5.13**
30	18.00	3.79	204.80	178.79	144.29	118.28	*26.01*	2	2		95.50	114.78	162.32	181.60	*-19.28*	**-3.36**	**4.58**
31	17.65	3.49	211.80	182.13	151.40	121.73	*29.67*	2	2		102.50	119.30	166.56	183.36	*-16.80*	**-3.89**	**-0.92**
32	17.35	3.26	217.80	181.33	163.48	127.01	*36.47*	2	2		108.50	125.16	165.44	182.11	*-16.66*	**-2.88**	**-3.69**
33	17.02	3.03	224.30	183.06	172.39	131.16	*41.24*	2	2		115.00	129.65	168.89	183.54	*-14.65*	**-1.58**	**-3.41**
34	16.67	2.81	231.30	186.90	178.74	134.34	*44.40*	2	2		122.00	133.26	175.52	186.78	*-11.26*	**-0.59**	**-2.25**
***35**	16.33	2.59	238.30	190.16	186.04	137.90	*48.14*	2	2		129.00	137.14	181.53	189.66	*-8.14*	**0.00**	**0.00**
36	15.93	2.34	246.30	195.58	191.55	140.83	*50.72*	2	2		137.00	140.22	191.55	194.77	*-3.22*	**0.00**	**0.00**
37	15.52	2.07	254.30	199.74	199.18	144.62	*54.56*	2	2		145.00	144.33	199.18	198.51	*0.67*	**0.00**	**0.00**
38	15.13	1.78	262.30	203.84	206.90	148.44	*58.46*	2	2		153.00	148.41	206.90	202.31	*4.59*	**0.00**	**0.00**
39	14.73	1.46	270.30	207.90	214.71	152.30	*62.40*	2	2		161.00	152.45	214.71	206.15	*8.55*	**0.00**	**0.00**
40	14.32	1.10	278.30	212.02	222.41	156.12	*66.28*	2	2		169.00	156.54	222.41	209.95	*12.46*	**0.00**	**0.00**
41	13.93	0.67	286.30	216.14	230.09	159.94	*70.16*	2	2		177.00	160.64	230.09	213.73	*16.36*	**0.00**	**0.00**
42	13.52	0.00	294.30	219.05	239.88	164.62	*75.25*	2	2		185.00	163.82	239.88	218.70	*21.18*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.55	7.80	-50.44	38.48	-81.60	53.35

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.49
8	13	0.00	0.00	0.00	0.00
10	8	134.95	134.95	0.00	134.95

STAGE 6 : REMOVE PROP1

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 6 : Remove prop1

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 9 inserted at this stage
Strut no. 10 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	error [mm]	Disp Node no.	error [kN/m²]	Press Node no.
1	0.0	1	2.7043	9	0.00	1
2	2.7	9	0.0007	21	0.71	15
3	2.7	9	0.0002	22	0.16	16
4	2.7	9	0.0000	22	0.01	16

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.04	21.43	21.43	19.90	19.90	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.20	25.70	25.70	15.69	15.69	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-0.90**	**5.34**
3	27.10	0.65	31.40	31.40	18.13	18.13	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-3.20**	**10.41**
4	26.80	1.49	37.10	37.10	19.27	19.27	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-7.14**	**16.26**
	26.80															**-7.14**	**-45.65**
5	26.45	2.48	43.75	43.75	22.36	22.36	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**7.74**	**-38.61**
6	26.10	3.47	50.40	50.40	24.93	24.93	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**19.88**	**-30.33**
7	25.75	4.44	57.05	57.05	26.59	26.59	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**28.97**	**-21.32**
8	25.40	5.38	63.70	63.70	27.06	27.06	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**34.81**	**-11.59**
9	25.00	6.31	71.30	71.30	27.02	27.02	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**37.41**	**-1.11**
10	24.60	6.97	78.90	78.90	29.00	29.00	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**35.69**	**10.09**
11	24.20	7.35	86.50	86.50	32.16	32.16	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**29.34**	**21.93**
12	23.85	7.51	93.15	93.15	36.28	36.28	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**19.55**	**34.30**
13	23.50	7.56	99.80	99.80	40.67	40.67	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**5.32**	**47.52**
	23.50															**5.32**	**-28.55**
14	23.17	7.56	105.98	105.98	43.74	43.74	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**12.37**	**-14.31**
15	22.83	7.50	112.63	112.63	47.37	47.37	0.00	1	1	p	3.32	3.32	11.36	11.36	0.00	**14.79**	**-1.07**
16	22.52	7.38	118.33	118.33	51.01	51.01	0.00	1	1	p	9.03	9.03	30.84	30.84	0.00	**13.36**	**8.05**
17	22.17	7.17	124.98	124.98	54.69	54.69	0.00	1	1		15.68	15.68	52.36	52.36	0.00	**9.39**	**11.74**
18	21.83	6.90	131.63	129.88	62.35	60.60	1.75	1	1		22.32	20.57	70.30	68.55	1.75	**5.14**	**11.04**
19	21.62	6.73	135.52	131.72	68.39	64.59	3.80	1	1		26.22	22.42	64.56	60.76	3.80	**3.11**	**10.36**
20	21.38	6.53	140.08	133.88	52.05	45.85	6.20	4	4		30.78	24.58	66.55	60.35	6.20	**0.52**	**8.90**
21	21.10	6.28	145.40	136.40	52.10	43.10	9.00	4	4		36.10	27.10	68.47	59.47	9.00	**-1.45**	**4.65**
22	20.80	6.03	151.10	139.10	59.08	47.08	12.00	4	4		41.80	29.80	68.06	56.06	12.00	**-2.13**	**0.81**

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
23	20.45	5.74	157.75	142.25	66.05	50.55	15.50	4	4	48.45	32.95	71.17	55.67	15.50	**-1.90**	**-1.61**
24	20.05	5.42	165.35	145.85	73.37	53.87	19.50	4	4	56.05	36.55	76.10	56.60	19.50	**-0.88**	**-3.11**
25	19.65	5.11	172.95	149.45	81.28	57.78	23.50	4	4	63.65	40.15	80.40	56.90	23.50	**0.59**	**-3.49**
26	19.30	4.84	179.60	152.60	89.24	62.24	27.00	4	4	70.30	43.30	82.87	55.87	27.00	**1.75**	**-2.26**
27	18.98	4.57	185.78	155.53	97.71	67.46	30.25	4	4	76.48	46.23	82.05	51.80	30.25	**2.13**	**1.27**
28	18.67	4.32	191.48	158.23	91.74	58.49	33.25	4	4	82.18	48.93	95.24	61.99	33.25	**1.02**	**3.15**
29	18.33	4.02	198.30	165.52	154.47	121.68	*32.78*	2	2	89.00	118.69	138.58	168.28	*-29.69*	**0.12**	**5.26**
30	18.00	3.75	204.80	178.46	144.96	118.62	*26.34*	2	2	95.50	115.10	161.68	181.28	*-19.60*	**-2.46**	**5.12**
31	17.65	3.46	211.80	182.06	151.55	121.81	*29.74*	2	2	102.50	119.28	166.61	183.39	*-16.78*	**-3.26**	**-0.15**
32	17.35	3.24	217.80	181.44	163.31	126.94	*36.36*	2	2	108.50	124.98	165.88	182.36	*-16.48*	**-2.48**	**-3.00**
33	17.02	3.02	224.30	183.19	172.19	131.08	*41.11*	2	2	115.00	129.45	169.37	183.81	*-14.45*	**-1.38**	**-2.93**
34	16.67	2.80	231.30	186.96	178.64	134.30	*44.34*	2	2	122.00	133.11	175.87	186.98	*-11.11*	**-0.52**	**-1.97**
***35**	16.33	2.58	238.30	190.26	185.88	137.84	*48.04*	2	2	129.00	136.97	181.92	189.89	*-7.97*	**0.00**	**0.00**
36	15.93	2.33	246.30	195.52	191.67	140.89	*50.78*	2	2	137.00	140.17	191.67	194.84	*-3.17*	**0.00**	**0.00**
37	15.52	2.06	254.30	199.68	199.30	144.68	*54.62*	2	2	145.00	144.28	199.30	198.58	*0.72*	**0.00**	**0.00**
38	15.13	1.77	262.30	203.77	207.04	148.51	*58.53*	2	2	153.00	148.34	207.04	202.39	*4.66*	**0.00**	**0.00**
39	14.73	1.45	270.30	207.81	214.88	152.39	*62.49*	2	2	161.00	152.37	214.88	206.25	*8.63*	**0.00**	**0.00**
40	14.32	1.10	278.30	211.91	222.62	156.23	*66.39*	2	2	169.00	156.45	222.62	210.06	*12.55*	**0.00**	**0.00**
41	13.93	0.67	286.30	216.00	230.38	160.08	*70.30*	2	2	177.00	160.51	230.38	213.89	*16.49*	**0.00**	**0.00**
42	13.52	0.00	294.30	219.05	239.88	164.62	*75.25*	2	2	185.00	163.82	239.88	218.70	*21.18*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.55	7.80	-50.44	38.48	-81.60	53.35

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.49
8	13	76.07	76.07	0.00	76.07
9	4	61.91	61.91	0.00	61.91
10	8				134.95

STAGE 7 : LONG TERM

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	74666.
2	27.40	1	0	50.00	50.00	74666.
3	27.10	1	0	50.00	50.00	74666.
4	26.80	1	0	50.00	50.00	74666.
5	26.45	1	0	50.00	50.00	74666.
6	26.10	1	0	50.00	50.00	74666.
7	25.75	1	0	50.00	50.00	74666.
8	25.40	1	0	50.00	50.00	10560.
9	25.00	1	0	50.00	50.00	10560.
10	24.60	1	0	50.00	50.00	10560.
11	24.20	1	0	50.00	50.00	10560.
12	23.85	1	0	50.00	50.00	10560.
13	23.50	1	0	50.00	50.00	10560.
14	23.17	1	0	50.00	50.00	10560.
15	22.83	1	1	50.00	50.00	10560.
16	22.52	1	1	50.00	50.00	10560.
17	22.17	1	1	50.00	50.00	10560.
18	21.83	1	1	50.00	50.00	10560.
19	21.62	1	1	50.00	50.00	10560.
20	21.38	4	4	50.00	50.00	10560.
21	21.10	4	4	50.00	50.00	10560.
22	20.80	4	4	50.00	50.00	10560.
23	20.45	4	4	50.00	50.00	10560.
24	20.05	4	4	50.00	50.00	10560.
25	19.65	4	4	50.00	50.00	10560.
26	19.30	4	4	50.00	50.00	10560.
27	18.98	4	4	50.00	50.00	10560.
28	18.67	4	4	50.00	50.00	10560.
29	18.33	3	3	50.00	50.00	10560.
30	18.00	3	3	50.00	50.00	10560.
31	17.65	3	3	50.00	50.00	5239.5
32	17.35	3	3	50.00	50.00	5239.5
33	17.02	3	3	50.00	50.00	5239.5
34	16.67	3	3	50.00	50.00	5239.5
***35**	***16.33**	***3**	***3**	***50.00**	***50.00**	***0.0**
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00
Wall relaxation 50%		

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 7 : Long term

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Fitzrovia

280mm dia Contigous Wall

SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 77256. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 119530. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.1858	31	0.01	16
2	1.2	31	0.0030	21	1.24	15
3	1.2	31	0.0019	22	1.20	16
4	1.2	31	0.0012	23	0.60	17
5	1.2	31	0.0006	23	0.30	17
7	1.2	31	0.0001	23	0.02	17

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.55	21.43	21.43	21.32	21.32	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.57	25.70	25.70	16.72	16.72	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-0.96**	**5.71**
3	27.10	0.42	31.40	31.40	18.96	18.96	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-3.42**	**11.06**
4	26.80	1.41	37.10	37.10	19.88	19.88	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-7.59**	**17.13**
	26.80															**-7.59**	**-40.40**
5	26.45	2.57	43.75	43.75	22.48	22.48	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**5.42**	**-33.24**
6	26.10	3.72	50.40	50.40	24.36	24.36	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**15.67**	**-25.04**
7	25.75	4.85	57.05	57.05	25.22	25.22	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**22.94**	**-16.36**
8	25.40	5.94	63.70	63.70	24.42	24.42	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**27.13**	**-7.37**
9	25.00	6.95	71.30	71.30	23.11	23.11	0.00	a 1	0		0.00	0.00	0.00	0.00	0.00	**28.24**	**1.83**
10	24.60	7.55	78.90	78.90	25.11	25.11	0.00	a 1	0		0.00	0.00	0.00	0.00	0.00	**25.66**	**11.47**
11	24.20	7.76	86.50	86.50	29.23	29.23	0.00	a 1	0		0.00	0.00	0.00	0.00	0.00	**19.07**	**21.97**
12	23.85	7.72	93.15	93.15	34.87	34.87	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**9.46**	**33.56**
13	23.50	7.58	99.80	99.80	40.69	40.69	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-4.43**	**46.53**
	23.50															**-4.43**	**-32.13**
14	23.17	7.45	105.98	105.98	43.84	43.84	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**3.79**	**-17.87**
15	22.83	7.28	112.63	112.63	47.31	47.31	0.00	1	1	p	3.32	3.32	11.36	11.36	0.00	**7.45**	**-4.63**
16	22.52	7.07	118.33	118.33	51.00	51.00	0.00	1	1	P	9.03	9.03	30.81	30.81	0.00	**7.09**	**4.49**
17	22.17	6.75	124.98	124.98	55.08	55.08	0.00	1	1	p	15.68	15.68	53.57	53.57	0.00	**4.37**	**8.04**
18	21.83	6.39	131.63	129.88	63.29	61.54	1.75	1	1	P	22.32	20.57	71.84	70.09	1.75	**1.46**	**7.11**
19	21.62	6.16	135.52	131.72	69.63	65.83	3.80	1	1		26.22	22.42	65.15	61.35	3.80	**0.25**	**6.43**
20	21.38	5.90	140.08	133.88	54.16	47.96	6.20	4	4		30.78	24.58	66.76	60.56	6.20	**-1.41**	**5.29**
21	21.10	5.60	145.40	136.40	53.91	44.91	9.00	4	4		36.10	27.10	68.08	59.08	9.00	**-2.44**	**1.59**
22	20.80	5.30	151.10	139.10	60.96	48.96	12.00	4	4		41.80	29.80	67.32	55.32	12.00	**-2.30**	**-1.49**
23	20.45	4.97	157.75	142.25	67.83	52.33	15.50	4	4		48.45	32.95	70.43	54.93	15.50	**-1.41**	**-3.02**
24	20.05	4.62	165.35	145.85	74.91	55.41	19.50	4	4		56.05	36.55	75.50	56.00	19.50	**-0.01**	**-3.62**
25	19.65	4.26	172.95	149.45	82.73	59.23	23.50	4	4		63.65	40.15	79.80	56.30	23.50	**1.49**	**-3.19**
26	19.30	3.93	179.60	152.60	90.90	63.90	27.00	4	4		70.30	43.30	81.91	54.91	27.00	**2.41**	**-1.12**
27	18.98	3.60	185.78	155.53	100.15	69.90	30.25	4	4		76.48	46.23	80.16	49.91	30.25	**2.28**	**3.52**
28	18.67	3.28	191.48	158.23	95.84	62.59	33.25	4	4		82.18	48.93	91.23	57.98	33.25	**0.29**	**7.39**
29	18.33	2.91	198.30	161.55	167.98	131.23	36.75	3	3		89.00	52.25	177.65	140.90	36.75	**-2.56**	**6.51**
30	18.00	2.58	204.80	164.80	171.36	131.36	40.00	3	3		95.50	55.50	189.73	149.73	40.00	**-4.15**	**1.78**
31	17.65	2.27	211.80	168.30	182.27	138.77	43.50	3	3		102.50	59.00	190.41	146.91	43.50	**-3.69**	**-2.64**
32	17.35	2.06	217.80	171.30	191.85	145.35	46.50	3	3		108.50	62.00	190.55	144.05	46.50	**-2.50**	**-3.76**
33	17.02	1.87	224.30	174.55	199.38	149.63	49.75	3	3		115.00	65.25	195.69	145.94	49.75	**-1.34**	**-2.94**
34	16.67	1.71	231.30	178.05	205.61	152.36	53.25	3	3		122.00	68.75	203.33	150.08	53.25	**-0.53**	**-1.92**
***35**	16.33	1.55	238.30	181.55	213.35	156.60	56.75	3	3		129.00	72.25	209.30	152.55	56.75	**0.00**	**0.00**
36	15.93	1.39	246.30	185.55	219.34	158.59	60.75	3	3		137.00	76.25	219.34	158.59	60.75	**0.00**	**0.00**
37	15.52	1.22	254.30	189.55	227.20	162.45	64.75	3	3		145.00	80.25	227.20	162.45	64.75	**0.00**	**0.00**
38	15.13	1.04	262.30	193.55	235.08	166.33	68.75	3	3		153.00	84.25	235.08	166.33	68.75	**0.00**	**0.00**
39	14.73	0.85	270.30	197.55	243.02	170.27	72.75	3	3		161.00	88.25	243.02	170.27	72.75	**0.00**	**0.00**
40	14.32	0.64	278.30	201.55	250.88	174.13	76.75	3	3		169.00	92.25	250.88	174.13	76.75	**0.00**	**0.00**
41	13.93	0.39	286.30	205.55	258.86	178.11	80.75	3	3		177.00	96.25	258.86	178.11	80.75	**0.00**	**0.00**
42	13.52	0.00	294.30	209.55	267.13	182.38	84.75	3	3		185.00	100.25	267.13	182.38	84.75	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
-1.55	7.80	-50.44	38.48	-81.60	53.35

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.49
8	13	78.66	78.66	0.00	78.66
9	4	57.53	57.53	0.00	61.91
10	8				134.95

Results Envelope

Node	Level [m]	Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
1	27.70	-1.55	2.04	0.00	0.00	0.00	0.00
2	27.40	-0.74	1.99	-0.96	0.00	-2.50	5.71
3	27.10	-0.24	1.93	-3.42	0.16	-0.80	11.06
4	26.80	0.00	1.88	-7.59	0.17	-45.65	17.13
5	26.45	0.00	2.57	-12.60	7.74	-38.61	21.90
6	26.10	0.00	3.72	-21.68	19.88	-30.33	30.76
7	25.75	0.00	4.85	-34.14	28.97	-21.32	41.08
8	25.40	0.00	5.94	-50.44	34.81	-81.60	53.35
9	25.00	0.00	6.95	-20.51	37.41	-67.10	1.83
10	24.60	0.00	7.55	-9.02	35.69	-51.69	11.47
11	24.20	0.00	7.76	-0.67	29.34	-36.96	21.97
12	23.85	0.00	7.72	0.00	31.31	-23.37	34.30
13	23.50	0.00	7.58	-4.43	37.20	-32.13	47.52
14	23.17	0.00	7.57	0.00	38.48	-17.87	2.73
15	22.83	0.00	7.78	0.00	35.19	-4.63	14.48
16	22.52	0.00	7.80	0.00	29.32	0.00	22.10
17	22.17	0.00	7.67	0.00	20.70	0.00	24.01
18	21.83	0.00	7.42	0.00	12.51	0.00	21.62
19	21.62	0.00	7.24	0.00	8.44	0.00	19.77
20	21.38	0.00	7.00	-1.41	5.31	0.00	16.60
21	21.10	0.00	6.72	-2.44	3.71	0.00	10.01
22	20.80	0.00	6.41	-2.30	2.61	-1.49	4.21
23	20.45	0.00	6.06	-2.68	1.93	-3.02	1.22
24	20.05	0.00	5.67	-2.10	1.73	-3.62	0.00
25	19.65	0.00	5.31	-0.70	1.94	-3.56	0.00
26	19.30	0.00	4.99	0.00	2.41	-2.61	0.00
27	18.98	0.00	4.69	0.00	2.28	0.00	3.52
28	18.67	0.00	4.41	0.00	1.37	0.00	7.39
29	18.33	0.00	4.09	-2.56	0.92	0.00	6.51
30	18.00	0.00	3.79	-4.15	0.00	0.00	5.12
31	17.65	0.00	3.49	-3.89	0.00	-2.64	0.60
32	17.35	0.00	3.26	-2.88	0.00	-3.76	0.00
33	17.02	0.00	3.03	-1.58	0.00	-3.41	0.00
34	16.67	0.00	2.81	-0.59	0.00	-2.25	0.00
***35**	***16.33***	***0.00***	***2.59***	***0.00***	***0.00***	***0.00***	***0.00***
36	15.93	0.00	2.34	0.00	0.00	0.00	0.00
37	15.52	0.00	2.07	0.00	0.00	0.00	0.00

Node	Level [m]	Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
38	15.13	0.00	1.78	0.00	0.00	0.00	0.00
39	14.73	0.00	1.46	0.00	0.00	0.00	0.00
40	14.32	0.00	1.10	0.00	0.00	0.00	0.00
41	13.93	0.00	0.67	0.00	0.00	0.00	0.00
42	13.52	0.00	0.00	0.00	0.00	0.00	0.00

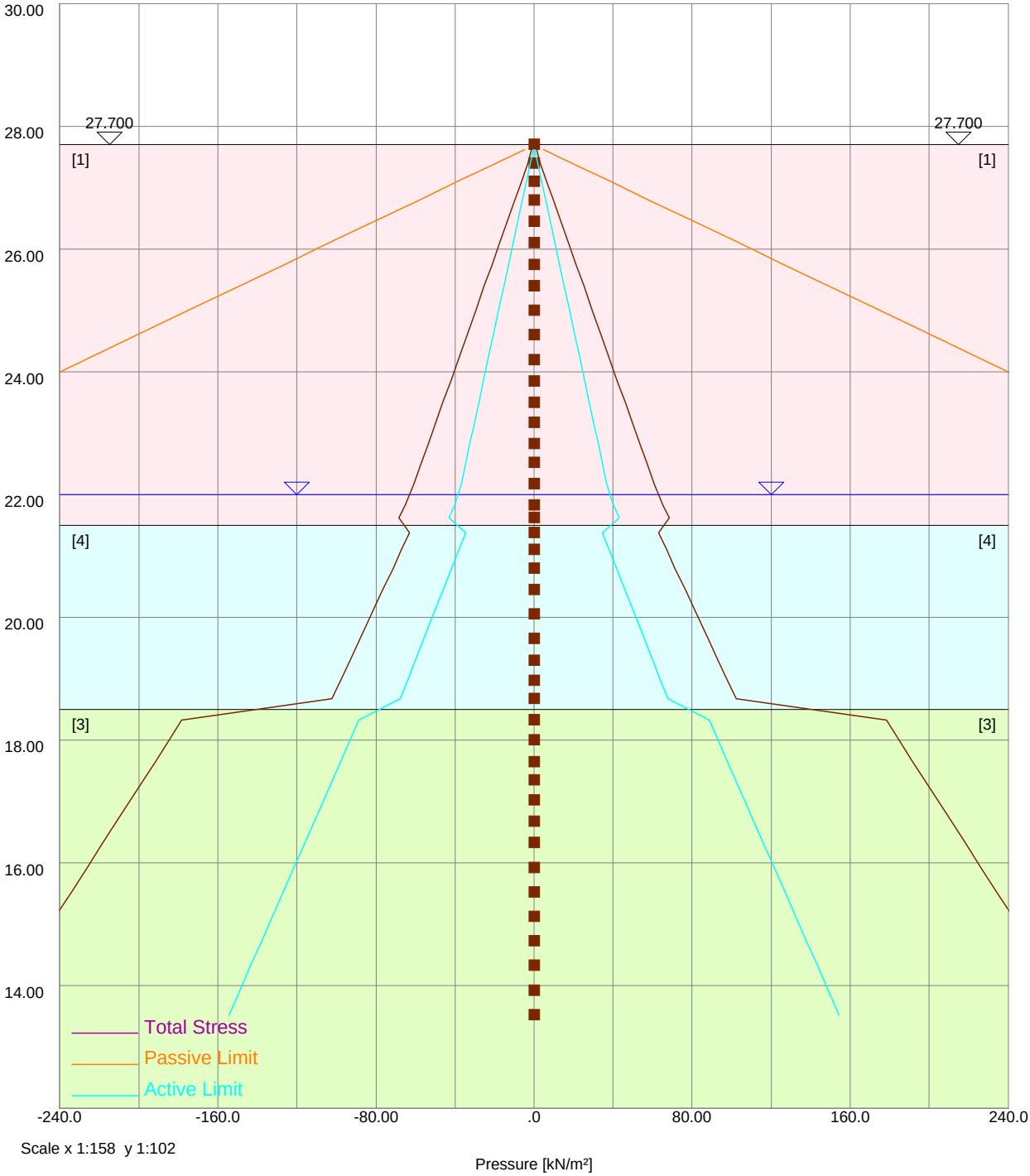
ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		

Drg. Ref.

Made by SB | Date | Checked

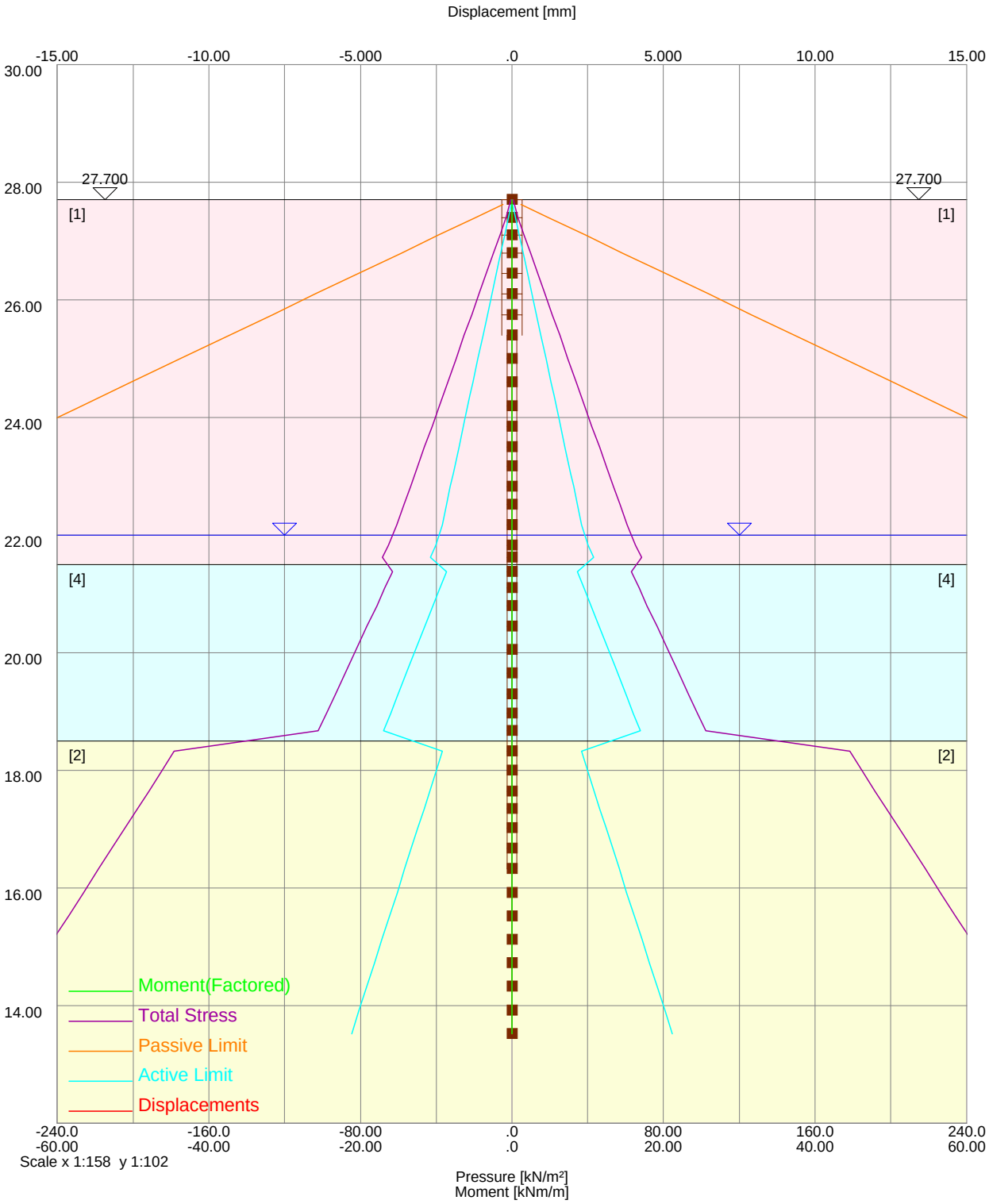


STAGE 0 : Initial condition

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked

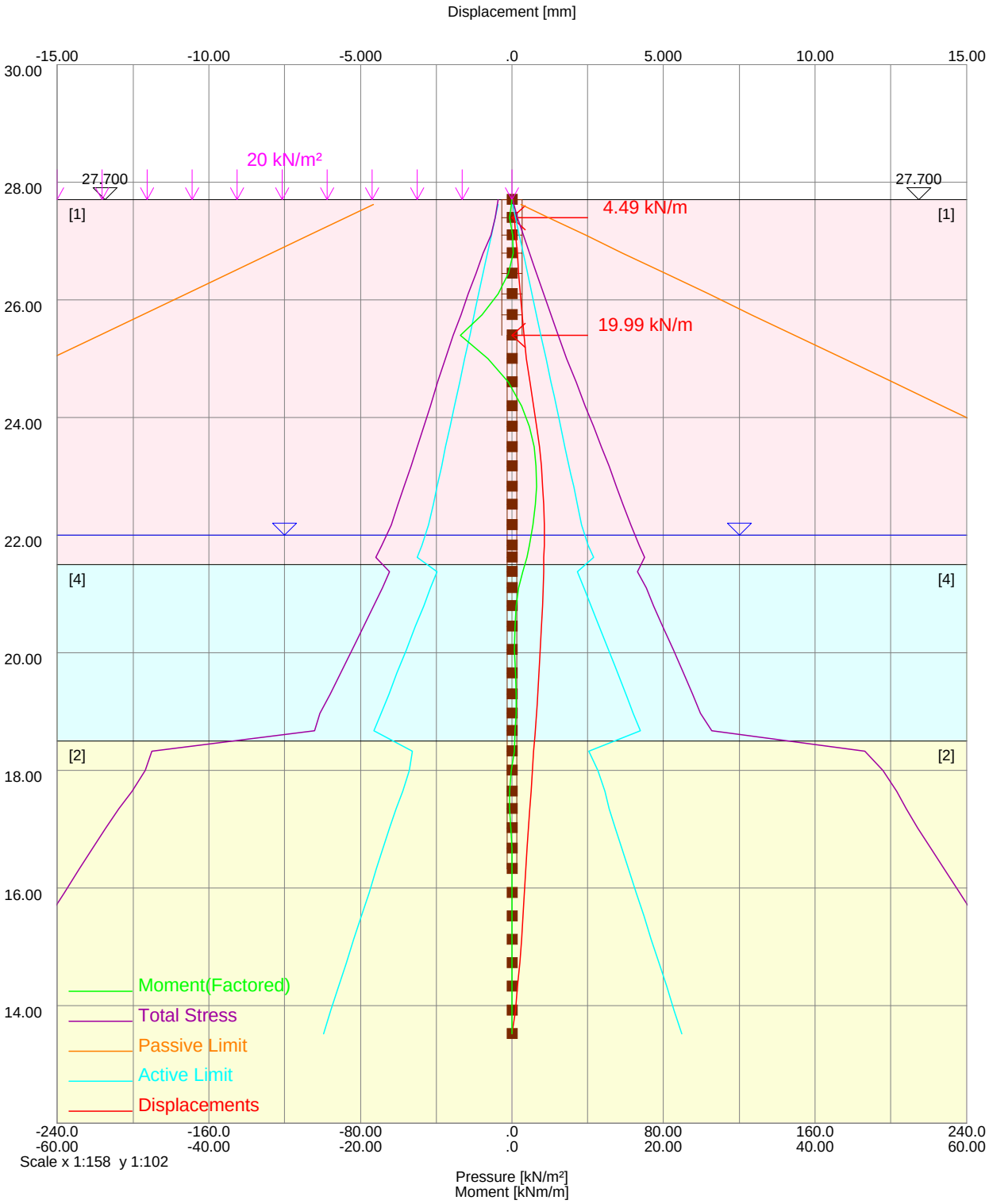


STAGE 1 : Add retaining wall

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked

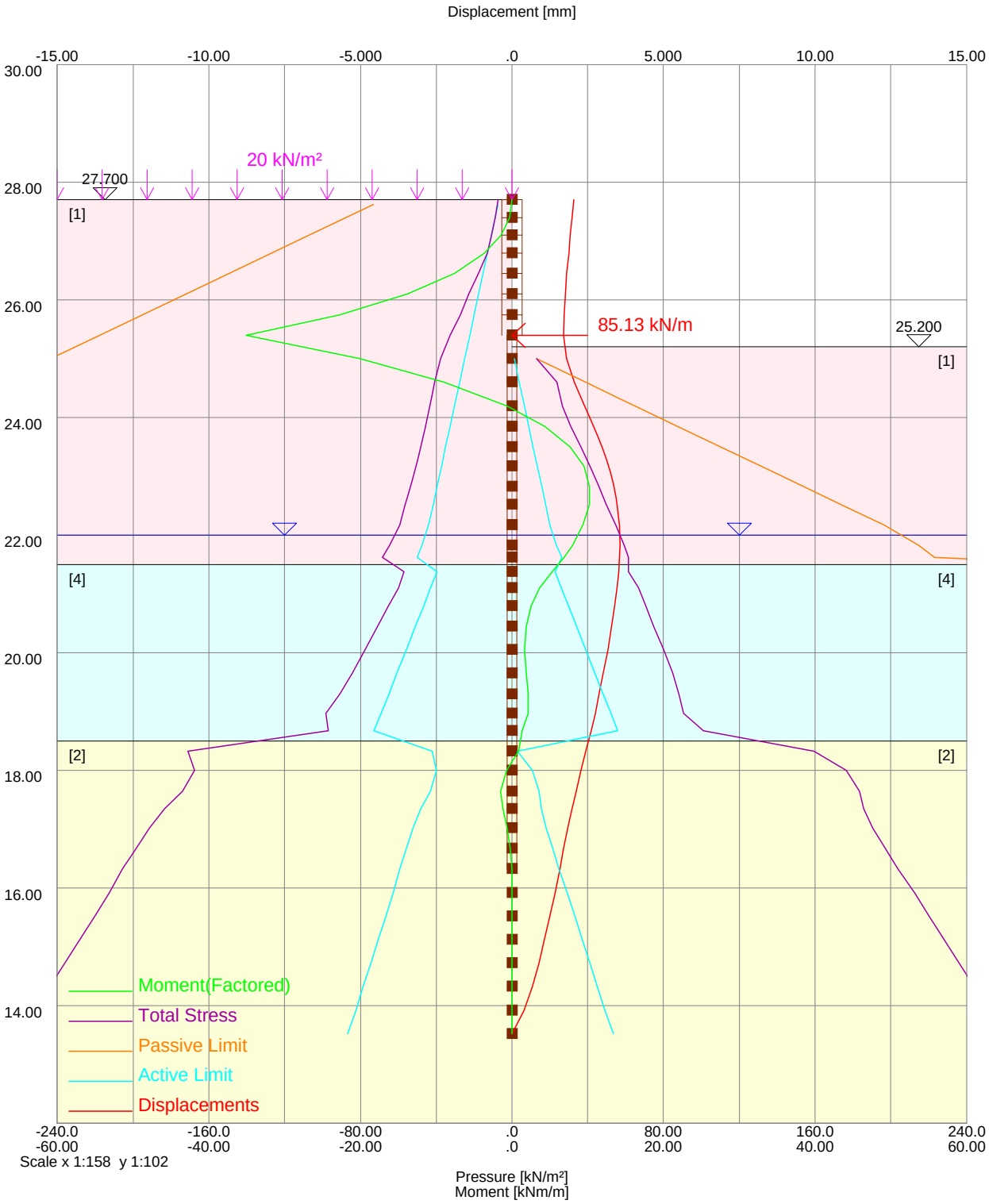


STAGE 2 : prop and surcharge

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked

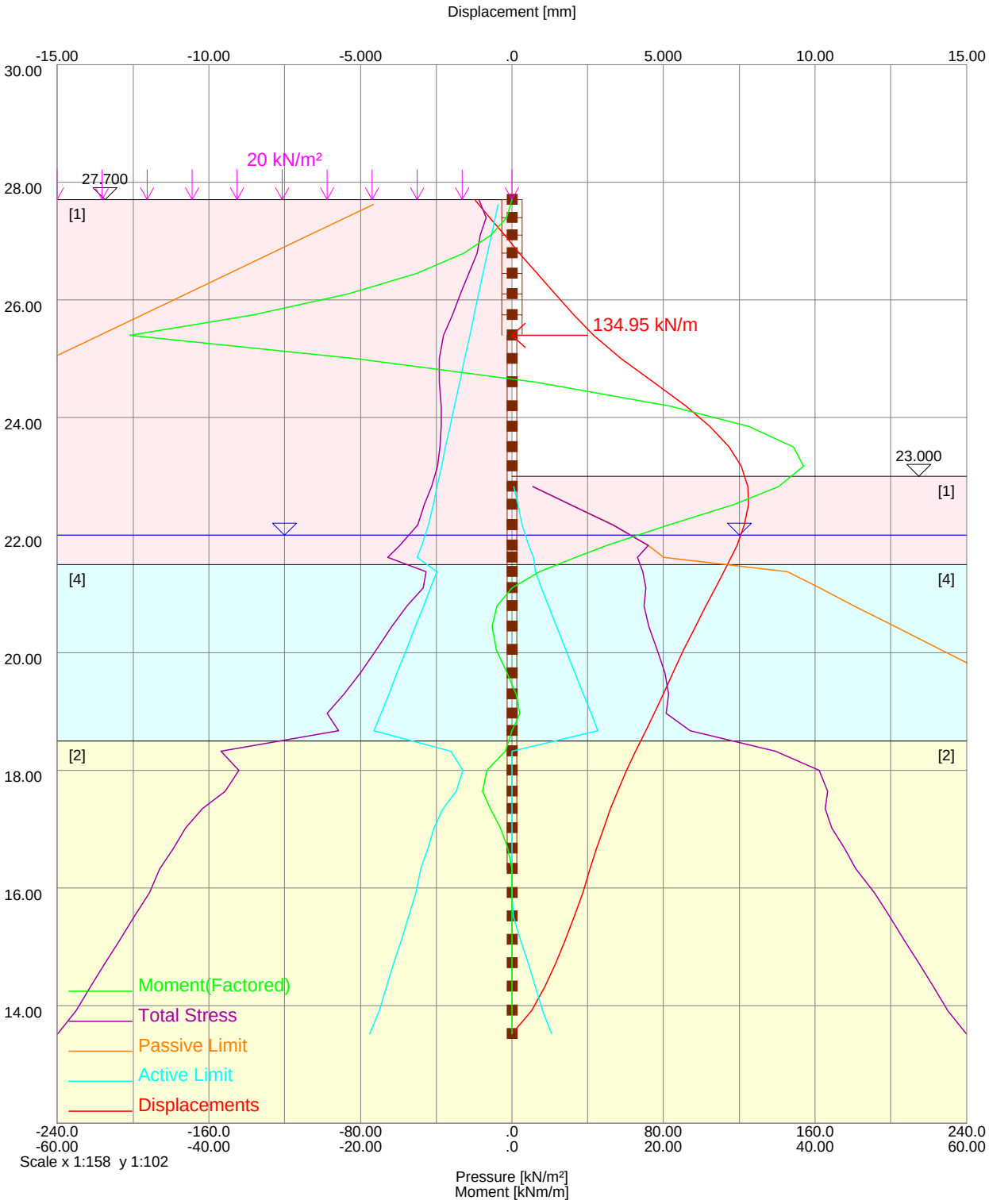


STAGE 3 : take out prop at ground level

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked

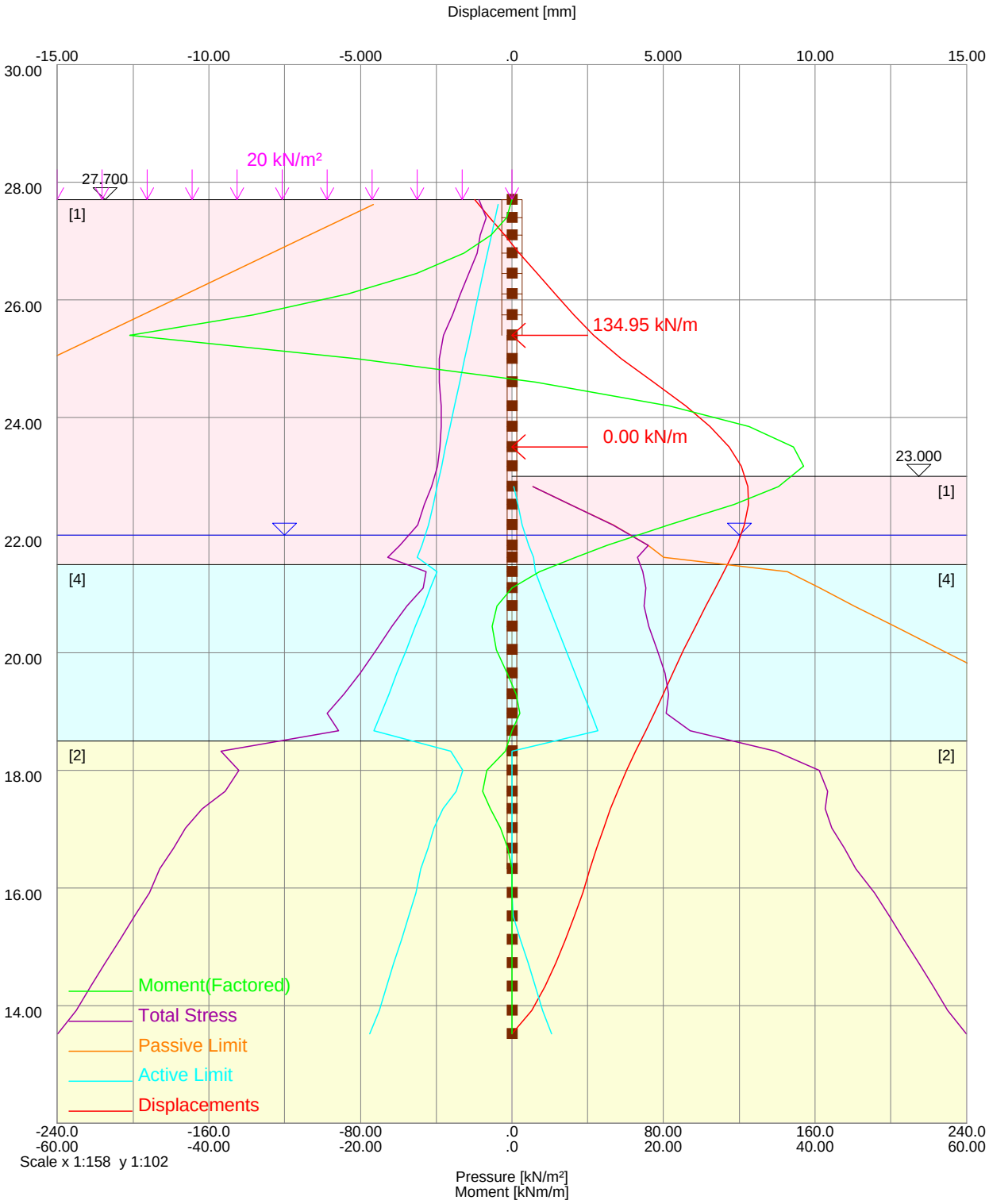


STAGE 4 : basement excavation

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked

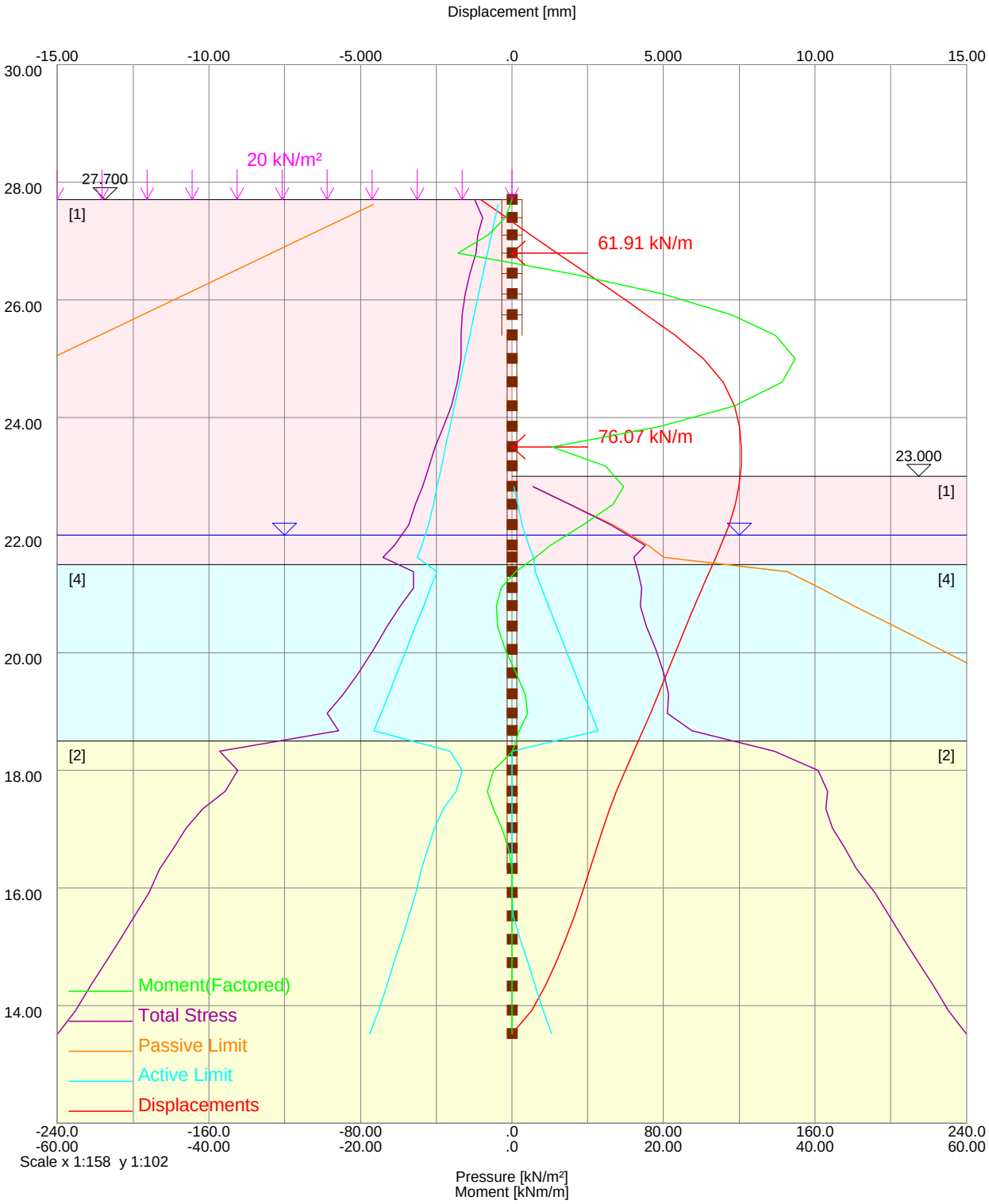


STAGE 5 : Add B1 base slab

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked

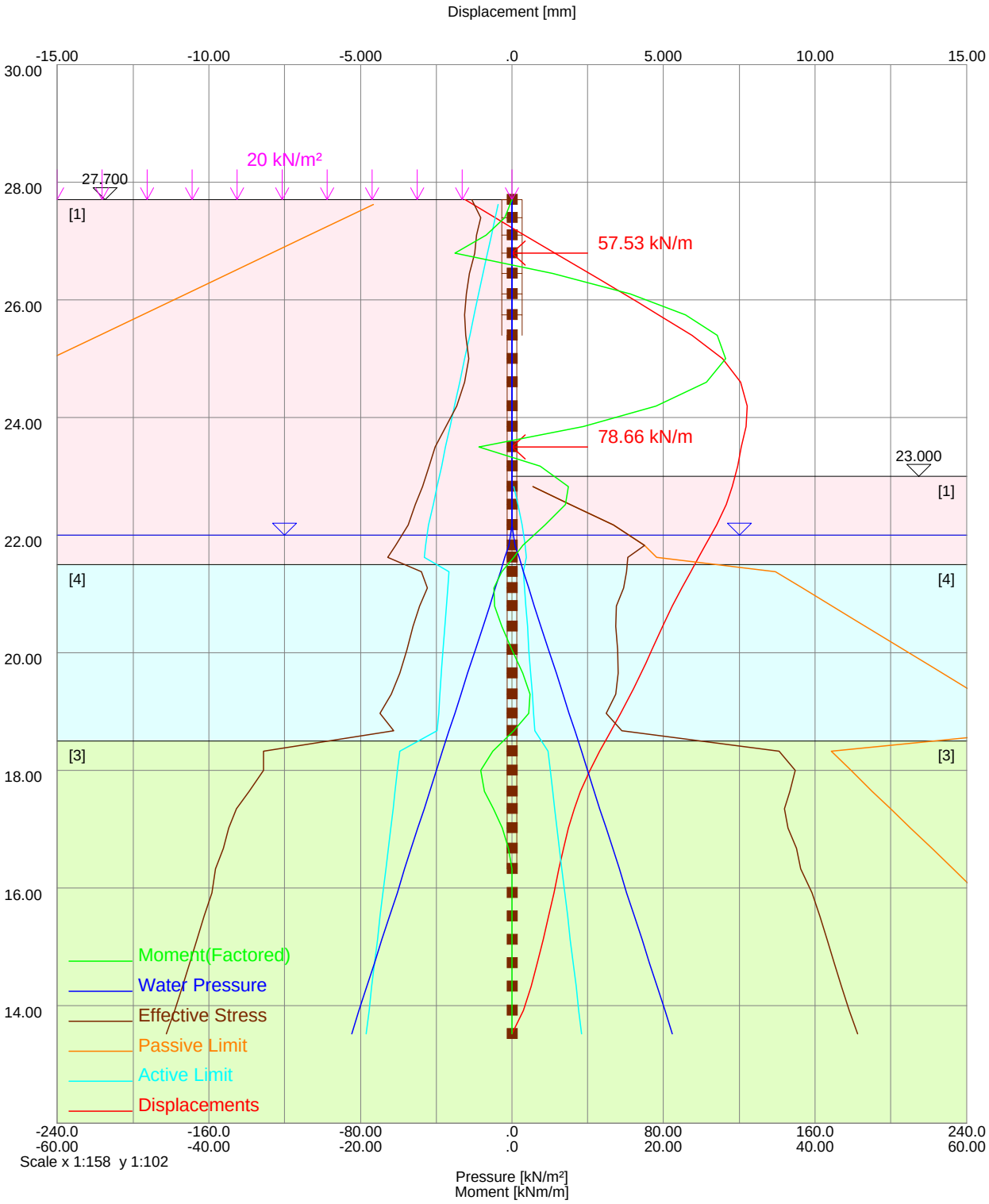


STAGE 6 : Remove prop1

ARUP

Fitzrovia
280mm dia Contigous Wall
SLS ground level prop removed after insitu wall cast and propped at +25.4mOD

Job No.	Sheet No.	Rev.
207329		
Drg. Ref.		
Made by SB	Date	Checked



STAGE 7 : Long term

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

INITIAL DATA

Notes

280/234 @ 400c/c

Soil properties

No.	Description	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
2	London Clay - Und	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
3	London Clay - Drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
4	RiverTerrace	19.00	0.50	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	0.00	0.00	0.00	10000.	0.00	Drained
2	100.00	18.50	6.50	100000.	6500.00	Undrained
3	0.00	18.50	0.00	80000.	5200.00	Drained
4	0.00	0.00	0.00	20000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	25.00	0.67	0.00	0.00
2	0.00	0.67	0.00	0.50
3	24.00	0.67	0.00	0.00
4	33.00	0.67	0.00	0.00

Soil Strength Partial Factors

Document and case:	tan Phi'	c'	Cu	E
EC7 DA1 Combination 1 (2011)	1.00	1.00	1.00	1.00

Note: Only the parameters in bold have been affected by Partial Factors,
No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	19.00	0.58	**0.35**	**3.42**	**1.19**	**3.70**	0.25	Calculated
2	20.00	1.00	**1.00**	**1.00**	**2.45**	**2.45**	1.00	Calculated
3	20.00	1.00	**0.37**	**3.22**	**1.21**	**3.59**	0.25	Calculated
4	19.00	0.50	**0.25**	**5.66**	**1.00**	**4.76**	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	**0.00**	0.00	**0.00**	**10000.**	**0.00**	Drained
2	**100.00**	18.50	**6.50**	**100000.**	**6500.00**	Undrained
3	**0.00**	18.50	**0.00**	**80000.**	**5200.00**	Drained
4	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	**25.00**	0.67	0.00	0.00
2	**0.00**	0.67	0.00	0.50
3	**24.00**	0.67	0.00	0.00
4	**33.00**	0.67	0.00	0.00

Surcharge properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure Factor [kN/m²]	Partial	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	22.00			1.00	
2	5	-	Right	23.00	0.00			1.00	

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

Surcharge Design properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	22.00			
2	5	-	Right	23.00	0.00			

Strut properties

No.	Stage In	Stage Out	Node	Level [m]	Prestress [kN/m]	Stiffness [kN/m/m]	Angle [°]	Lever arm [m]
1	2	3	2	27.40	0.00	50000.00	0.00	0.00
2	-	-	3	27.10	0.00	50000.00	0.00	0.00
3	-	-	4	26.80	0.00	50000.00	0.00	0.00
4	-	-	5	26.45	0.00	50000.00	0.00	0.00
5	-	-	6	26.10	0.00	50000.00	0.00	0.00
6	-	-	7	25.75	0.00	50000.00	0.00	0.00
7	-	-	9	25.00	0.00	50000.00	0.00	0.00
8	5	-	13	23.50	0.00	194444.00	0.00	0.00
9	6	-	4	26.80	0.00	50000.00	0.00	0.00
10	2	6	8	25.40	0.00	50000.00	0.00	0.00

STAGE 0 : INITIAL CONDITION

Geometry

Node	Level [m]	Soil	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	1	50.00	50.00 149330.
2	27.40	1	1	50.00	50.00 149330.
3	27.10	1	1	50.00	50.00 149330.
4	26.80	1	1	50.00	50.00 149330.
5	26.45	1	1	50.00	50.00 149330.
6	26.10	1	1	50.00	50.00 149330.
7	25.75	1	1	50.00	50.00 149330.
8	25.40	1	1	50.00	50.00 21120.
9	25.00	1	1	50.00	50.00 21120.
10	24.60	1	1	50.00	50.00 21120.
11	24.20	1	1	50.00	50.00 21120.
12	23.85	1	1	50.00	50.00 21120.
13	23.50	1	1	50.00	50.00 21120.
14	23.17	1	1	50.00	50.00 21120.
15	22.83	1	1	50.00	50.00 21120.
16	22.52	1	1	50.00	50.00 21120.
17	22.17	1	1	50.00	50.00 21120.
18	21.83	1	1	50.00	50.00 21120.
19	21.62	1	1	50.00	50.00 21120.
20	21.38	4	4	50.00	50.00 21120.
21	21.10	4	4	50.00	50.00 21120.
22	20.80	4	4	50.00	50.00 21120.
23	20.45	4	4	50.00	50.00 21120.
24	20.05	4	4	50.00	50.00 21120.
25	19.65	4	4	50.00	50.00 21120.
26	19.30	4	4	50.00	50.00 21120.
27	18.98	4	4	50.00	50.00 21120.
28	18.67	4	4	50.00	50.00 21120.
29	18.33	3	3	50.00	50.00 21120.
30	18.00	3	3	50.00	50.00 21120.
31	17.65	3	3	50.00	50.00 10479.
32	17.35	3	3	50.00	50.00 10479.
33	17.02	3	3	50.00	50.00 10479.
34	16.67	3	3	50.00	50.00 10479.
*****	***35 16.33***	***3***	***3 50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00 0.0
37	15.52	3	3	50.00	50.00 0.0

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00

Convergence control parameters

Maximum number of iterations : 9000
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 0 : Initial condition

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.83	0.83	0.00	1	1	1.43	1.43	0.83	0.83	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	3.31	3.31	0.00	1	1	5.70	5.70	3.31	3.31	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	6.61	6.61	0.00	1	1	11.40	11.40	6.61	6.61	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	9.92	9.92	0.00	1	1	17.10	17.10	9.92	9.92	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	13.78	13.78	0.00	1	1	23.75	23.75	13.78	13.78	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	17.63	17.63	0.00	1	1	30.40	30.40	17.63	17.63	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	21.49	21.49	0.00	1	1	37.05	37.05	21.49	21.49	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	25.35	25.35	0.00	1	1	43.70	43.70	25.35	25.35	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	36.75	3	3	178.30	141.55	178.30	141.55	36.75	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	40.00	3	3	184.80	144.80	184.80	144.80	40.00	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	43.50	3	3	191.80	148.30	191.80	148.30	43.50	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	46.50	3	3	197.80	151.30	197.80	151.30	46.50	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	49.75	3	3	204.30	154.55	204.30	154.55	49.75	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	53.25	3	3	211.30	158.05	211.30	158.05	53.25	**0.00**	**0.00**
35	16.33	0.00	218.30	161.55	218.30	161.55	56.75	3	3	218.30	161.55	218.30	161.55	56.75	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	60.75	3	3	226.30	165.55	226.30	165.55	60.75	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	64.75	3	3	234.30	169.55	234.30	169.55	64.75	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	68.75	3	3	242.30	173.55	242.30	173.55	68.75	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	72.75	3	3	250.30	177.55	250.30	177.55	72.75	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	76.75	3	3	258.30	181.55	258.30	181.55	76.75	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	80.75	3	3	266.30	185.55	266.30	185.55	80.75	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	84.75	3	3	274.30	189.55	274.30	189.55	84.75	**0.00**	**0.00**

NOTE: Displacements from STAGE 0 are disregarded in later stages

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

STAGE 1 : ADD RETAINING WALL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	1	50.00	50.00	149330.
2	27.40	1	1	50.00	50.00	149330.
3	27.10	1	1	50.00	50.00	149330.
4	26.80	1	1	50.00	50.00	149330.
5	26.45	1	1	50.00	50.00	149330.
6	26.10	1	1	50.00	50.00	149330.
7	25.75	1	1	50.00	50.00	149330.
8	25.40	1	1	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

** Wall toe level: 16.33*

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 1 : Add retaining wall

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no. error. [mm]	Disp Node no.	Press Node error [kN/m²]	Node no.
1	0.0	1 0.0000	1	0.00	1
2	0.0	1 0.0000	1	0.00	1
3	0.0	1 0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.83	0.83	0.00	1	1	1.43	1.43	0.83	0.83	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	3.31	3.31	0.00	1	1	5.70	5.70	3.31	3.31	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	6.61	6.61	0.00	1	1	11.40	11.40	6.61	6.61	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	9.92	9.92	0.00	1	1	17.10	17.10	9.92	9.92	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	13.78	13.78	0.00	1	1	23.75	23.75	13.78	13.78	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	17.63	17.63	0.00	1	1	30.40	30.40	17.63	17.63	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	21.49	21.49	0.00	1	1	37.05	37.05	21.49	21.49	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	25.35	25.35	0.00	1	1	43.70	43.70	25.35	25.35	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	*36.75*	2	2	178.30	141.55	178.30	141.55	*36.75*	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	*40.00*	2	2	184.80	144.80	184.80	144.80	*40.00*	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	*43.50*	2	2	191.80	148.30	191.80	148.30	*43.50*	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	*46.50*	2	2	197.80	151.30	197.80	151.30	*46.50*	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	*49.75*	2	2	204.30	154.55	204.30	154.55	*49.75*	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	*53.25*	2	2	211.30	158.05	211.30	158.05	*53.25*	**0.00**	**0.00**
***35**	16.33	0.00	218.30	161.55	218.30	161.55	*56.75*	2	2	218.30	161.55	218.30	161.55	*56.75*	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	*60.75*	2	2	226.30	165.55	226.30	165.55	*60.75*	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	*64.75*	2	2	234.30	169.55	234.30	169.55	*64.75*	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	*68.75*	2	2	242.30	173.55	242.30	173.55	*68.75*	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	*72.75*	2	2	250.30	177.55	250.30	177.55	*72.75*	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	*76.75*	2	2	258.30	181.55	258.30	181.55	*76.75*	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	*80.75*	2	2	266.30	185.55	266.30	185.55	*80.75*	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	*84.75*	2	2	274.30	189.55	274.30	189.55	*84.75*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

** Wall toe level: 16.33*

**Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.**

**Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-1.43	7.90	-70.11	52.30	-112.08	73.58

STAGE 2 : PROP AND SURCHARGE

Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max

Minimum equivalent fluid pressure parameters

Material	Left a	Left yo	Left b	Right a	Right yo	Right b
	[kN/m²/m]	[m]	[kN/m²]	[kN/m²/m]	[m]	[kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 2 : prop and surcharge

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 1 inserted at this stage
Strut no 10 inserted at this stage
Surcharge no. 1 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ	Node no.	Disp error [mm]	Node no.	Press Node error [kN/m²]	no.
1	0.0	1	1.1799	18	1.93	1
2	1.2	18	0.0002	1	0.38	2
3	1.2	18	0.0001	1	0.62	1
4	1.2	18	0.0000	1	0.15	3
5	1.2	18	0.0001	1	0.02	2

Ground level left = 27.70 Ground level right = 27.70

Node	Level	Disp	Stress Vt	Stress Ve	Stress Pt	Pore Pe	Pore Pressure		Soil Left	Soil Right		Stress Vt	Stress Ve	Stress Pt	Pore Pe	Pore Pressure	BM**	SF**
	[m]	[mm]	[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]					[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]	[kNm/m]	[kN/m]
1	27.70	0.05	23.43	23.43	8.26	8.26	0.00	A	1	1	a	1.43	1.43	0.50	0.50	0.00	**0.00**	**0.00**
2	27.40	0.10	27.70	27.70	9.79	9.79	0.00	A	1	1		5.70	5.70	2.83	2.83	0.00	**-0.47**	**2.98**
	27.40																**-0.47**	**-3.71**
3	27.10	0.15	33.40	33.40	11.79	11.79	0.00	A	1	1		11.40	11.40	6.17	6.17	0.00	**0.22**	**-1.17**
4	26.80	0.20	39.10	39.10	15.78	15.78	0.00		1	1		17.10	17.10	9.43	9.43	0.00	**0.23**	**1.37**
5	26.45	0.26	45.75	45.75	19.77	19.77	0.00		1	1		23.75	23.75	13.23	13.23	0.00	**-0.74**	**4.30**
6	26.10	0.32	52.40	52.40	23.72	23.72	0.00		1	1		30.40	30.40	17.02	17.02	0.00	**-2.79**	**7.43**
7	25.75	0.38	59.05	59.05	27.65	27.65	0.00		1	1		37.05	37.05	20.81	20.81	0.00	**-5.94**	**10.63**
8	25.40	0.44	65.70	65.70	31.71	31.71	0.00		1	1		43.70	43.70	24.47	24.47	0.00	**-10.23**	**14.08**
	25.40																**-10.23**	**-15.59**
9	25.00	0.54	73.30	73.30	35.98	35.98	0.00		1	1		51.30	51.30	29.02	29.02	0.00	**-4.72**	**-11.88**
10	24.60	0.67	80.90	80.90	39.89	39.89	0.00		1	1		58.90	58.90	33.93	33.93	0.00	**-0.72**	**-8.39**
11	24.20	0.80	88.50	88.50	43.69	43.69	0.00		1	1		66.50	66.50	38.95	38.95	0.00	**1.99**	**-5.57**
12	23.85	0.91	95.15	95.15	47.08	47.08	0.00		1	1		73.15	73.15	43.27	43.27	0.00	**3.52**	**-3.47**
13	23.50	1.00	101.80	101.80	50.54	50.54	0.00		1	1		79.80	79.80	47.53	47.53	0.00	**4.42**	**-1.88**
14	23.17	1.07	107.98	107.98	53.78	53.78	0.00		1	1		85.98	85.98	51.45	51.45	0.00	**4.80**	**-0.66**
15	22.83	1.13	114.63	114.63	57.41	57.41	0.00		1	1		92.63	92.63	55.53	55.53	0.00	**4.85**	**0.28**
16	22.52	1.16	120.33	120.33	60.60	60.60	0.00		1	1		98.33	98.33	58.95	58.95	0.00	**4.64**	**1.05**
17	22.17	1.18	126.98	126.98	64.18	64.18	0.00		1	1		104.98	104.98	63.09	63.09	0.00	**4.15**	**1.67**
18	21.83	1.18	133.63	131.88	69.11	67.36	1.75		1	1		111.63	109.88	67.35	65.60	1.75	**3.47**	**2.26**
19	21.62	1.17	137.52	133.72	72.54	68.74	3.80		1	1		115.52	111.72	70.15	66.35	3.80	**2.94**	**2.95**
20	21.38	1.16	142.08	135.88	65.00	58.80	6.20		4	4		120.08	113.88	66.78	60.58	6.20	**2.15**	**2.99**
21	21.10	1.14	147.40	138.40	68.60	59.60	9.00		4	4		125.40	116.40	71.30	62.30	9.00	**1.40**	**2.15**
22	20.80	1.11	153.10	141.10	73.37	61.37	12.00		4	4		131.10	119.10	75.23	63.23	12.00	**0.91**	**1.21**
23	20.45	1.08	159.75	144.25	78.70	63.20	15.50		4	4		137.75	122.25	80.06	64.56	15.50	**0.63**	**0.46**
24	20.05	1.04	167.35	147.85	84.74	65.24	19.50		4	4		145.35	125.85	85.61	66.11	19.50	**0.58**	**-0.12**
25	19.65	0.99	174.95	151.45	90.90	67.40	23.50		4	4		152.95	129.45	91.06	67.56	23.50	**0.73**	**-0.40**
26	19.30	0.94	181.60	154.60	96.49	69.49	27.00		4	4		159.60	132.60	95.61	68.61	27.00	**0.88**	**-0.24**
27	18.98	0.90	187.78	157.53	101.92	71.67	30.25		4	4		165.78	135.53	99.63	69.38	30.25	**0.90**	**0.45**
28	18.67	0.86	193.48	160.23	104.44	71.19	33.25		4	4		171.48	138.23	105.77	72.52	33.25	**0.62**	**0.64**
29	18.33	0.80	200.30	146.14	191.29	137.13	*54.16*		2	2		178.30	137.12	187.27	146.10	*41.18*	**0.50**	**1.26**
30	18.00	0.75	206.80	151.08	194.54	138.82	*55.72*		2	2		184.80	138.79	197.05	151.04	*46.01*	**-0.21**	**1.60**
31	17.65	0.70	213.80	154.71	201.29	142.20	*59.09*		2	2		191.80	142.16	204.30	154.66	*49.64*	**-0.57**	**0.37**
32	17.35	0.65	219.80	157.12	208.41	145.73	*62.68*		2	2		197.80	145.70	209.19	157.09	*52.10*	**-0.49**	**-0.45**
33	17.02	0.61	226.30	160.09	215.45	149.23	*66.21*		2	2		204.30	149.21	215.15	160.06	*55.09*	**-0.28**	**-0.55**
34	16.67	0.56	233.30	163.58	222.45	152.74	*69.72*		2	2		211.30	152.71	222.14	163.55	*58.59*	**-0.12**	**-0.41**
***35**	16.33	0.52	240.30	166.99	229.63	156.32	*73.31*		2	2		218.30	156.29	228.97	166.96	*62.01*	**0.00**	**0.00**
36	15.93	0.47	248.30	171.16	237.30	160.16	*77.14*		2	2		226.30	160.13	237.30	171.13	*66.17*	**0.00**	**0.00**
37	15.52	0.41	256.30	175.15	245.30	164.15	*81.15*		2	2		234.30	164.13	245.30	175.13	*70.17*	**0.00**	**0.00**
38	15.13	0.35	264.30	179.15	253.30	168.15	*85.15*		2	2		242.30	168.13	253.30	179.12	*74.17*	**0.00**	**0.00**
39	14.73	0.29	272.30	183.15	261.30	172.15	*89.15*		2	2		250.30	172.12	261.30	183.12	*78.18*	**0.00**	**0.00**
40	14.32	0.22	280.30	187.15	269.30	176.15	*93.15*		2	2		258.30	176.12	269.30	187.12	*82.18*	**0.00**	**0.00**
41	13.93	0.13	288.30	191.15	277.30	180.14	*97.15*		2	2		266.30	180.12	277.30	191.12	*86.18*	**0.00**	**0.00**
42	13.52	0.00	296.30	195.14	285.30	184.14	*101.16*		2	2		274.30	184.12	285.30	195.12	*90.18*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far
Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max
-1.43 7.90 -70.11 52.30 -112.08 73.58
Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	4.96	4.96	0.00	4.96
10	8	21.98	21.98	0.00	21.98

STAGE 3 : TAKE OUT PROP AT GROUND LEVEL

Geometry

Node	Level	Soil	Boundary Left	Boundary Right	EI below node
	[m]				[kNm2/m]
1	27.70	1	0 50.00	50.00	149330.

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
***35**	***16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

**** Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 3 : take out prop at ground level

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes

Strut no. 1 removed at this stage

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 120430. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	2.5030	18	4.16	9
2	2.5	18	0.0583	1	3.02	1
3	2.5	18	0.0353	1	1.71	2
4	2.5	18	0.0264	1	1.22	3
5	2.5	18	0.0215	1	0.68	3
10	2.5	18	0.0018	1	0.04	4

Ground level left = 27.70 Ground level right = 25.20

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	2.16	23.43	23.43	8.25	8.25	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	2.10	27.70	27.70	9.78	9.78	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-0.50**	**3.65**
3	27.10	2.03	33.40	33.40	11.79	11.79	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-2.19**	**8.02**
4	26.80	1.97	39.10	39.10	13.74	13.74	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-5.31**	**13.42**
5	26.45	1.90	45.75	45.75	17.65	17.65	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-11.07**	**20.61**
6	26.10	1.84	52.40	52.40	23.19	23.19	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-19.74**	**30.26**
7	25.75	1.78	59.05	59.05	27.97	27.97	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-32.25**	**42.34**
8	25.40	1.75	65.70	65.70	33.47	33.47	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-49.38**	**57.42**
	25.40																**-49.38**	**-60.91**
9	25.00	1.85	73.30	73.30	38.37	38.37	0.00		1	1	p	3.80	3.80	12.98	12.98	0.00	**-28.41**	**-45.58**
10	24.60	2.11	80.90	80.90	41.54	41.54	0.00		1	1		11.40	11.40	23.95	23.95	0.00	**-12.92**	**-33.98**
11	24.20	2.45	88.50	88.50	44.09	44.09	0.00		1	1		19.00	19.00	26.69	26.69	0.00	**-1.23**	**-24.82**
12	23.85	2.76	95.15	95.15	46.37	46.37	0.00		1	1		25.65	25.65	31.32	31.32	0.00	**5.92**	**-16.86**
13	23.50	3.04	101.80	101.80	48.81	48.81	0.00		1	1		32.30	32.30	36.55	36.55	0.00	**10.58**	**-10.51**
14	23.17	3.27	107.98	107.98	51.16	51.16	0.00		1	1		38.48	38.48	41.35	41.35	0.00	**13.09**	**-5.49**
15	22.83	3.45	114.63	114.63	54.10	54.10	0.00		1	1		45.12	45.12	46.24	46.24	0.00	**14.23**	**-1.53**
16	22.52	3.57	120.33	120.33	56.89	56.89	0.00		1	1		50.83	50.83	50.15	50.15	0.00	**14.17**	**1.68**
17	22.17	3.64	126.98	126.98	59.73	59.73	0.00		1	1		57.48	57.48	55.16	55.16	0.00	**13.06**	**4.23**
18	21.83	3.66	133.63	131.88	65.10	63.35	1.75		1	1		64.12	62.37	59.57	57.82	1.75	**11.20**	**6.35**
19	21.62	3.65	137.52	133.72	68.97	65.17	3.80		1	1		68.02	64.22	61.79	57.99	3.80	**9.69**	**8.46**
20	21.38	3.62	142.08	135.88	57.31	51.11	6.20		4	4		72.58	66.38	61.93	55.73	6.20	**7.40**	**8.73**
21	21.10	3.56	147.40	138.40	60.17	51.17	9.00		4	4		77.90	68.90	67.44	58.44	9.00	**5.18**	**6.49**
22	20.80	3.49	153.10	141.10	65.63	53.62	12.00		4	4		83.60	71.60	71.01	59.01	12.00	**3.66**	**3.89**
23	20.45	3.39	159.75	144.25	71.35	55.85	15.50		4	4		90.25	74.75	75.28	59.78	15.50	**2.71**	**1.71**
24	20.05	3.26	167.35	147.85	77.82	58.32	19.50		4	4		97.85	78.35	80.51	61.01	19.50	**2.43**	**-0.01**
25	19.65	3.11	174.95	151.45	84.73	61.23	23.50		4	4		105.45	81.95	85.36	61.86	23.50	**2.72**	**-0.89**
26	19.30	2.97	181.60	154.60	91.47	64.47	27.00		4	4		112.10	85.10	88.49	61.49	27.00	**3.09**	**-0.38**
27	18.98	2.83	187.78	157.53	98.58	68.33	30.25		4	4		118.27	88.02	90.83	60.58	30.25	**2.99**	**1.94**
28	18.67	2.69	193.48	160.23	97.34	64.09	33.25		4	4		123.98	90.73	101.50	68.25	33.25	**1.92**	**2.66**
29	18.33	2.52	200.30	156.38	172.26	128.34	*43.92*		2	2		130.80	127.44	160.36	157.00	*3.36*	**1.31**	**4.46**
30	18.00	2.36	206.80	165.38	168.60	127.17	*41.42*		2	2		137.30	125.81	177.73	166.24	*11.49*	**-1.02**	**5.09**
31	17.65	2.18	213.80	169.21	174.95	130.37	*44.59*		2	2		144.30	129.29	184.71	169.70	*15.01*	**-2.08**	**0.87**
32	17.35	2.05	219.80	170.18	184.46	134.84	*49.62*		2	2		150.30	134.04	186.71	170.45	*16.26*	**-1.69**	**-1.75**
33	17.02	1.91	226.30	172.51	192.53	138.74	*53.79*		2	2		156.80	138.10	191.37	172.67	*18.70*	**-0.97**	**-1.96**
34	16.67	1.77	233.30	176.07	199.39	142.16	*57.23*		2	2		163.80	141.71	198.09	176.00	*22.09*	**-0.38**	**-1.39**
***35**	16.33	1.63	240.30	179.37	206.71	145.77	*60.93*		2	2		170.80	145.42	204.58	179.20	*25.38*	**0.00**	**0.00**
36	15.93	1.47	248.30	184.00	213.53	149.23	*64.30*		2	2		178.80	148.97	213.53	183.70	*29.83*	**0.00**	**0.00**
37	15.52	1.30	256.30	188.07	221.37	153.13	*68.23*		2	2		186.80	153.02	221.37	187.59	*33.78*	**0.00**	**0.00**
38	15.13	1.12	264.30	192.11	229.24	157.05	*72.19*		2	2		194.80	157.06	229.24	191.50	*37.74*	**0.00**	**0.00**
39	14.73	0.92	272.30	196.14	237.15	160.99	*76.16*		2	2		202.80	161.09	237.15	195.44	*41.71*	**0.00**	**0.00**
40	14.32	0.69	280.30	200.21	244.99	164.90	*80.09*		2	2		210.80	165.15	244.99	199.33	*45.65*	**0.00**	**0.00**
41	13.93	0.42	288.30	204.24	252.88	168.83	*84.06*		2	2		218.80	169.18	252.88	203.26	*49.62*	**0.00**	**0.00**
42	13.52	0.00	296.30	207.81	261.63	173.14	*88.49*		2	2		226.80	172.82	261.63	207.65	*53.98*	**0.00**	**0.00**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

Wall toe level: 16.33

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.43	7.90	-70.11	52.30	-112.08	73.58

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.96
10	8	87.65	87.65	0.00	87.65

STAGE 4 : BASEMENT EXCAVATION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	149330.
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	0	50.00	50.00	21120.
10	24.60	1	0	50.00	50.00	21120.
11	24.20	1	0	50.00	50.00	21120.
12	23.85	1	0	50.00	50.00	21120.
13	23.50	1	0	50.00	50.00	21120.
14	23.17	1	0	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
***35**	***16.33**	***2**	***2**	***50.00**	***50.00**	***0.0**
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

Wall toe level: 16.33

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	25.40	0.00	5.00	25.40	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	0.00	0.00	0.00	0.00	0.00	0.00

RESULTS FOR STAGE 4 : basement excavation

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	4.1822	15	24.43	15
2	4.2	15	0.0958	14	24.75	16
3	4.3	15	0.0678	14	15.01	4
4	4.3	15	0.0390	14	7.64	17
5	4.4	15	0.0192	15	4.20	17
10	4.4	15	0.0001	13	0.13	16
11	4.4	15	0.0003	14	0.07	17

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.12	23.43	23.43	18.17	18.17	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.63	27.70	27.70	14.48	14.48	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-1.10**	**6.61**
3	27.10	-0.15	33.40	33.40	17.59	17.59	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-3.97**	**13.11**
4	26.80	0.34	39.10	39.10	19.34	19.34	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-8.97**	**20.91**
5	26.45	0.92	45.75	45.75	23.01	23.01	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-17.77**	**30.59**
6	26.10	1.51	52.40	52.40	27.93	27.93	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-30.38**	**42.63**
7	25.75	2.11	59.05	59.05	31.88	31.88	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-47.61**	**56.76**
8	25.40	2.75	65.70	65.70	36.69	36.69	0.00	1	0	0.00	0.00	0.00	0.00	0.00	**-70.11**	**73.58**

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
	25.40															-70.11	-112.08
9	25.00	3.66	73.30	73.30	39.24	39.24	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-29.00	-92.20
10	24.60	4.74	80.90	80.90	39.04	39.04	0.00	1	0		0.00	0.00	0.00	0.00	0.00	3.64	-71.06
11	24.20	5.80	88.50	88.50	38.10	38.10	0.00	1	0		0.00	0.00	0.00	0.00	0.00	27.85	-50.88
12	23.85	6.61	95.15	95.15	37.92	37.92	0.00	1	0		0.00	0.00	0.00	0.00	0.00	42.28	-32.27
13	23.50	7.25	101.80	101.80	38.61	38.61	0.00	1	0		0.00	0.00	0.00	0.00	0.00	50.44	-14.52
14	23.17	7.65	107.98	107.98	39.90	39.90	0.00	1	0		0.00	0.00	0.00	0.00	0.00	52.30	3.37
15	22.83	7.87	114.63	114.63	43.03	43.03	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	47.94	19.41
16	22.52	7.90	120.33	120.33	46.69	46.69	0.00	1	1	P	9.03	9.03	30.79	30.79	0.00	40.03	29.84
17	22.17	7.77	126.98	126.98	50.27	50.27	0.00	1	1	P	15.68	15.68	53.48	53.48	0.00	28.37	32.57
18	21.83	7.52	133.63	131.88	59.59	57.84	1.75	1	1	P	22.32	20.57	72.00	70.25	1.75	17.23	29.49
19	21.62	7.34	137.52	133.72	66.09	62.29	3.80	1	1		26.22	22.42	66.96	63.16	3.80	11.67	27.03
20	21.38	7.10	142.08	135.88	45.58	39.38	6.20	4	4		30.78	24.58	69.70	63.50	6.20	5.21	22.67
21	21.10	6.81	147.40	138.40	47.06	38.06	9.00	4	4		36.10	27.10	71.29	62.29	9.00	0.05	13.69
22	20.80	6.50	153.10	141.10	55.71	43.71	12.00	4	4		41.80	29.80	70.13	58.13	12.00	-2.63	5.78
23	20.45	6.15	159.75	144.25	63.73	48.23	15.50	4	4		48.45	32.95	72.76	57.26	15.50	-3.55	0.33
24	20.05	5.76	167.35	147.85	72.02	52.52	19.50	4	4		56.05	36.55	77.19	57.69	19.50	-2.77	-3.35
25	19.65	5.39	174.95	151.45	80.66	57.16	23.50	4	4		63.65	40.15	81.02	57.52	23.50	-0.87	-4.84
26	19.30	5.07	181.60	154.60	89.14	62.14	27.00	4	4		70.30	43.30	83.09	56.09	27.00	0.86	-3.55
27	18.98	4.77	187.78	157.53	98.10	67.85	30.25	4	4		76.48	46.23	81.65	51.40	30.25	1.56	1.30
28	18.67	4.49	193.48	160.23	91.94	58.69	33.25	4	4		82.18	48.93	94.65	61.40	33.25	0.13	4.17
29	18.33	4.16	200.30	166.30	155.05	121.05	*34.00*	2	2		89.00	118.11	139.88	168.99	*-29.11*	-1.12	7.03
30	18.00	3.86	206.80	179.48	145.20	117.87	*27.32*	2	2		95.50	114.34	163.42	182.26	*-18.84*	-4.53	6.34
31	17.65	3.56	213.80	182.84	152.27	121.31	*30.96*	2	2		102.50	118.84	167.69	184.04	*-16.34*	-5.29	-1.20
32	17.35	3.32	219.80	181.96	164.45	126.60	*37.84*	2	2		108.50	124.73	166.48	182.71	*-16.23*	-3.92	-5.01
33	17.02	3.09	226.30	183.66	173.40	130.76	*42.64*	2	2		115.00	129.23	169.89	184.11	*-14.23*	-2.15	-4.64
34	16.67	2.86	233.30	187.49	179.75	133.94	*45.81*	2	2		122.00	132.84	176.51	187.35	*-10.84*	-0.81	-3.07
***35**	16.33	2.64	240.30	190.75	187.06	137.51	*49.55*	2	2		129.00	136.72	182.51	190.22	*-7.72*	0.00	0.00
36	15.93	2.38	248.30	196.18	192.55	140.43	*52.12*	2	2		137.00	139.79	192.55	195.34	*-2.79*	0.00	0.00
37	15.52	2.11	256.30	200.34	200.18	144.22	*55.96*	2	2		145.00	143.90	200.18	199.08	*1.10*	0.00	0.00
38	15.13	1.81	264.30	204.44	207.90	148.04	*59.86*	2	2		153.00	147.97	207.90	202.88	*5.03*	0.00	0.00
39	14.73	1.48	272.30	208.49	215.71	151.90	*63.81*	2	2		161.00	152.01	215.71	206.72	*8.99*	0.00	0.00
40	14.32	1.12	280.30	212.61	223.41	155.72	*67.69*	2	2		169.00	156.10	223.41	210.51	*12.90*	0.00	0.00
41	13.93	0.68	288.30	216.73	231.10	159.53	*71.57*	2	2		177.00	160.20	231.10	214.30	*16.80*	0.00	0.00
42	13.52	0.00	296.30	219.63	240.88	164.21	*76.67*	2	2		185.00	163.38	240.88	219.26	*21.62*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.43	7.90	-70.11	52.30	-112.08	73.58

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.96
10	8	137.52	137.52	0.00	137.52

STAGE 5 : ADD B1 BASE SLAB

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 5 : Add B1 base slab

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 8 inserted at this stage
Surcharge no. 2 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	1	0.00	1
2	0.0	1	0.0000	1	0.00	1
3	0.0	1	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.12	23.43	23.43	18.17	18.17	0.00	1	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	-0.63	27.70	27.70	14.48	14.48	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-1.10	6.61
3	27.10	-0.15	33.40	33.40	17.59	17.59	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-3.97	13.11
4	26.80	0.34	39.10	39.10	19.34	19.34	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-8.97	20.91
5	26.45	0.92	45.75	45.75	23.01	23.01	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-17.77	30.59
6	26.10	1.51	52.40	52.40	27.93	27.93	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-30.38	42.63
7	25.75	2.11	59.05	59.05	31.88	31.88	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-47.61	56.76
8	25.40	2.75	65.70	65.70	36.69	36.69	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-70.11	73.58
	25.40															-70.11	-112.08
9	25.00	3.66	73.30	73.30	39.24	39.24	0.00	1	0		0.00	0.00	0.00	0.00	0.00	-29.00	-92.20
10	24.60	4.74	80.90	80.90	39.04	39.04	0.00	1	0		0.00	0.00	0.00	0.00	0.00	3.64	-71.06
11	24.20	5.80	88.50	88.50	38.10	38.10	0.00	1	0		0.00	0.00	0.00	0.00	0.00	27.85	-50.88
12	23.85	6.61	95.15	95.15	37.92	37.92	0.00	1	0		0.00	0.00	0.00	0.00	0.00	42.28	-32.27
13	23.50	7.25	101.80	101.80	38.61	38.61	0.00	1	0		0.00	0.00	0.00	0.00	0.00	50.44	-14.52
	23.50															50.44	-14.52
14	23.17	7.65	107.98	107.98	39.90	39.90	0.00	1	0		0.00	0.00	0.00	0.00	0.00	52.30	3.37
15	22.83	7.87	114.63	114.63	43.03	43.03	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	47.94	19.41
16	22.52	7.90	120.33	120.33	46.69	46.69	0.00	1	1	P	9.03	9.03	30.79	30.79	0.00	40.03	29.84

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
17	22.17	7.77	126.98	126.98	50.27	50.27	0.00	1	1	P	15.68	15.68	53.48	53.48	0.00	**28.37**	**32.57**
18	21.83	7.52	133.63	131.88	59.59	57.84	1.75	1	1	P	22.32	20.57	72.00	70.25	1.75	**17.23**	**29.49**
19	21.62	7.34	137.52	133.72	66.09	62.29	3.80	1	1		26.22	22.42	66.96	63.16	3.80	**11.67**	**27.03**
20	21.38	7.10	142.08	135.88	45.58	39.38	6.20	4	4		30.78	24.58	69.70	63.50	6.20	**5.21**	**22.67**
21	21.10	6.81	147.40	138.40	47.06	38.06	9.00	4	4		36.10	27.10	71.29	62.29	9.00	**0.05**	**13.69**
22	20.80	6.50	153.10	141.10	55.71	43.71	12.00	4	4		41.80	29.80	70.13	58.13	12.00	**-2.63**	**5.78**
23	20.45	6.15	159.75	144.25	63.73	48.23	15.50	4	4		48.45	32.95	72.76	57.26	15.50	**-3.55**	**0.33**
24	20.05	5.76	167.35	147.85	72.02	52.52	19.50	4	4		56.05	36.55	77.19	57.69	19.50	**-2.77**	**-3.35**
25	19.65	5.39	174.95	151.45	80.66	57.16	23.50	4	4		63.65	40.15	81.02	57.52	23.50	**-0.87**	**-4.84**
26	19.30	5.07	181.60	154.60	89.14	62.14	27.00	4	4		70.30	43.30	83.09	56.09	27.00	**0.86**	**-3.55**
27	18.98	4.77	187.78	157.53	98.10	67.85	30.25	4	4		76.48	46.23	81.65	51.40	30.25	**1.56**	**1.30**
28	18.67	4.49	193.48	160.23	91.94	58.69	33.25	4	4		82.18	48.93	94.65	61.40	33.25	**0.13**	**4.17**
29	18.33	4.16	200.30	166.30	155.05	121.05	*34.00*	2	2		89.00	118.11	139.88	168.99	*-29.11*	**-1.12**	**7.03**
30	18.00	3.86	206.80	179.48	145.20	117.87	*27.32*	2	2		95.50	114.34	163.42	182.26	*-18.84*	**-4.53**	**6.34**
31	17.65	3.56	213.80	182.84	152.27	121.31	*30.96*	2	2		102.50	118.84	167.69	184.04	*-16.34*	**-5.29**	**-1.20**
32	17.35	3.32	219.80	181.96	164.45	126.60	*37.84*	2	2		108.50	124.73	166.48	182.71	*-16.23*	**-3.92**	**-5.01**
33	17.02	3.09	226.30	183.66	173.40	130.76	*42.64*	2	2		115.00	129.23	169.89	184.11	*-14.23*	**-2.15**	**-4.64**
34	16.67	2.86	233.30	187.49	179.75	133.94	*45.81*	2	2		122.00	132.84	176.51	187.35	*-10.84*	**-0.81**	**-3.07**
***35**	16.33	2.64	240.30	190.75	187.06	137.51	*49.55*	2	2		129.00	136.72	182.51	190.22	*-7.72*	**0.00**	**0.00**
36	15.93	2.38	248.30	196.18	192.55	140.43	*52.12*	2	2		137.00	139.79	192.55	195.34	*-2.79*	**0.00**	**0.00**
37	15.52	2.11	256.30	200.34	200.18	144.22	*55.96*	2	2		145.00	143.90	200.18	199.08	*1.10*	**0.00**	**0.00**
38	15.13	1.81	264.30	204.44	207.90	148.04	*59.86*	2	2		153.00	147.97	207.90	202.88	*5.03*	**0.00**	**0.00**
39	14.73	1.48	272.30	208.49	215.71	151.90	*63.81*	2	2		161.00	152.01	215.71	206.72	*8.99*	**0.00**	**0.00**
40	14.32	1.12	280.30	212.61	223.41	155.72	*67.69*	2	2		169.00	156.10	223.41	210.51	*12.90*	**0.00**	**0.00**
41	13.93	0.68	288.30	216.73	231.10	159.53	*71.57*	2	2		177.00	160.20	231.10	214.30	*16.80*	**0.00**	**0.00**
42	13.52	0.00	296.30	219.63	240.88	164.21	*76.67*	2	2		185.00	163.38	240.88	219.26	*21.62*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.43	7.90	-70.11	52.30	-112.08	73.58

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.96
8	13	0.00	0.00	0.00	0.00
10	8	137.52	137.52	0.00	137.52

STAGE 6 : REMOVE PROP1

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 6 : Remove prop1

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 9 inserted at this stage
Strut no. 10 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	error [mm]	Disp Node no.	error [kN/m²]	Press Node no.
1	0.0	1	2.7557	9	0.00	1
2	2.8	9	0.0007	21	0.72	15
3	2.8	9	0.0002	22	0.16	16
4	2.8	9	0.0000	22	0.01	16

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-0.92	23.43	23.43	20.67	20.67	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.08	27.70	27.70	16.44	16.44	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-1.26**	**7.51**
3	27.10	0.76	33.40	33.40	18.88	18.88	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-4.51**	**14.67**
4	26.80	1.60	39.10	39.10	19.98	19.98	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-10.05**	**22.87**
	26.80															**-10.05**	**-62.30**
5	26.45	2.59	45.75	45.75	22.27	22.27	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**10.22**	**-52.65**
6	26.10	3.58	52.40	52.40	25.28	25.28	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**26.80**	**-41.42**
7	25.75	4.54	59.05	59.05	26.96	26.96	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**39.21**	**-29.08**
8	25.40	5.49	65.70	65.70	27.45	27.45	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**47.16**	**-15.76**
9	25.00	6.41	73.30	73.30	27.42	27.42	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**50.69**	**-1.41**
10	24.60	7.06	80.90	80.90	29.42	29.42	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**48.29**	**13.94**
11	24.20	7.44	88.50	88.50	32.60	32.60	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**39.54**	**30.13**
12	23.85	7.60	95.15	95.15	36.76	36.76	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**26.10**	**47.07**
13	23.50	7.65	101.80	101.80	41.17	41.17	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**6.59**	**65.13**
	23.50															**6.59**	**-39.52**
14	23.17	7.65	107.98	107.98	44.22	44.22	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**16.39**	**-20.07**
15	22.83	7.58	114.63	114.63	47.82	47.82	0.00	1	1	p	3.32	3.32	11.36	11.36	0.00	**19.89**	**-1.99**
16	22.52	7.47	120.33	120.33	51.45	51.45	0.00	1	1	p	9.03	9.03	30.84	30.84	0.00	**18.08**	**10.53**
17	22.17	7.26	126.98	126.98	55.09	55.09	0.00	1	1		15.68	15.68	52.34	52.34	0.00	**12.82**	**15.70**
18	21.83	6.99	133.63	131.88	62.74	60.99	1.75	1	1		22.32	20.57	70.27	68.52	1.75	**7.10**	**14.94**
19	21.62	6.82	137.52	133.72	68.79	64.99	3.80	1	1		26.22	22.42	65.10	61.30	3.80	**4.32**	**14.08**
20	21.38	6.61	142.08	135.88	52.37	46.17	6.20	4	4		30.78	24.58	66.91	60.71	6.20	**0.81**	**12.09**
21	21.10	6.37	147.40	138.40	52.37	43.37	9.00	4	4		36.10	27.10	68.83	59.83	9.00	**-1.86**	**6.31**
22	20.80	6.11	153.10	141.10	59.35	47.35	12.00	4	4		41.80	29.80	68.38	56.38	12.00	**-2.79**	**1.11**

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
23	20.45	5.83	159.75	144.25	66.31	50.81	15.50	4	4	48.45	32.95	71.47	55.97	15.50	**-2.48**	**-2.18**
24	20.05	5.51	167.35	147.85	73.63	54.13	19.50	4	4	56.05	36.55	76.39	56.89	19.50	**-1.09**	**-4.23**
25	19.65	5.20	174.95	151.45	81.55	58.05	23.50	4	4	63.65	40.15	80.67	57.17	23.50	**0.90**	**-4.75**
26	19.30	4.92	181.60	154.60	89.54	62.54	27.00	4	4	70.30	43.30	83.09	56.09	27.00	**2.49**	**-3.06**
27	18.98	4.65	187.78	157.53	98.08	67.83	30.25	4	4	76.48	46.23	82.23	51.98	30.25	**3.00**	**1.76**
28	18.67	4.40	193.48	160.23	91.92	58.67	33.25	4	4	82.18	48.93	95.57	62.32	33.25	**1.47**	**4.30**
29	18.33	4.09	200.30	165.99	155.67	121.36	*34.31*	2	2	89.00	118.36	139.38	168.74	*-29.36*	**0.25**	**7.21**
30	18.00	3.81	206.80	179.14	145.88	118.21	*27.66*	2	2	95.50	114.67	162.77	181.94	*-19.17*	**-3.30**	**7.07**
31	17.65	3.52	213.80	182.76	152.42	121.38	*31.04*	2	2	102.50	118.83	167.74	184.06	*-16.33*	**-4.43**	**-0.14**
32	17.35	3.30	219.80	182.07	164.27	126.53	*37.73*	2	2	108.50	124.55	166.93	182.98	*-16.05*	**-3.38**	**-4.06**
33	17.02	3.07	226.30	183.79	173.19	130.68	*42.51*	2	2	115.00	129.02	170.37	184.39	*-14.02*	**-1.88**	**-3.98**
34	16.67	2.85	233.30	187.55	179.65	133.90	*45.75*	2	2	122.00	132.68	176.87	187.55	*-10.68*	**-0.71**	**-2.68**
***35**	16.33	2.63	240.30	190.84	186.90	137.44	*49.46*	2	2	129.00	136.55	182.91	190.45	*-7.55*	**0.00**	**0.00**
36	15.93	2.37	248.30	196.12	192.67	140.49	*52.18*	2	2	137.00	139.74	192.67	195.41	*-2.74*	**0.00**	**0.00**
37	15.52	2.10	256.30	200.27	200.31	144.28	*56.03*	2	2	145.00	143.85	200.31	199.15	*1.15*	**0.00**	**0.00**
38	15.13	1.80	264.30	204.36	208.05	148.11	*59.94*	2	2	153.00	147.91	208.05	202.96	*5.09*	**0.00**	**0.00**
39	14.73	1.48	272.30	208.40	215.88	151.98	*63.90*	2	2	161.00	151.94	215.88	206.82	*9.06*	**0.00**	**0.00**
40	14.32	1.12	280.30	212.50	223.62	155.82	*67.80*	2	2	169.00	156.01	223.62	210.63	*12.99*	**0.00**	**0.00**
41	13.93	0.68	288.30	216.59	231.39	159.68	*71.71*	2	2	177.00	160.07	231.39	214.46	*16.93*	**0.00**	**0.00**
42	13.52	0.00	296.30	219.63	240.88	164.21	*76.67*	2	2	185.00	163.38	240.88	219.26	*21.62*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

Wall toe level: 16.33

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.43	7.90	-70.11	52.30	-112.08	73.58

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.96
8	13	77.52	77.52	0.00	77.52
9	4	63.09	63.09	0.00	63.09
10	8				137.52

STAGE 7 : LONG TERM

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	74666.
2	27.40	1	0	50.00	50.00	74666.
3	27.10	1	0	50.00	50.00	74666.
4	26.80	1	0	50.00	50.00	74666.
5	26.45	1	0	50.00	50.00	74666.
6	26.10	1	0	50.00	50.00	74666.
7	25.75	1	0	50.00	50.00	74666.
8	25.40	1	0	50.00	50.00	10560.
9	25.00	1	0	50.00	50.00	10560.
10	24.60	1	0	50.00	50.00	10560.
11	24.20	1	0	50.00	50.00	10560.
12	23.85	1	0	50.00	50.00	10560.
13	23.50	1	0	50.00	50.00	10560.
14	23.17	1	0	50.00	50.00	10560.
15	22.83	1	1	50.00	50.00	10560.
16	22.52	1	1	50.00	50.00	10560.
17	22.17	1	1	50.00	50.00	10560.
18	21.83	1	1	50.00	50.00	10560.
19	21.62	1	1	50.00	50.00	10560.
20	21.38	4	4	50.00	50.00	10560.
21	21.10	4	4	50.00	50.00	10560.
22	20.80	4	4	50.00	50.00	10560.
23	20.45	4	4	50.00	50.00	10560.
24	20.05	4	4	50.00	50.00	10560.
25	19.65	4	4	50.00	50.00	10560.
26	19.30	4	4	50.00	50.00	10560.
27	18.98	4	4	50.00	50.00	10560.
28	18.67	4	4	50.00	50.00	10560.
29	18.33	3	3	50.00	50.00	10560.
30	18.00	3	3	50.00	50.00	10560.
31	17.65	3	3	50.00	50.00	5239.5
32	17.35	3	3	50.00	50.00	5239.5
33	17.02	3	3	50.00	50.00	5239.5
34	16.67	3	3	50.00	50.00	5239.5
***35**	***16.33**	***3**	***3**	***50.00**	***50.00**	***0.0**
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

Wall toe level: 16.33

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00
Wall relaxation 50%		

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 7 : Long term

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Fitzrovia

280mm dia Contigous Wall

DA1C1 ground level prop removed after insitu wall cast and propped at +25.4mOD

Material	Left			Right		
	a	yo	b	a	yo	b
	[kN/m²/m]	[m]	[kN/m²]	[kN/m²/m]	[m]	[kN/m²]

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 77256. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 119530. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.2068	31	0.01	16
2	1.2	31	0.0030	21	1.25	15
3	1.2	31	0.0019	22	1.22	16
4	1.2	31	0.0012	23	0.61	17
5	1.2	31	0.0007	23	0.31	17
7	1.2	31	0.0001	23	0.02	17

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-1.43	23.43	23.43	22.08	22.08	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	-0.45	27.70	27.70	17.47	17.47	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-1.34**	**8.01**
3	27.10	0.53	33.40	33.40	19.71	19.71	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-4.81**	**15.54**
4	26.80	1.52	39.10	39.10	20.60	20.60	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-10.67**	**24.05**
	26.80															**-10.67**	**-55.22**
5	26.45	2.68	45.75	45.75	22.40	22.40	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**7.08**	**-45.41**
6	26.10	3.83	52.40	52.40	24.69	24.69	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**21.12**	**-34.29**
7	25.75	4.96	59.05	59.05	25.58	25.58	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**31.08**	**-22.41**
8	25.40	6.04	65.70	65.70	24.78	24.78	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**36.81**	**-10.09**
9	25.00	7.06	73.30	73.30	23.47	23.47	0.00	a 1	0		0.00	0.00	0.00	0.00	0.00	**38.34**	**2.52**
10	24.60	7.65	80.90	80.90	25.49	25.49	0.00	a 1	0		0.00	0.00	0.00	0.00	0.00	**34.80**	**15.73**
11	24.20	7.86	88.50	88.50	29.65	29.65	0.00	a 1	0		0.00	0.00	0.00	0.00	0.00	**25.75**	**30.12**
12	23.85	7.81	95.15	95.15	35.34	35.34	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**12.58**	**45.98**
13	23.50	7.66	101.80	101.80	41.20	41.20	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**-6.43**	**63.71**
	23.50															**-6.43**	**-44.25**
14	23.17	7.53	107.98	107.98	44.32	44.32	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**4.90**	**-24.77**
15	22.83	7.36	114.63	114.63	47.76	47.76	0.00	1	1	p	3.32	3.32	11.36	11.36	0.00	**10.04**	**-6.69**
16	22.52	7.16	120.33	120.33	51.41	51.41	0.00	1	1	P	9.03	9.03	30.81	30.81	0.00	**9.65**	**5.82**
17	22.17	6.84	126.98	126.98	55.46	55.46	0.00	1	1	p	15.68	15.68	53.57	53.57	0.00	**6.03**	**10.78**
18	21.83	6.47	133.63	131.88	63.67	61.92	1.75	1	1	P	22.32	20.57	71.85	70.10	1.75	**2.10**	**9.70**
19	21.62	6.25	137.52	133.72	70.03	66.23	3.80	1	1		26.22	22.42	65.71	61.91	3.80	**0.43**	**8.81**
20	21.38	5.98	142.08	135.88	54.46	48.26	6.20	4	4		30.78	24.58	67.16	60.96	6.20	**-1.84**	**7.23**
21	21.10	5.68	147.40	138.40	54.17	45.17	9.00	4	4		36.10	27.10	68.47	59.47	9.00	**-3.24**	**2.20**
22	20.80	5.38	153.10	141.10	61.22	49.22	12.00	4	4		41.80	29.80	67.66	55.66	12.00	**-3.06**	**-2.01**
23	20.45	5.05	159.75	144.25	68.09	52.59	15.50	4	4		48.45	32.95	70.74	55.24	15.50	**-1.87**	**-4.09**
24	20.05	4.69	167.35	147.85	75.18	55.68	19.50	4	4		56.05	36.55	75.78	56.28	19.50	**0.04**	**-4.93**
25	19.65	4.33	174.95	151.45	83.02	59.52	23.50	4	4		63.65	40.15	80.06	56.56	23.50	**2.08**	**-4.34**
26	19.30	4.00	181.60	154.60	91.24	64.24	27.00	4	4		70.30	43.30	82.11	55.11	27.00	**3.33**	**-1.51**
27	18.98	3.66	187.78	157.53	100.57	70.32	30.25	4	4		76.48	46.23	80.29	50.04	30.25	**3.15**	**4.85**
28	18.67	3.34	193.48	160.23	96.10	62.85	33.25	4	4		82.18	48.93	91.48	58.23	33.25	**0.41**	**10.14**
29	18.33	2.96	200.30	163.55	168.23	131.48	36.75	3	3		89.00	52.25	178.00	141.25	36.75	**-3.49**	**8.92**
30	18.00	2.63	206.80	166.80	171.58	131.58	40.00	3	3		95.50	55.50	190.20	150.20	40.00	**-5.67**	**2.46**
31	17.65	2.32	213.80	170.30	182.54	139.04	43.50	3	3		102.50	59.00	190.81	147.31	43.50	**-5.04**	**-3.60**
32	17.35	2.10	219.80	173.30	192.16	145.66	46.50	3	3		108.50	62.00	190.86	144.36	46.50	**-3.42**	**-5.14**
33	17.02	1.91	226.30	176.55	199.71	149.96	49.75	3	3		115.00	65.25	195.97	146.22	49.75	**-1.84**	**-4.02**
34	16.67	1.74	233.30	180.05	205.93	152.68	53.25	3	3		122.00	68.75	203.63	150.38	53.25	**-0.73**	**-2.62**
***35**	16.33	1.58	240.30	183.55	213.69	156.94	56.75	3	3		129.00	72.25	209.58	152.83	56.75	**0.00**	**0.00**
36	15.93	1.41	248.30	187.55	219.66	158.91	60.75	3	3		137.00	76.25	219.66	158.91	60.75	**0.00**	**0.00**
37	15.52	1.24	256.30	191.55	227.52	162.77	64.75	3	3		145.00	80.25	227.52	162.77	64.75	**0.00**	**0.00**
38	15.13	1.06	264.30	195.55	235.39	166.64	68.75	3	3		153.00	84.25	235.39	166.64	68.75	**0.00**	**0.00**
39	14.73	0.86	272.30	199.55	243.33	170.58	72.75	3	3		161.00	88.25	243.33	170.58	72.75	**0.00**	**0.00**
40	14.32	0.65	280.30	203.55	251.20	174.45	76.75	3	3		169.00	92.25	251.20	174.45	76.75	**0.00**	**0.00**
41	13.93	0.39	288.30	207.55	259.18	178.43	80.75	3	3		177.00	96.25	259.18	178.43	80.75	**0.00**	**0.00**
42	13.52	0.00	296.30	211.55	267.43	182.68	84.75	3	3		185.00	100.25	267.43	182.68	84.75	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.43	7.90	-70.11	52.30	-112.08	73.58

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				4.96
8	13	79.97	79.97	0.00	79.97
9	4	58.72	58.72	0.00	63.09
10	8				137.52

Results Envelope

Node	Level [m]	Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
1	27.70	-1.43	2.16	0.00	0.00	0.00	0.00
2	27.40	-0.63	2.10	-1.34	0.00	-3.71	8.01
3	27.10	-0.15	2.03	-4.81	0.22	-1.17	15.54
4	26.80	0.00	1.97	-10.67	0.23	-62.30	24.05
5	26.45	0.00	2.68	-17.77	10.22	-52.65	30.59
6	26.10	0.00	3.83	-30.38	26.80	-41.42	42.63
7	25.75	0.00	4.96	-47.61	39.21	-29.08	56.76
8	25.40	0.00	6.04	-70.11	47.16	-112.08	73.58
9	25.00	0.00	7.06	-29.00	50.69	-92.20	2.52
10	24.60	0.00	7.65	-12.92	48.29	-71.06	15.73
11	24.20	0.00	7.86	-1.23	39.54	-50.88	30.13
12	23.85	0.00	7.81	0.00	42.28	-32.27	47.07
13	23.50	0.00	7.66	-6.43	50.44	-44.25	65.13
14	23.17	0.00	7.65	0.00	52.30	-24.77	3.37
15	22.83	0.00	7.87	0.00	47.94	-6.69	19.41
16	22.52	0.00	7.90	0.00	40.03	0.00	29.84
17	22.17	0.00	7.77	0.00	28.37	0.00	32.57
18	21.83	0.00	7.52	0.00	17.23	0.00	29.49
19	21.62	0.00	7.34	0.00	11.67	0.00	27.03
20	21.38	0.00	7.10	-1.84	7.40	0.00	22.67
21	21.10	0.00	6.81	-3.24	5.18	0.00	13.69
22	20.80	0.00	6.50	-3.06	3.66	-2.01	5.78
23	20.45	0.00	6.15	-3.55	2.71	-4.09	1.71
24	20.05	0.00	5.76	-2.77	2.43	-4.93	0.00
25	19.65	0.00	5.39	-0.87	2.72	-4.84	0.00
26	19.30	0.00	5.07	0.00	3.33	-3.55	0.00
27	18.98	0.00	4.77	0.00	3.15	0.00	4.85
28	18.67	0.00	4.49	0.00	1.92	0.00	10.14
29	18.33	0.00	4.16	-3.49	1.31	0.00	8.92
30	18.00	0.00	3.86	-5.67	0.00	0.00	7.07
31	17.65	0.00	3.56	-5.29	0.00	-3.60	0.87
32	17.35	0.00	3.32	-3.92	0.00	-5.14	0.00
33	17.02	0.00	3.09	-2.15	0.00	-4.64	0.00
34	16.67	0.00	2.86	-0.81	0.00	-3.07	0.00
***35**	***16.33***	***0.00***	***2.64***	***0.00***	***0.00***	***0.00***	***0.00***
36	15.93	0.00	2.38	0.00	0.00	0.00	0.00
37	15.52	0.00	2.11	0.00	0.00	0.00	0.00

Node	Level [m]	Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
38	15.13	0.00	1.81	0.00	0.00	0.00	0.00
39	14.73	0.00	1.48	0.00	0.00	0.00	0.00
40	14.32	0.00	1.12	0.00	0.00	0.00	0.00
41	13.93	0.00	0.68	0.00	0.00	0.00	0.00
42	13.52	0.00	0.00	0.00	0.00	0.00	0.00

Fitzrovia

280mm dia Contigous Wall

DA1C2 ground level prop removed after insitu wall cast and propped at +25.4mOD

INITIAL DATA

Notes
280/234 @ 400c/c

Soil properties

No.	Description	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
2	London Clay - Und	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
3	London Clay - Drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
4	RiverTerrace	19.00	0.50	0.25	5.66	1.00	4.76	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	0.00	0.00	0.00	10000.	0.00	Drained
2	100.00	18.50	6.50	100000.	6500.00	Undrained
3	0.00	18.50	0.00	80000.	5200.00	Drained
4	0.00	0.00	0.00	20000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	25.00	0.67	0.00	0.00
2	0.00	0.67	0.00	0.50
3	24.00	0.67	0.00	0.00
4	33.00	0.67	0.00	0.00

Soil Strength Partial Factors

Document and case:	tan Phi'	c'	Cu	E
EC7 DA1 Combination 2 (2011)	1.25	1.25	1.40	1.00

Note: Only the parameters in bold have been affected by Partial Factors,
No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	19.00	0.58	**0.43**	**2.65**	**1.31**	**3.25**	0.25	Calculated
2	20.00	1.00	**1.00**	**1.00**	**2.45**	**2.45**	1.00	Calculated
3	20.00	1.00	**0.44**	**2.53**	**1.33**	**3.18**	0.25	Calculated
4	19.00	0.50	**0.32**	**3.95**	**1.13**	**3.98**	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	**0.00**	0.00	**0.00**	**10000.**	**0.00**	Drained
2	**71.43**	18.50	**4.64**	**100000.**	**6500.00**	Undrained
3	**0.00**	18.50	**0.00**	**80000.**	**5200.00**	Drained
4	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	**20.46**	0.67	0.00	0.00
2	**0.00**	0.67	0.00	0.50
3	**19.61**	0.67	0.00	0.00
4	**27.45**	0.67	0.00	0.00

Surcharge properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure Factor [kN/m²]	Partial	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	26.00		1.00		
2	5	-	Right	23.00	0.00		1.00		

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

Surcharge Design properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	26.00			
2	5	-	Right	23.00	0.00			

Strut properties

No.	Stage In	Stage Out	Node	Level [m]	Prestress [kN/m]	Stiffness [kN/m/m]	Angle [°]	Lever arm [m]
1	2	3	2	27.40	0.00	50000.00	0.00	0.00
2	-	-	3	27.10	0.00	50000.00	0.00	0.00
3	-	-	4	26.80	0.00	50000.00	0.00	0.00
4	-	-	5	26.45	0.00	50000.00	0.00	0.00
5	-	-	6	26.10	0.00	50000.00	0.00	0.00
6	-	-	7	25.75	0.00	50000.00	0.00	0.00
7	-	-	9	25.00	0.00	50000.00	0.00	0.00
8	5	-	13	23.50	0.00	194444.00	0.00	0.00
9	6	-	4	26.80	0.00	50000.00	0.00	0.00
10	2	6	8	25.40	0.00	50000.00	0.00	0.00

STAGE 0 : INITIAL CONDITION

Geometry

Node	Level [m]	Soil	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	1	50.00	50.00 149330.
2	27.40	1	1	50.00	50.00 149330.
3	27.10	1	1	50.00	50.00 149330.
4	26.80	1	1	50.00	50.00 149330.
5	26.45	1	1	50.00	50.00 149330.
6	26.10	1	1	50.00	50.00 149330.
7	25.75	1	1	50.00	50.00 149330.
8	25.40	1	1	50.00	50.00 21120.
9	25.00	1	1	50.00	50.00 21120.
10	24.60	1	1	50.00	50.00 21120.
11	24.20	1	1	50.00	50.00 21120.
12	23.85	1	1	50.00	50.00 21120.
13	23.50	1	1	50.00	50.00 21120.
14	23.17	1	1	50.00	50.00 21120.
15	22.83	1	1	50.00	50.00 21120.
16	22.52	1	1	50.00	50.00 21120.
17	22.17	1	1	50.00	50.00 21120.
18	21.83	1	1	50.00	50.00 21120.
19	21.62	1	1	50.00	50.00 21120.
20	21.38	4	4	50.00	50.00 21120.
21	21.10	4	4	50.00	50.00 21120.
22	20.80	4	4	50.00	50.00 21120.
23	20.45	4	4	50.00	50.00 21120.
24	20.05	4	4	50.00	50.00 21120.
25	19.65	4	4	50.00	50.00 21120.
26	19.30	4	4	50.00	50.00 21120.
27	18.98	4	4	50.00	50.00 21120.
28	18.67	4	4	50.00	50.00 21120.
29	18.33	3	3	50.00	50.00 21120.
30	18.00	3	3	50.00	50.00 21120.
31	17.65	3	3	50.00	50.00 10479.
32	17.35	3	3	50.00	50.00 10479.
33	17.02	3	3	50.00	50.00 10479.
34	16.67	3	3	50.00	50.00 10479.
*****	***35 16.33***	***3***	***3 50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00 0.0
37	15.52	3	3	50.00	50.00 0.0

Fitzrovia

280mm dia Contigous Wall

DA1C2 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00

Convergence control parameters

Maximum number of iterations : 9000
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 0 : Initial condition

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	0.00	1.43	1.43	0.83	0.83	0.00	1	1	1.43	1.43	0.83	0.83	0.00	0.00	0.00
2	27.40	0.00	5.70	5.70	3.31	3.31	0.00	1	1	5.70	5.70	3.31	3.31	0.00	0.00	0.00
3	27.10	0.00	11.40	11.40	6.61	6.61	0.00	1	1	11.40	11.40	6.61	6.61	0.00	0.00	0.00
4	26.80	0.00	17.10	17.10	9.92	9.92	0.00	1	1	17.10	17.10	9.92	9.92	0.00	0.00	0.00
5	26.45	0.00	23.75	23.75	13.78	13.78	0.00	1	1	23.75	23.75	13.78	13.78	0.00	0.00	0.00
6	26.10	0.00	30.40	30.40	17.63	17.63	0.00	1	1	30.40	30.40	17.63	17.63	0.00	0.00	0.00
7	25.75	0.00	37.05	37.05	21.49	21.49	0.00	1	1	37.05	37.05	21.49	21.49	0.00	0.00	0.00
8	25.40	0.00	43.70	43.70	25.35	25.35	0.00	1	1	43.70	43.70	25.35	25.35	0.00	0.00	0.00
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	0.00	0.00
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	0.00	0.00
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	0.00	0.00
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	0.00	0.00
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	0.00	0.00
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	0.00	0.00
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	0.00	0.00
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	0.00	0.00
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	0.00	0.00
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	0.00	0.00
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	0.00	0.00
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	0.00	0.00
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	0.00	0.00
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	0.00	0.00
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	0.00	0.00
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	0.00	0.00
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	0.00	0.00
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	0.00	0.00
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	0.00	0.00
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	0.00	0.00
29	18.33	0.00	178.30	141.55	178.30	141.55	36.75	3	3	178.30	141.55	178.30	141.55	36.75	0.00	0.00
30	18.00	0.00	184.80	144.80	184.80	144.80	40.00	3	3	184.80	144.80	184.80	144.80	40.00	0.00	0.00
31	17.65	0.00	191.80	148.30	191.80	148.30	43.50	3	3	191.80	148.30	191.80	148.30	43.50	0.00	0.00
32	17.35	0.00	197.80	151.30	197.80	151.30	46.50	3	3	197.80	151.30	197.80	151.30	46.50	0.00	0.00
33	17.02	0.00	204.30	154.55	204.30	154.55	49.75	3	3	204.30	154.55	204.30	154.55	49.75	0.00	0.00
34	16.67	0.00	211.30	158.05	211.30	158.05	53.25	3	3	211.30	158.05	211.30	158.05	53.25	0.00	0.00
35	16.33	0.00	218.30	161.55	218.30	161.55	56.75	3	3	218.30	161.55	218.30	161.55	56.75	0.00	0.00
36	15.93	0.00	226.30	165.55	226.30	165.55	60.75	3	3	226.30	165.55	226.30	165.55	60.75	0.00	0.00
37	15.52	0.00	234.30	169.55	234.30	169.55	64.75	3	3	234.30	169.55	234.30	169.55	64.75	0.00	0.00
38	15.13	0.00	242.30	173.55	242.30	173.55	68.75	3	3	242.30	173.55	242.30	173.55	68.75	0.00	0.00
39	14.73	0.00	250.30	177.55	250.30	177.55	72.75	3	3	250.30	177.55	250.30	177.55	72.75	0.00	0.00
40	14.32	0.00	258.30	181.55	258.30	181.55	76.75	3	3	258.30	181.55	258.30	181.55	76.75	0.00	0.00
41	13.93	0.00	266.30	185.55	266.30	185.55	80.75	3	3	266.30	185.55	266.30	185.55	80.75	0.00	0.00
42	13.52	0.00	274.30	189.55	274.30	189.55	84.75	3	3	274.30	189.55	274.30	189.55	84.75	0.00	0.00

NOTE: Displacements from STAGE 0 are disregarded in later stages

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

STAGE 1 : ADD RETAINING WALL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	1	50.00	50.00	149330.
2	27.40	1	1	50.00	50.00	149330.
3	27.10	1	1	50.00	50.00	149330.
4	26.80	1	1	50.00	50.00	149330.
5	26.45	1	1	50.00	50.00	149330.
6	26.10	1	1	50.00	50.00	149330.
7	25.75	1	1	50.00	50.00	149330.
8	25.40	1	1	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
***35**	***16.33**	***2**	***2**	***50.00**	***50.00**	***0.0**
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

Wall toe level: 16.33

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 1 : Add retaining wall

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc Node max displ [mm]	No. Node error. [mm]	Disp Node no.	Press Node error [kN/m²]	no.
1	0.0	1 0.0000	1	0.00	1
2	0.0	1 0.0000	1	0.00	1
3	0.0	1 0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	0.00	1.43	1.43	0.83	0.83	0.00	1	1	1.43	1.43	0.83	0.83	0.00	0.00	0.00
2	27.40	0.00	5.70	5.70	3.31	3.31	0.00	1	1	5.70	5.70	3.31	3.31	0.00	0.00	0.00
3	27.10	0.00	11.40	11.40	6.61	6.61	0.00	1	1	11.40	11.40	6.61	6.61	0.00	0.00	0.00
4	26.80	0.00	17.10	17.10	9.92	9.92	0.00	1	1	17.10	17.10	9.92	9.92	0.00	0.00	0.00
5	26.45	0.00	23.75	23.75	13.78	13.78	0.00	1	1	23.75	23.75	13.78	13.78	0.00	0.00	0.00
6	26.10	0.00	30.40	30.40	17.63	17.63	0.00	1	1	30.40	30.40	17.63	17.63	0.00	0.00	0.00
7	25.75	0.00	37.05	37.05	21.49	21.49	0.00	1	1	37.05	37.05	21.49	21.49	0.00	0.00	0.00
8	25.40	0.00	43.70	43.70	25.35	25.35	0.00	1	1	43.70	43.70	25.35	25.35	0.00	0.00	0.00
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	0.00	0.00
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	0.00	0.00
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	0.00	0.00
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	0.00	0.00
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	0.00	0.00
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	0.00	0.00
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	0.00	0.00
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	0.00	0.00
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	0.00	0.00
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	0.00	0.00
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	0.00	0.00
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	0.00	0.00
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	0.00	0.00
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	0.00	0.00
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	0.00	0.00
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	0.00	0.00
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	0.00	0.00
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	0.00	0.00
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	0.00	0.00
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	0.00	0.00
29	18.33	0.00	178.30	141.55	178.30	141.55	*36.75*	2	2	178.30	141.55	178.30	141.55	*36.75*	0.00	0.00
30	18.00	0.00	184.80	144.80	184.80	144.80	*40.00*	2	2	184.80	144.80	184.80	144.80	*40.00*	0.00	0.00
31	17.65	0.00	191.80	148.30	191.80	148.30	*43.50*	2	2	191.80	148.30	191.80	148.30	*43.50*	0.00	0.00
32	17.35	0.00	197.80	151.30	197.80	151.30	*46.50*	2	2	197.80	151.30	197.80	151.30	*46.50*	0.00	0.00
33	17.02	0.00	204.30	154.55	204.30	154.55	*49.75*	2	2	204.30	154.55	204.30	154.55	*49.75*	0.00	0.00
34	16.67	0.00	211.30	158.05	211.30	158.05	*53.25*	2	2	211.30	158.05	211.30	158.05	*53.25*	0.00	0.00
***35**	16.33	0.00	218.30	161.55	218.30	161.55	*56.75*	2	2	218.30	161.55	218.30	161.55	*56.75*	0.00	0.00
36	15.93	0.00	226.30	165.55	226.30	165.55	*60.75*	2	2	226.30	165.55	226.30	165.55	*60.75*	0.00	0.00
37	15.52	0.00	234.30	169.55	234.30	169.55	*64.75*	2	2	234.30	169.55	234.30	169.55	*64.75*	0.00	0.00
38	15.13	0.00	242.30	173.55	242.30	173.55	*68.75*	2	2	242.30	173.55	242.30	173.55	*68.75*	0.00	0.00
39	14.73	0.00	250.30	177.55	250.30	177.55	*72.75*	2	2	250.30	177.55	250.30	177.55	*72.75*	0.00	0.00
40	14.32	0.00	258.30	181.55	258.30	181.55	*76.75*	2	2	258.30	181.55	258.30	181.55	*76.75*	0.00	0.00
41	13.93	0.00	266.30	185.55	266.30	185.55	*80.75*	2	2	266.30	185.55	266.30	185.55	*80.75*	0.00	0.00
42	13.52	0.00	274.30	189.55	274.30	189.55	*84.75*	2	2	274.30	189.55	274.30	189.55	*84.75*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

Wall toe level: 16.33

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

STAGE 2 : PROP AND SURCHARGE

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 2 : prop and surcharge

Surcharge or strut changes
Strut no 1 inserted at this stage
Strut no 10 inserted at this stage
Surcharge no. 1 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.3904	18	4.36	1
2	1.4	18	0.0085	1	2.42	2
3	1.4	18	0.0068	1	2.01	3
4	1.4	18	0.0057	1	1.45	4
5	1.4	18	0.0044	1	1.07	4
10	1.4	18	0.0005	1	0.19	6
13	1.4	18	0.0001	1	0.08	4

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	Soil	Left	Right		Stress Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN]
1	27.70	0.10	27.43	27.43	11.68	11.68	0.00	A	1	1	a	1.43	1.43	0.61	0.61	0.00	0.00	0.00
2	27.40	0.16	31.70	31.70	13.52	13.52	0.00	A	1	1		5.70	5.70	2.80	2.80	0.00	-0.50	3.27
	27.40																-0.50	-4.48
3	27.10	0.21	37.40	37.40	15.99	15.99	0.00	A	1	1		11.40	11.40	6.17	6.17	0.00	0.36	-1.40
4	26.80	0.26	43.10	43.10	18.44	18.44	0.00	A	1	1		17.10	17.10	9.41	9.41	0.00	0.34	1.54
5	26.45	0.32	49.75	49.75	21.25	21.25	0.00	A	1	1		23.75	23.75	13.19	13.19	0.00	-0.71	4.42
6	26.10	0.38	56.40	56.40	24.04	24.04	0.00	A	1	1		30.40	30.40	16.95	16.95	0.00	-2.75	7.07
7	25.75	0.44	63.05	63.05	26.84	26.84	0.00	a	1	1		37.05	37.05	20.70	20.70	0.00	-5.66	9.39
8	25.40	0.51	69.70	69.70	31.98	31.98	0.00		1	1		43.70	43.70	24.29	24.29	0.00	-9.32	11.90
	25.40																-9.32	-13.49
9	25.00	0.62	77.30	77.30	36.76	36.76	0.00		1	1		51.30	51.30	28.83	28.83	0.00	-4.50	-10.46
10	24.60	0.76	84.90	84.90	40.76	40.76	0.00		1	1		58.90	58.90	33.81	33.81	0.00	-0.95	-7.49
11	24.20	0.92	92.50	92.50	44.54	44.54	0.00		1	1		66.50	66.50	38.93	38.93	0.00	1.49	-5.05
12	23.85	1.05	99.15	99.15	47.90	47.90	0.00		1	1		73.15	73.15	43.34	43.34	0.00	2.89	-3.20
13	23.50	1.16	105.80	105.80	51.31	51.31	0.00		1	1		79.80	79.80	47.68	47.68	0.00	3.73	-1.79
14	23.17	1.24	111.98	111.98	54.50	54.50	0.00		1	1		85.98	85.98	51.67	51.67	0.00	4.11	-0.70
15	22.83	1.31	118.63	118.63	58.09	58.09	0.00		1	1		92.63	92.63	55.81	55.81	0.00	4.19	0.15
16	22.52	1.35	124.33	124.33	61.27	61.27	0.00		1	1		98.33	98.33	59.26	59.26	0.00	4.04	0.84
17	22.17	1.37	130.98	130.98	64.80	64.80	0.00		1	1		104.98	104.98	63.45	63.45	0.00	3.63	1.40
18	21.83	1.38	137.63	135.88	69.78	68.03	1.75		1	1		111.63	109.88	67.67	65.92	1.75	3.05	1.93
19	21.62	1.37	141.52	137.72	73.28	69.48	3.80		1	1		115.52	111.72	70.44	66.64	3.80	2.60	2.54
20	21.38	1.35	146.08	139.88	65.37	59.17	6.20		4	4		120.08	113.88	67.41	61.21	6.20	1.91	2.59
21	21.10	1.33	151.40	142.40	68.87	59.87	9.00		4	4		125.40	116.40	71.99	62.99	9.00	1.26	1.87
22	20.80	1.30	157.10	145.10	73.68	61.68	12.00		4	4		131.10	119.10	75.86	63.86	12.00	0.83	1.07
23	20.45	1.26	163.75	148.25	79.06	63.56	15.50		4	4		137.75	122.25	80.65	65.15	15.50	0.59	0.41
24	20.05	1.21	171.35	151.85	85.15	65.65	19.50		4	4		145.35	125.85	86.17	66.67	19.50	0.54	-0.09
25	19.65	1.16	178.95	155.45	91.39	67.89	23.50		4	4		152.95	129.45	91.56	68.06	23.50	0.66	-0.32
26	19.30	1.11	185.60	158.60	97.11	70.11	27.00		4	4		159.60	132.60	96.03	69.03	27.00	0.78	-0.17
27	18.98	1.06	191.78	161.53	102.60	72.35	30.25		4	4		165.78	135.53	99.92	69.67	30.25	0.78	0.43
28	18.67	1.01	197.48	164.23	104.51	71.26	33.25		4	4		171.48	138.23	106.36	73.11	33.25	0.52	0.55
29	18.33	0.94	204.30	147.06	193.59	136.35	*57.24*		2	2		178.30	136.40	188.83	146.92	*41.90*	0.44	1.05
30	18.00	0.88	210.80	152.32	196.33	137.85	*58.48*		2	2		184.80	137.81	199.19	152.20	*46.99*	-0.17	1.37
31	17.65	0.82	217.80	155.97	203.03	141.20	*61.83*		2	2		191.80	141.15	206.51	155.86	*50.65*	-0.48	0.32
32	17.35	0.77	223.80	158.27	210.33	144.80	*65.53*		2	2		197.80	144.76	211.22	158.18	*53.04*	-0.41	-0.38
33	17.02	0.72	230.30	161.18	217.45	148.33	*69.12*		2	2		204.30	148.30	217.10	161.10	*56.00*	-0.24	-0.46
34	16.67	0.66	237.30	164.67	224.46	151.83	*72.63*		2	2		211.30	151.80	224.10	164.59	*59.50*	-0.10	-0.34
***35**	16.33	0.61	244.30	168.07	231.65	155.42	*76.23*		2	2		218.30	155.38	230.91	167.99	*62.92*	0.00	0.00
36	15.93	0.55	252.30	172.26	239.28	159.24	*80.04*		2	2		226.30	159.20	239.28	172.18	*67.10*	0.00	0.00
37	15.52	0.49	260.30	176.26	247.28	163.23	*84.04*		2	2		234.30	163.20	247.28	176.18	*71.10*	0.00	0.00
38	15.13	0.42	268.30	180.25	255.28	167.23	*88.05*		2	2		242.30	167.20	255.28	180.17	*75.10*	0.00	0.00
39	14.73	0.34	276.30	184.25	263.27	171.22	*92.05*		2	2		250.30	171.20	263.27	184.17	*79.10*	0.00	0.00
40	14.32	0.26	284.30	188.25	271.27	175.21	*96.05*		2	2		258.30	175.19	271.27	188.16	*83.11*	0.00	0.00
41	13.93	0.16	292.30	192.25	279.25	179.20	*100.05*		2	2		266.30	179.20	279.25	192.15	*87.10*	0.00	0.00
42	13.52	0.00	300.30	196.22	287.30	183.22	*104.08*		2	2		274.30	183.17	287.30	196.17	*91.13*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	7.75	7.75	0.00	7.75
10	8	25.39	25.39	0.00	25.39

STAGE 3 : TAKE OUT PROP AT GROUND LEVEL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	149330.
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	1	50.00	50.00	21120.
10	24.60	1	1	50.00	50.00	21120.
11	24.20	1	1	50.00	50.00	21120.
12	23.85	1	1	50.00	50.00	21120.
13	23.50	1	1	50.00	50.00	21120.
14	23.17	1	1	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
***35**	***16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

Wall toe level: 16.33

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 3 : take out prop at ground level

Surcharge or strut changes
Strut no. 1 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 120430. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	2.5113	1	6.89	9
2	2.5	1	0.1221	1	4.44	1
3	2.6	1	0.1042	1	2.73	2
4	2.7	1	0.0950	1	2.24	3
5	2.8	1	0.0862	1	1.70	4
10	3.2	1	0.0344	1	0.60	7
15	3.3	1	0.0064	1	0.16	7
17	3.3	1	0.0020	1	0.05	4

Ground level left = 27.70 Ground level right = 25.20

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right		Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	3.38	27.43	27.43	11.68	11.68	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	3.17	31.70	31.70	13.51	13.51	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-0.53	3.78
3	27.10	2.97	37.40	37.40	15.96	15.96	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-2.27	8.20
4	26.80	2.77	43.10	43.10	18.41	18.41	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-5.45	13.59
5	26.45	2.54	49.75	49.75	21.23	21.23	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-11.25	20.29
6	26.10	2.32	56.40	56.40	24.03	24.03	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-19.65	28.21
7	25.75	2.12	63.05	63.05	26.82	26.82	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	-31.00	37.11
8	25.40	1.94	69.70	69.70	29.76	29.76	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-45.63	47.38
	25.40																-45.63	-49.51
9	25.00	1.90	77.30	77.30	38.83	38.83	0.00		1	1	p	3.80	3.80	10.07	10.07	0.00	-28.06	-38.17
10	24.60	2.09	84.90	84.90	42.70	42.70	0.00		1	1		11.40	11.40	26.04	26.04	0.00	-15.09	-29.09
11	24.20	2.39	92.50	92.50	45.56	45.56	0.00		1	1		19.00	19.00	26.53	26.53	0.00	-4.79	-22.19
12	23.85	2.69	99.15	99.15	47.89	47.89	0.00		1	1		25.65	25.65	31.05	31.05	0.00	1.73	-15.68
13	23.50	2.98	105.80	105.80	50.27	50.27	0.00		1	1		32.30	32.30	36.23	36.23	0.00	6.19	-10.36
14	23.17	3.22	111.98	111.98	52.53	52.53	0.00		1	1		38.48	38.48	41.06	41.06	0.00	8.79	-6.05
15	22.83	3.43	118.63	118.63	55.33	55.33	0.00		1	1		45.12	45.12	46.02	46.02	0.00	10.23	-2.61
16	22.52	3.57	124.33	124.33	58.00	58.00	0.00		1	1		50.83	50.83	50.03	50.03	0.00	10.56	0.20
17	22.17	3.67	130.98	130.98	60.71	60.71	0.00		1	1		57.48	57.48	55.13	55.13	0.00	10.03	2.47
18	21.83	3.71	137.63	135.88	65.93	64.18	1.75		1	1		64.12	62.37	59.63	57.88	1.75	8.82	4.33
19	21.62	3.71	141.52	137.72	69.70	65.90	3.80		1	1		68.02	64.22	61.94	58.14	3.80	7.76	6.06
20	21.38	3.69	146.08	139.88	58.11	51.91	6.20		4	4		72.58	66.38	62.19	55.99	6.20	6.09	6.40
21	21.10	3.65	151.40	142.40	60.99	51.99	9.00		4	4		77.90	68.90	67.75	58.75	9.00	4.45	4.89
22	20.80	3.59	157.10	145.10	66.18	54.18	12.00		4	4		83.60	71.60	71.40	59.40	12.00	3.28	3.06
23	20.45	3.49	163.75	148.25	71.84	56.34	15.50		4	4		90.25	74.75	75.76	60.26	15.50	2.51	1.47
24	20.05	3.37	171.35	151.85	78.27	58.77	19.50		4	4		97.85	78.35	81.04	61.54	19.50	2.21	0.19
25	19.65	3.23	178.95	155.45	85.18	61.68	23.50		4	4		105.45	81.95	85.90	62.40	23.50	2.36	-0.50
26	19.30	3.09	185.60	158.60	91.98	64.98	27.00		4	4		112.10	85.10	89.02	62.02	27.00	2.58	-0.14
27	18.98	2.95	191.78	161.53	98.98	68.73	30.25		4	4		118.27	88.02	91.25	61.00	30.25	2.46	1.57
28	18.67	2.81	197.48	164.23	97.30	64.05	33.25		4	4		123.98	90.73	102.25	69.00	33.25	1.63	1.98
29	18.33	2.64	204.30	157.58	174.69	127.97	*46.72*		2	2		130.80	127.02	161.80	158.02	*3.78*	1.22	3.35
30	18.00	2.47	210.80	167.12	170.59	126.91	*43.68*		2	2		137.30	125.40	179.63	167.74	*11.90*	-0.57	3.99
31	17.65	2.29	217.80	171.07	176.76	130.03	*46.73*		2	2		144.30	128.77	186.85	171.31	*15.53*	-1.44	0.83
32	17.35	2.15	223.80	171.85	186.35	134.40	*51.95*		2	2		150.30	133.45	188.78	171.93	*16.85*	-1.20	-1.19
33	17.02	2.01	230.30	174.09	194.48	138.27	*56.21*		2	2		156.80	137.48	193.38	174.07	*19.32*	-0.69	-1.38
34	16.67	1.86	237.30	177.63	201.35	141.68	*59.67*		2	2		163.80	141.08	200.09	177.37	*22.72*	-0.27	-0.98
35	16.33	1.72	244.30	180.92	208.64	145.26	*63.38*		2	2		170.80	144.76	206.61	180.57	*26.04*	0.00	0.00
36	15.93	1.55	252.30	185.54	215.51	148.76	*66.76*		2	2		178.80	148.33	215.51	185.05	*30.47*	0.00	0.00
37	15.52	1.37	260.30	189.60	223.35	152.65	*70.70*		2	2		186.80	152.38	223.35	188.93	*34.42*	0.00	0.00
38	15.13	1.18	268.30	193.64	231.22	156.56	*74.66*		2	2		194.80	156.41	231.22	192.82	*38.39*	0.00	0.00
39	14.73	0.97	276.30	197.65	239.13	160.48	*78.65*		2	2		202.80	160.42	239.13	196.75	*42.38*	0.00	0.00
40	14.32	0.73	284.30	201.71	246.96	164.38	*82.59*		2	2		210.80	164.47	246.96	200.63	*46.33*	0.00	0.00
41	13.93	0.44	292.30	205.75	254.85	168.29	*86.55*		2	2		218.80	168.49	254.85	204.54	*50.31*	0.00	0.00
42	13.52	0.00	300.30	209.26	263.63	172.59	*91.04*		2	2		226.80	172.12	263.63	208.95	*54.68*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

Wall toe level: 16.33

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				7.75
10	8	96.89	96.89	0.00	96.89

STAGE 4 : BASEMENT EXCAVATION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	149330.
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	0	50.00	50.00	21120.
10	24.60	1	0	50.00	50.00	21120.

Fitzrovia

280mm dia Contigous Wall

DA1C2 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
11	24.20	1	0	50.00	50.00	21120.
12	23.85	1	0	50.00	50.00	21120.
13	23.50	1	0	50.00	50.00	21120.
14	23.17	1	0	50.00	50.00	21120.
15	22.83	1	0	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
*	*35 16.33*	*2*	*2*	*50.00*	*50.00*	*0.0*
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

** Wall toe level: 16.33*

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	25.40	0.00	5.00	25.40	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	0.00	0.00	0.00	0.00	0.00	0.00

RESULTS FOR STAGE 4 : basement excavation

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 153840. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	5.1828	15	30.49	16
2	5.2	15	0.1955	15	31.99	17
3	5.4	15	0.1353	15	23.64	19
4	5.5	15	0.1122	16	24.80	19
5	5.6	15	0.0896	16	18.68	19
10	5.9	15	0.0321	18	3.23	21
15	6.0	15	0.0074	18	0.59	19
20	6.0	15	0.0012	13	0.49	20
30	6.0	15	0.0014	19	0.16	20
33	6.0	15	0.0011	19	0.06	20

Ground level left = 27.70 Ground level right = 22.67

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN]
1	27.70	-0.97	27.43	27.43	24.52	24.52	0.00		1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	-0.46	31.70	31.70	19.61	19.61	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-1.10	6.62
3	27.10	0.05	37.40	37.40	23.50	23.50	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-3.97	13.09
4	26.80	0.57	43.10	43.10	25.71	25.71	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-8.95	20.79
5	26.45	1.17	49.75	49.75	28.25	28.25	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-17.69	29.91
6	26.10	1.79	56.40	56.40	30.28	30.28	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-29.89	40.15
7	25.75	2.44	63.05	63.05	32.09	32.09	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-45.80	51.07
8	25.40	3.12	69.70	69.70	34.30	34.30	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-65.64	63.11
	25.40															-65.64	-92.94
9	25.00	4.14	77.30	77.30	40.58	40.58	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-31.04	-78.39
10	24.60	5.39	84.90	84.90	40.33	40.33	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-2.92	-62.21
11	24.20	6.68	92.50	92.50	38.66	38.66	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	18.73	-46.90
12	23.85	7.70	99.15	99.15	37.62	37.62	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	32.61	-33.06
13	23.50	8.54	105.80	105.80	37.30	37.30	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	41.88	-20.19
14	23.17	9.10	111.98	111.98	37.45	37.45	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	46.39	-7.57
15	22.83	9.45	118.63	118.63	39.64	39.64	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	46.83	5.19
16	22.52	9.54	124.33	124.33	42.60	42.60	0.00	a	1	1 P	2.85	2.85	7.55	7.55	0.00	43.34	17.33
17	22.17	9.41	130.98	130.98	45.35	45.35	0.00	a	1	1 P	9.50	9.50	25.16	25.16	0.00	35.28	26.56
18	21.83	9.08	137.63	135.88	56.25	54.50	1.75	a	1	1 P	16.15	14.40	39.89	38.14	1.75	24.75	32.36
19	21.62	8.82	141.52	137.72	63.68	59.88	3.80		1	1 P	20.04	16.24	46.82	43.02	3.80	17.65	36.51
20	21.38	8.47	146.08	139.88	42.44	36.24	6.20	a	4	4 P	24.61	18.41	78.97	72.77	6.20	8.44	33.63
21	21.10	8.03	151.40	142.40	54.33	45.33	9.00	A	4	4 P	29.92	20.93	91.73	82.73	9.00	0.35	23.46
22	20.80	7.56	157.10	145.10	58.18	46.18	12.00	A	4	4	35.63	23.63	93.20	81.20	12.00	-5.06	12.35
23	20.45	7.03	163.75	148.25	62.68	47.18	15.50	A	4	4	42.27	26.77	80.91	65.41	15.50	-7.39	3.24
24	20.05	6.48	171.35	151.85	67.81	48.31	19.50	A	4	4	49.88	30.38	80.99	61.49	19.50	-7.32	-2.82
25	19.65	5.98	178.95	155.45	79.44	55.94	23.50		4	4	57.48	33.98	82.49	58.99	23.50	-5.14	-6.02
26	19.30	5.58	185.60	158.60	89.99	62.99	27.00		4	4	64.13	37.13	83.45	56.45	27.00	-2.83	-5.49
27	18.98	5.22	191.78	161.53	99.54	69.29	30.25		4	4	70.30	40.05	81.46	51.21	30.25	-1.40	-1.57
28	18.67	4.89	197.48	164.23	91.90	58.65	33.25		4	4	76.00	42.75	92.75	59.50	33.25	-1.78	1.12
29	18.33	4.52	204.30	169.26	155.58	120.54	*35.04*		2	2	82.82	116.93	138.40	172.50	*-34.10*	-2.13	3.88
30	18.00	4.19	210.80	184.18	144.39	117.77	*26.62*		2	2	89.33	113.64	162.58	186.89	*-24.31*	-4.33	3.71
31	17.65	3.86	217.80	187.44	151.50	121.14	*30.36*		2	2	96.33	117.95	166.82	188.45	*-21.62*	-4.56	-1.85
32	17.35	3.60	223.80	185.89	164.07	126.16	*37.91*		2	2	102.32	123.60	165.29	186.57	*-21.28*	-3.25	-4.53
33	17.02	3.36	230.30	187.43	173.01	130.14	*42.87*		2	2	108.83	128.05	168.43	187.65	*-19.22*	-1.72	-3.95
34	16.67	3.11	237.30	191.43	179.09	133.22	*45.87*		2	2	115.83	131.63	175.01	190.81	*-15.80*	-0.61	-2.46
*35	16.33	2.87	244.30	194.83	186.08	136.61	*49.47*		2	2	122.82	135.28	181.42	193.88	*-12.45*	0.00	0.00
36	15.93	2.59	252.30	200.42	191.46	139.57	*51.88*		2	2	130.83	138.39	191.46	199.02	*-7.57*	0.00	0.00
37	15.52	2.29	260.30	204.52	199.12	143.34	*55.78*		2	2	138.83	142.44	199.12	202.73	*-3.62*	0.00	0.00
38	15.13	1.97	268.30	208.58	206.85	147.13	*59.72*		2	2	146.83	146.47	206.85	206.49	*0.36*	0.00	0.00
39	14.73	1.62	276.30	212.62	214.62	150.94	*63.68*		2	2	154.83	150.48	214.62	210.28	*4.34*	0.00	0.00
40	14.32	1.22	284.30	216.73	222.30	154.72	*67.57*		2	2	162.83	154.54	222.30	214.02	*8.28*	0.00	0.00
41	13.93	0.74	292.30	220.81	230.02	158.52	*71.49*		2	2	170.83	158.59	230.02	217.79	*12.23*	0.00	0.00
42	13.52	0.00	300.30	223.57	239.83	163.10	*76.73*		2	2	178.83	161.79	239.83	222.79	*17.04*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

** Wall toe level: 16.33*

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

Surcharge 1 present in this stage

Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2				7.75
10	8	156.05	156.05	0.00	156.05

STAGE 5 : ADD B1 BASE SLAB

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	149330.
2	27.40	1	0	50.00	50.00	149330.
3	27.10	1	0	50.00	50.00	149330.
4	26.80	1	0	50.00	50.00	149330.
5	26.45	1	0	50.00	50.00	149330.
6	26.10	1	0	50.00	50.00	149330.
7	25.75	1	0	50.00	50.00	149330.
8	25.40	1	0	50.00	50.00	21120.
9	25.00	1	0	50.00	50.00	21120.
10	24.60	1	0	50.00	50.00	21120.
11	24.20	1	0	50.00	50.00	21120.
12	23.85	1	0	50.00	50.00	21120.
13	23.50	1	0	50.00	50.00	21120.
14	23.17	1	0	50.00	50.00	21120.
15	22.83	1	1	50.00	50.00	21120.
16	22.52	1	1	50.00	50.00	21120.
17	22.17	1	1	50.00	50.00	21120.
18	21.83	1	1	50.00	50.00	21120.
19	21.62	1	1	50.00	50.00	21120.
20	21.38	4	4	50.00	50.00	21120.
21	21.10	4	4	50.00	50.00	21120.
22	20.80	4	4	50.00	50.00	21120.
23	20.45	4	4	50.00	50.00	21120.
24	20.05	4	4	50.00	50.00	21120.
25	19.65	4	4	50.00	50.00	21120.
26	19.30	4	4	50.00	50.00	21120.
27	18.98	4	4	50.00	50.00	21120.
28	18.67	4	4	50.00	50.00	21120.
29	18.33	2	2	50.00	50.00	21120.
30	18.00	2	2	50.00	50.00	21120.
31	17.65	2	2	50.00	50.00	10479.
32	17.35	2	2	50.00	50.00	10479.
33	17.02	2	2	50.00	50.00	10479.
34	16.67	2	2	50.00	50.00	10479.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

** **Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 5 : Add B1 base slab

Surcharge or strut changes
Strut no 8 inserted at this stage
Surcharge no. 2 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.2249	24	0.00	1
2	0.2	24	0.0023	19	2.10	20
3	0.2	24	0.0012	19	0.86	20
4	0.2	25	0.0010	19	0.37	21
5	0.2	25	0.0006	19	0.20	21
7	0.2	25	0.0001	17	0.05	20

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kN/m]	SF [kN]
1	27.70	-0.98	27.43	27.43	24.48	24.48	0.00		1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	-0.47	31.70	31.70	19.62	19.62	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-1.10	6.62
3	27.10	0.04	37.40	37.40	23.48	23.48	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-3.97	13.08
4	26.80	0.56	43.10	43.10	25.67	25.67	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-8.95	20.77
5	26.45	1.17	49.75	49.75	28.19	28.19	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-17.68	29.88
6	26.10	1.79	56.40	56.40	30.18	30.18	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-29.86	40.09
7	25.75	2.44	63.05	63.05	31.94	31.94	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-45.75	50.96
8	25.40	3.13	69.70	69.70	34.12	34.12	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-65.54	62.95
	25.40															-65.54	-93.52
9	25.00	4.15	77.30	77.30	40.33	40.33	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-30.69	-79.05
10	24.60	5.40	84.90	84.90	40.00	40.00	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-2.30	-62.99
11	24.20	6.69	92.50	92.50	38.26	38.26	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	19.70	-47.81
12	23.85	7.70	99.15	99.15	37.17	37.17	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	33.92	-34.13
13	23.50	8.52	105.80	105.80	36.86	36.86	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	43.59	-21.41
	23.50															43.59	-17.70
14	23.17	9.06	111.98	111.98	37.11	37.11	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	47.32	-5.22
15	22.83	9.38	118.63	118.63	39.47	39.47	0.00	a	1	1	3.32	3.32	2.18	2.18	0.00	46.96	7.10
16	22.52	9.44	124.33	124.33	42.58	42.58	0.00	a	1	1	9.03	9.03	9.33	9.33	0.00	43.01	18.56
17	22.17	9.28	130.98	130.98	45.51	45.51	0.00	a	1	1	15.68	15.68	26.90	26.90	0.00	34.62	27.22
18	21.83	8.93	137.63	135.88	56.57	54.82	1.75	a	1	1	22.32	20.57	41.53	39.78	1.75	23.95	32.57
19	21.62	8.65	141.52	137.72	64.07	60.27	3.80		1	1	26.22	22.42	48.34	44.54	3.80	16.85	36.40
20	21.38	8.28	146.08	139.88	45.60	39.40	6.20	a	4	4	30.78	24.58	80.18	73.98	6.20	7.69	33.66
21	21.10	7.83	151.40	142.40	54.25	45.25	9.00	a	4	4	36.10	27.10	92.77	83.77	9.00	-0.47	23.57
22	20.80	7.35	157.10	145.10	58.53	46.53	12.00	A	4	4	41.80	29.80	94.16	82.16	12.00	-5.87	12.20
23	20.45	6.81	163.75	148.25	63.44	47.94	15.50		4	4	48.45	32.95	81.77	66.27	15.50	-8.11	2.97
24	20.05	6.26	171.35	151.85	68.67	49.17	19.50		4	4	56.05	36.55	81.75	62.25	19.50	-7.92	-3.09
25	19.65	5.76	178.95	155.45	80.30	56.80	23.50		4	4	63.65	40.15	83.21	59.71	23.50	-5.64	-6.25
26	19.30	5.36	185.60	158.60	90.78	63.78	27.00		4	4	70.30	43.30	84.17	57.17	27.00	-3.27	-5.68
27	18.98	5.00	191.78	161.53	100.21	69.96	30.25		4	4	76.48	46.23	82.39	52.14	30.25	-1.78	-1.78
28	18.67	4.68	197.48	164.23	92.93	59.68	33.25		4	4	82.18	48.93	93.28	60.03	33.25	-2.08	0.95
29	18.33	4.32	204.30	168.09	157.92	121.71	*36.21*		2	2	89.00	118.25	141.93	171.18	*-29.25*	-2.40	3.59
30	18.00	4.00	210.80	182.60	147.55	119.35	*28.20*		2	2	95.50	115.42	165.18	185.10	*-19.92*	-4.44	3.31
31	17.65	3.68	217.80	185.78	154.83	122.81	*32.02*		2	2	102.50	119.74	169.42	186.66	*-17.24*	-4.56	-2.04
32	17.35	3.43	223.80	184.33	167.19	127.72	*39.47*		2	2	108.50	125.28	168.12	184.90	*-16.78*	-3.23	-4.55
33	17.02	3.20	230.30	185.93	176.02	131.65	*44.37*		2	2	115.00	129.64	171.42	186.06	*-14.64*	-1.71	-3.92
34	16.67	2.96	237.30	189.91	182.12	134.73	*47.39*		2	2	122.00	133.18	178.07	189.26	*-11.18*	-0.61	-2.44

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
***35**	16.33	2.73	244.30	193.30	189.14	138.14	*51.00*	2	2	129.00	136.82	184.53	192.34	*-7.82*	0.00	0.00
36	15.93	2.47	252.30	198.86	194.56	141.12	*53.44*	2	2	137.00	139.93	194.56	197.49	*-2.93*	0.00	0.00
37	15.52	2.18	260.30	202.95	202.25	144.90	*57.35*	2	2	145.00	143.96	202.25	201.21	*1.04*	0.00	0.00
38	15.13	1.87	268.30	207.01	210.00	148.71	*61.29*	2	2	153.00	147.98	210.00	204.98	*5.02*	0.00	0.00
39	14.73	1.54	276.30	211.04	217.79	152.53	*65.26*	2	2	161.00	151.99	217.79	208.78	*9.01*	0.00	0.00
40	14.32	1.16	284.30	215.14	225.48	156.31	*69.16*	2	2	169.00	156.04	225.48	212.52	*12.96*	0.00	0.00
41	13.93	0.71	292.30	219.20	233.22	160.13	*73.10*	2	2	177.00	160.08	233.22	216.30	*16.92*	0.00	0.00
42	13.52	0.00	300.30	222.04	242.90	164.63	*78.26*	2	2	185.00	163.34	242.90	221.24	*21.66*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

***** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				7.75
8	13	-3.70	-3.70	0.00	3.70
10	8	156.47	156.47	0.00	156.47

STAGE 6 : REMOVE PROP1

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 6 : Remove prop1

Surcharge or strut changes
Strut no 9 inserted at this stage
Strut no. 10 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	3.1354	9	0.00	1
2	3.1	9	0.0127	23	5.66	14
3	3.1	9	0.0134	23	4.44	16
4	3.1	9	0.0125	23	3.44	16
5	3.1	9	0.0107	23	2.56	17
10	3.1	9	0.0026	25	1.59	19
15	3.1	9	0.0017	18	0.94	13
20	3.1	9	0.0006	24	0.29	14
29	3.1	9	0.0002	25	0.08	19

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil	Left	Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	-0.76	27.43	27.43	27.34	27.34	0.00		1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	0.16	31.70	31.70	21.85	21.85	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-1.23	7.38
3	27.10	1.07	37.40	37.40	24.95	24.95	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-4.43	14.40
4	26.80	1.99	43.10	43.10	26.41	26.41	0.00		1	0	0.00	0.00	0.00	0.00	0.00	-9.87	22.43
	26.80															-9.87	-49.28
5	26.45	3.07	49.75	49.75	27.35	27.35	0.00		1	0	0.00	0.00	0.00	0.00	0.00	5.88	-40.20
6	26.10	4.15	56.40	56.40	27.15	27.15	0.00		1	0	0.00	0.00	0.00	0.00	0.00	18.27	-30.67
7	25.75	5.21	63.05	63.05	26.33	26.33	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	27.34	-21.31
8	25.40	6.25	69.70	69.70	23.62	23.62	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	33.19	-12.27
9	25.00	7.29	77.30	77.30	26.90	26.90	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	36.32	-2.46
10	24.60	8.06	84.90	84.90	29.06	29.06	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	35.16	8.73
11	24.20	8.57	92.50	92.50	32.00	32.00	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	29.34	20.54
12	23.85	8.84	99.15	99.15	35.82	35.82	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	20.05	32.81
13	23.50	9.00	105.80	105.80	43.03	43.03	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	6.38	46.33
	23.50															6.38	-43.07
14	23.17	9.09	111.98	111.98	47.70	47.70	0.00	a	1	0	0.00	0.00	0.00	0.00	0.00	18.02	-27.76
15	22.83	9.09	118.63	118.63	50.54	50.54	0.00	A	1	1	3.32	3.32	3.13	3.13	0.00	24.92	-12.01
16	22.52	8.98	124.33	124.33	52.98	52.98	0.00	A	1	1	9.03	9.03	9.21	9.21	0.00	26.21	2.81
17	22.17	8.71	130.98	130.98	55.83	55.83	0.00	A	1	1	15.68	15.68	25.79	25.79	0.00	22.73	15.18
18	21.83	8.32	137.63	135.88	59.67	57.92	1.75	A	1	1	22.32	20.57	39.77	38.02	1.75	15.58	23.20
19	21.62	8.04	141.52	137.72	62.54	58.74	3.80	A	1	1	26.22	22.42	46.32	42.52	3.80	10.25	27.77
20	21.38	7.69	146.08	139.88	50.73	44.53	6.20	A	4	4	30.78	24.58	76.90	70.70	6.20	3.16	26.17
21	21.10	7.28	151.40	142.40	55.64	46.64	9.00		4	4	36.10	27.10	89.67	80.67	9.00	-3.22	17.83
22	20.80	6.85	157.10	145.10	61.26	49.26	12.00		4	4	41.80	29.80	91.74	79.74	12.00	-7.09	7.95
23	20.45	6.38	163.75	148.25	65.57	50.07	15.50		4	4	48.45	32.95	79.81	64.31	15.50	-8.14	0.32
24	20.05	5.90	171.35	151.85	70.10	50.60	19.50		4	4	56.05	36.55	80.31	60.81	19.50	-7.20	-4.39
25	19.65	5.47	178.95	155.45	81.02	57.52	23.50		4	4	63.65	40.15	82.34	58.84	23.50	-4.63	-6.68
26	19.30	5.12	185.60	158.60	90.93	63.93	27.00		4	4	70.30	43.30	83.81	56.81	27.00	-2.20	-5.72
27	18.98	4.81	191.78	161.53	99.77	69.52	30.25		4	4	76.48	46.23	82.88	52.63	30.25	-0.73	-1.88
28	18.67	4.53	197.48	164.23	92.69	59.44	33.25		4	4	82.18	48.93	94.07	60.82	33.25	-0.96	0.53
29	18.33	4.21	204.30	167.65	158.80	122.15	*36.65*		2	2	89.00	118.86	140.71	170.57	*-29.86*	-1.07	3.36
30	18.00	3.92	210.80	182.06	148.63	119.89	*28.74*		2	2	95.50	116.11	163.80	184.41	*-20.61*	-3.15	3.85
31	17.65	3.62	217.80	185.65	155.09	122.94	*32.15*		2	2	102.50	119.86	169.17	186.54	*-17.36*	-3.60	-1.00
32	17.35	3.39	223.80	184.51	166.91	127.62	*39.29*		2	2	108.50	125.11	168.56	185.17	*-16.61*	-2.62	-3.54
33	17.02	3.16	230.30	186.17	175.64	131.51	*44.13*		2	2	115.00	129.42	171.98	186.40	*-14.42*	-1.38	-3.18
34	16.67	2.93	237.30	190.06	181.88	134.65	*47.24*		2	2	122.00	133.02	178.49	189.51	*-11.02*	-0.48	-1.97
***35**	16.33	2.71	244.30	193.54	188.76	138.01	*50.76*		2	2	129.00	136.59	185.08	192.68	*-7.59*	0.00	0.00
36	15.93	2.45	252.30	198.82	194.65	141.17	*53.48*		2	2	137.00	139.89	194.65	197.54	*-2.89*	0.00	0.00
37	15.52	2.17	260.30	202.91	202.35	144.95	*57.39*		2	2	145.00	143.92	202.35	201.27	*1.08*	0.00	0.00
38	15.13	1.86	268.30	206.95	210.11	148.76	*61.35*		2	2	153.00	147.93	210.11	205.05	*5.07*	0.00	0.00
39	14.73	1.53	276.30	210.97	217.92	152.59	*65.33*		2	2	161.00	151.93	217.92	208.86	*9.07*	0.00	0.00
40	14.32	1.15	284.30	215.05	225.65	156.40	*69.25*		2	2	169.00	155.97	225.65	212.62	*13.03*	0.00	0.00
41	13.93	0.70	292.30	219.08	233.46	160.25	*73.22*		2	2	177.00	159.98	233.46	216.44	*17.02*	0.00	0.00
42	13.52	0.00	300.30	222.04	242.90	164.63	*78.26*		2	2	185.00	163.34	242.90	221.24	*21.66*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

***** Wall toe level: 16.33***

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				7.75
8	13	89.40	89.40	0.00	89.40
9	4	71.72	71.72	0.00	71.72
10	8				156.47

STAGE 7 : ACCIDENTAL GROUNDWATER RISE

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	27.00	0.00	10.00
2	22.50	45.00	10.00
3	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 7 : accidental groundwater rise

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 94320. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.5978	9	0.00	1
2	0.6	9	0.0000	9	0.00	1
3	0.6	9	0.0000	9	0.00	1

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	-0.77	27.43	27.43	27.95	27.95	0.00	1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	0.23	31.70	31.70	22.31	22.31	0.00	1	0	0.00	0.00	0.00	0.00	0.00	-1.26	7.54
3	27.10	1.22	37.36	37.36	25.31	25.31	0.00	1	0	0.00	0.00	0.00	0.00	0.00	-4.52	14.69
4	26.80	2.22	43.10	41.10	28.19	26.19	2.00	1	0	0.00	0.00	0.00	0.00	0.00	-10.07	23.07
	26.80														-10.07	-59.89
5	26.45	3.39	49.75	44.25	31.54	26.04	5.50	1	0	0.00	0.00	0.00	0.00	0.00	9.29	-49.79
6	26.10	4.55	56.40	47.40	33.67	24.67	9.00	1	0	0.00	0.00	0.00	0.00	0.00	24.78	-38.38
7	25.75	5.69	63.05	50.55	35.13	22.63	12.50	1	0	0.00	0.00	0.00	0.00	0.00	36.15	-26.34
8	25.40	6.80	69.70	53.70	34.44	18.44	16.00 a	1	0	0.00	0.00	0.00	0.00	0.00	43.22	-13.73
9	25.00	7.89	77.30	57.30	40.14	20.14	20.00 a	1	0	0.00	0.00	0.00	0.00	0.00	46.13	0.76
10	24.60	8.63	84.90	60.90	45.47	21.47	24.00 a	1	0	0.00	0.00	0.00	0.00	0.00	42.61	17.88
11	24.20	9.06	92.50	64.50	52.13	24.13	28.00 a	1	0	0.00	0.00	0.00	0.00	0.00	31.83	36.75
12	23.85	9.24	99.15	67.65	59.59	28.09	31.50 a	1	0	0.00	0.00	0.00	0.00	0.00	15.54	56.95
13	23.50	9.34	105.80	70.80	70.21	35.21	35.00	1	0	0.00	0.00	0.00	0.00	0.00	-8.04	79.23
	23.50														-8.04	-76.80
14	23.17	9.43	111.98	73.73	76.84	38.59	38.25	1	0	0.00	0.00	0.00	0.00	0.00	13.07	-51.98
15	22.83	9.47	118.63	76.88	81.48	39.73	41.75	1	1	3.32	3.32	3.46	3.46	0.00	26.73	-26.34
16	22.52	9.38	124.33	79.58	85.59	40.84	44.75	1	1	9.03	9.03	9.63	9.63	0.00	30.82	-1.32
17	22.17	9.13	130.98	115.23	66.33	50.58	15.75	1	1	15.68	15.68	26.69	26.69	0.00	26.97	17.96
18	21.83	8.71	137.63	135.88	58.62	56.87	1.75 a	1	1	22.32	20.57	40.86	39.11	1.75	18.25	27.37
19	21.62	8.42	141.52	137.72	61.56	57.76	3.80 a	1	1	26.22	22.42	47.45	43.65	3.80	12.13	31.40
20	21.38	8.05	146.08	139.88	49.43	43.23	6.20 a	4	4	30.78	24.58	78.64	72.44	6.20	4.22	29.17
21	21.10	7.60	151.40	142.40	54.15	45.15	9.00 a	4	4	36.10	27.10	91.22	82.22	9.00	-2.88	20.00
22	20.80	7.13	157.10	145.10	60.13	48.13	12.00	4	4	41.80	29.80	92.88	80.88	12.00	-7.27	9.30
23	20.45	6.62	163.75	148.25	64.83	49.33	15.50	4	4	48.45	32.95	80.71	65.21	15.50	-8.66	1.00
24	20.05	6.10	171.35	151.85	69.73	50.23	19.50	4	4	56.05	36.55	80.96	61.46	19.50	-7.87	-4.22
25	19.65	5.63	178.95	155.45	81.01	57.51	23.50	4	4	63.65	40.15	82.73	59.23	23.50	-5.29	-6.79
26	19.30	5.25	185.60	158.60	91.22	64.22	27.00	4	4	70.30	43.30	83.96	56.96	27.00	-2.80	-5.89
27	18.98	4.92	191.78	161.53	100.34	70.09	30.25	4	4	76.48	46.23	82.62	52.37	30.25	-1.28	-1.90
28	18.67	4.62	197.48	164.23	92.87	59.62	33.25	4	4	82.18	48.93	93.57	60.32	33.25	-1.54	0.76
29	18.33	4.28	204.30	167.93	158.35	121.98	*36.37*	2	2	89.00	118.61	141.35	170.96	*-29.61*	-1.77	3.51
30	18.00	3.97	210.80	182.45	148.05	119.70	*28.35*	2	2	95.50	115.83	164.59	184.92	*-20.33*	-3.84	3.59
31	17.65	3.66	217.80	185.74	154.96	122.90	*32.06*	2	2	102.50	119.79	169.36	186.65	*-17.29*	-4.12	-1.54
32	17.35	3.42	223.80	184.43	167.08	127.71	*39.37*	2	2	108.50	125.20	168.37	185.07	*-16.70*	-2.95	-4.09
33	17.02	3.18	230.30	186.05	175.88	131.63	*44.25*	2	2	115.00	129.55	171.72	186.27	*-14.55*	-1.56	-3.59
34	16.67	2.95	237.30	189.98	182.04	134.72	*47.32*	2	2	122.00	133.11	178.30	189.41	*-11.11*	-0.55	-2.23
***35**	16.33	2.73	244.30	193.42	189.01	138.13	*50.88*	2	2	129.00	136.73	184.81	192.54	*-7.73*	0.00	0.00
36	15.93	2.46	252.30	198.82	194.64	141.17	*53.48*	2	2	137.00	139.89	194.64	197.54	*-2.89*	0.00	0.00
37	15.52	2.18	260.30	202.91	202.34	144.95	*57.39*	2	2	145.00	143.93	202.34	201.27	*1.07*	0.00	0.00
38	15.13	1.87	268.30	206.96	210.11	148.76	*61.34*	2	2	153.00	147.94	210.11	205.04	*5.06*	0.00	0.00
39	14.73	1.53	276.30	210.98	217.91	152.59	*65.32*	2	2	161.00	151.94	217.91	208.85	*9.06*	0.00	0.00
40	14.32	1.16	284.30	215.06	225.63	156.39	*69.24*	2	2	169.00	155.98	225.63	212.61	*13.02*	0.00	0.00
41	13.93	0.71	292.30	219.10	233.44	160.24	*73.20*	2	2	177.00	159.99	233.44	216.43	*17.01*	0.00	0.00
42	13.52	0.00	300.30	222.04	242.90	164.63	*78.26*	2	2	185.00	163.34	242.90	221.24	*21.66*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far
Displacements [mm] Moments [kNm/m] Shears [kN/m]

```
  Min          Max    Min      Max    Min    Max
-1.24         9.54 -65.64    47.32 -93.52  79.23
Surcharge 1 present in this stage
Surcharge 2 present in this stage
```

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2				7.75
8	13	156.02	156.02	0.00	156.02
9	4	82.96	82.96	0.00	82.96
10	8				156.47

STAGE 8 : LONG TERM

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	1	0	50.00	50.00	74666.
2	27.40	1	0	50.00	50.00	74666.
3	27.10	1	0	50.00	50.00	74666.
4	26.80	1	0	50.00	50.00	74666.
5	26.45	1	0	50.00	50.00	74666.
6	26.10	1	0	50.00	50.00	74666.
7	25.75	1	0	50.00	50.00	74666.
8	25.40	1	0	50.00	50.00	10560.
9	25.00	1	0	50.00	50.00	10560.
10	24.60	1	0	50.00	50.00	10560.
11	24.20	1	0	50.00	50.00	10560.
12	23.85	1	0	50.00	50.00	10560.
13	23.50	1	0	50.00	50.00	10560.
14	23.17	1	0	50.00	50.00	10560.
15	22.83	1	1	50.00	50.00	10560.
16	22.52	1	1	50.00	50.00	10560.
17	22.17	1	1	50.00	50.00	10560.
18	21.83	1	1	50.00	50.00	10560.
19	21.62	1	1	50.00	50.00	10560.
20	21.38	4	4	50.00	50.00	10560.
21	21.10	4	4	50.00	50.00	10560.
22	20.80	4	4	50.00	50.00	10560.
23	20.45	4	4	50.00	50.00	10560.
24	20.05	4	4	50.00	50.00	10560.
25	19.65	4	4	50.00	50.00	10560.
26	19.30	4	4	50.00	50.00	10560.
27	18.98	4	4	50.00	50.00	10560.
28	18.67	4	4	50.00	50.00	10560.
29	18.33	3	3	50.00	50.00	10560.
30	18.00	3	3	50.00	50.00	10560.
31	17.65	3	3	50.00	50.00	5239.5
32	17.35	3	3	50.00	50.00	5239.5
33	17.02	3	3	50.00	50.00	5239.5
34	16.67	3	3	50.00	50.00	5239.5
*	***35 16.33***	***3***	***3***	***50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00
Wall relaxation 50%		

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

RESULTS FOR STAGE 8 : Long term

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 77256. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 119530. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.2898	31	3.42	12
2	1.3	31	0.0204	20	4.66	12
3	1.3	31	0.0221	20	3.65	21
4	1.3	31	0.0175	20	2.51	12
5	1.3	30	0.0143	21	1.90	13
10	1.3	30	0.0040	24	0.95	19
15	1.3	30	0.0025	17	0.43	19
20	1.3	30	0.0016	19	0.22	11
30	1.3	30	0.0003	25	0.08	19

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
								Left	Right							
1	27.70	-1.24	27.43	27.43	28.49	28.49	0.00	1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	-0.20	31.70	31.70	22.76	22.76	0.00	1	0	0.00	0.00	0.00	0.00	0.00	-1.28	7.69
3	27.10	0.85	37.40	37.40	25.70	25.70	0.00	1	0	0.00	0.00	0.00	0.00	0.00	-4.61	14.96
4	26.80	1.90	43.10	43.10	26.98	26.98	0.00	1	0	0.00	0.00	0.00	0.00	0.00	-10.26	23.20
	26.80														-10.26	-43.98
5	26.45	3.14	49.75	49.75	27.46	27.46	0.00	1	0	0.00	0.00	0.00	0.00	0.00	3.60	-34.79
6	26.10	4.37	56.40	56.40	26.57	26.57	0.00	1	0	0.00	0.00	0.00	0.00	0.00	14.10	-25.33
7	25.75	5.59	63.05	63.05	25.00	25.00	0.00 a	1	0	0.00	0.00	0.00	0.00	0.00	21.34	-16.31
8	25.40	6.76	69.70	69.70	21.13	21.13	0.00 a	1	0	0.00	0.00	0.00	0.00	0.00	25.51	-7.97
9	25.00	7.89	77.30	77.30	23.20	23.20	0.00 a	1	0	0.00	0.00	0.00	0.00	0.00	27.12	0.63
10	24.60	8.61	84.90	84.90	25.36	25.36	0.00 a	1	0	0.00	0.00	0.00	0.00	0.00	25.01	10.34
11	24.20	8.97	92.50	92.50	33.96	33.96	0.00 a	1	0	0.00	0.00	0.00	0.00	0.00	18.84	21.78

Fitzrovia

280mm dia Contigous Wall

DA1C2 ground level prop removed after insitu wall cast and propped at +25.4mOD

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pressure [kN/m²]		Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
12	23.85	9.05	99.15	99.15	42.24	42.24	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	8.99	35.54
13	23.50	9.04	105.80	105.80	45.08	45.08	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	-6.03	50.54
	23.50																-6.03	-46.46
14	23.17	9.04	111.98	111.98	47.72	47.72	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	6.59	-30.80
15	22.83	8.98	118.63	118.63	50.56	50.56	0.00	A	1	1		3.32	3.32	4.51	4.51	0.00	14.55	-15.26
16	22.52	8.80	124.33	124.33	53.00	53.00	0.00	A	1	1		9.03	9.03	10.90	10.90	0.00	16.89	-0.94
17	22.17	8.41	130.98	130.98	55.84	55.84	0.00	A	1	1		15.68	15.68	28.14	28.14	0.00	14.82	10.75
18	21.83	7.87	137.63	135.88	59.68	57.93	1.75	A	1	1		22.32	20.57	41.80	40.05	1.75	9.36	18.08
19	21.62	7.49	141.52	137.72	62.55	58.75	3.80	A	1	1		26.22	22.42	47.71	43.91	3.80	5.15	22.21
20	21.38	7.03	146.08	139.88	50.72	44.52	6.20	A	4	4		30.78	24.58	77.32	71.12	6.20	-0.58	20.40
21	21.10	6.49	151.40	142.40	54.31	45.31	9.00	A	4	4		36.10	27.10	88.56	79.56	9.00	-5.33	11.98
22	20.80	5.96	157.10	145.10	62.67	50.67	12.00		4	4		41.80	29.80	89.58	77.58	12.00	-7.43	2.64
23	20.45	5.41	163.75	148.25	68.18	52.68	15.50		4	4		48.45	32.95	77.29	61.79	15.50	-6.82	-3.44
24	20.05	4.88	171.35	151.85	72.77	53.27	19.50		4	4		56.05	36.55	77.89	58.39	19.50	-4.76	-6.17
25	19.65	4.42	178.95	155.45	83.35	59.85	23.50		4	4		63.65	40.15	80.28	56.78	23.50	-1.88	-6.62
26	19.30	4.04	185.60	158.60	93.04	66.04	27.00		4	4		70.30	43.30	81.83	54.83	27.00	0.23	-4.15
27	18.98	3.69	191.78	161.53	102.21	71.96	30.25		4	4		76.48	46.23	80.57	50.32	30.25	0.97	1.12
28	18.67	3.36	197.48	164.23	96.96	63.71	33.25		4	4		82.18	48.93	89.48	56.23	33.25	-0.38	5.71
29	18.33	2.98	204.30	167.55	170.37	133.62	36.75		3	3	p	89.00	52.25	178.52	141.77	36.75	-2.81	5.56
30	18.00	2.65	210.80	170.80	174.44	134.44	40.00		3	3	p	95.50	55.50	191.23	151.23	40.00	-4.17	1.35
31	17.65	2.35	217.80	174.30	184.84	141.34	43.50		3	3		102.50	59.00	192.43	148.93	43.50	-3.65	-2.72
32	17.35	2.13	223.80	177.30	193.87	147.37	46.50		3	3		108.50	62.00	192.56	146.06	46.50	-2.46	-3.75
33	17.02	1.94	230.30	180.55	201.22	151.47	49.75		3	3		115.00	65.25	197.50	147.75	49.75	-1.31	-2.92
34	16.67	1.77	237.30	184.05	207.44	154.19	53.25		3	3		122.00	68.75	205.01	151.76	53.25	-0.50	-1.87
***35**	16.33	1.62	244.30	187.55	215.06	158.31	56.75		3	3		129.00	72.25	211.22	154.47	56.75	0.00	0.00
36	15.93	1.45	252.30	191.55	221.16	160.41	60.75		3	3		137.00	76.25	221.16	160.41	60.75	0.00	0.00
37	15.52	1.27	260.30	195.55	229.03	164.28	64.75		3	3		145.00	80.25	229.03	164.28	64.75	0.00	0.00
38	15.13	1.08	268.30	199.55	236.89	168.14	68.75		3	3		153.00	84.25	236.89	168.14	68.75	0.00	0.00
39	14.73	0.88	276.30	203.55	244.79	172.04	72.75		3	3		161.00	88.25	244.79	172.04	72.75	0.00	0.00
40	14.32	0.67	284.30	207.55	252.61	175.86	76.75		3	3		169.00	92.25	252.61	175.86	76.75	0.00	0.00
41	13.93	0.40	292.30	211.55	260.58	179.83	80.75		3	3		177.00	96.25	260.58	179.83	80.75	0.00	0.00
42	13.52	0.00	300.30	215.55	272.70	187.95	84.75	A	3	3		185.00	100.25	272.70	187.95	84.75	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-1.24	9.54	-65.64	47.32	-93.52	79.23

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				7.75
8	13	97.00	97.00	0.00	156.02
9	4	67.17	67.17	0.00	82.96
10	8				156.47

Results Envelope

Node	Level [m]	Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
1	27.70	-1.24	3.38	0.00	0.00	0.00	0.00
2	27.40	-0.47	3.17	-1.28	0.00	-4.48	7.69
3	27.10	0.00	2.97	-4.61	0.36	-1.40	14.96
4	26.80	0.00	2.77	-10.26	0.34	-59.89	23.20
5	26.45	0.00	3.39	-17.69	9.29	-49.79	29.91
6	26.10	0.00	4.55	-29.89	24.78	-38.38	40.15
7	25.75	0.00	5.69	-45.80	36.15	-26.34	51.07
8	25.40	0.00	6.80	-65.64	43.22	-93.52	63.11
9	25.00	0.00	7.89	-31.04	46.13	-79.05	0.76
10	24.60	0.00	8.63	-15.09	42.61	-62.99	17.88
11	24.20	0.00	9.06	-4.79	31.83	-47.81	36.75
12	23.85	0.00	9.24	0.00	33.92	-34.13	56.95
13	23.50	0.00	9.34	-8.04	43.59	-76.80	79.23
14	23.17	0.00	9.43	0.00	47.32	-51.98	0.00
15	22.83	0.00	9.47	0.00	46.96	-26.34	7.10
16	22.52	0.00	9.54	0.00	43.34	-1.32	18.56
17	22.17	0.00	9.41	0.00	35.28	0.00	27.22
18	21.83	0.00	9.08	0.00	24.75	0.00	32.57
19	21.62	0.00	8.82	0.00	17.65	0.00	36.51
20	21.38	0.00	8.47	-0.58	8.44	0.00	33.66
21	21.10	0.00	8.03	-5.33	4.45	0.00	23.57
22	20.80	0.00	7.56	-7.43	3.28	0.00	12.35
23	20.45	0.00	7.03	-8.66	2.51	-3.44	3.24
24	20.05	0.00	6.48	-7.92	2.21	-6.17	0.19
25	19.65	0.00	5.98	-5.64	2.36	-6.79	0.00
26	19.30	0.00	5.58	-3.27	2.58	-5.89	0.00
27	18.98	0.00	5.22	-1.78	2.46	-1.90	1.57
28	18.67	0.00	4.89	-2.08	1.63	0.00	5.71
29	18.33	0.00	4.52	-2.81	1.22	0.00	5.56
30	18.00	0.00	4.19	-4.44	0.00	0.00	3.99
31	17.65	0.00	3.86	-4.56	0.00	-2.72	0.83
32	17.35	0.00	3.60	-3.25	0.00	-4.55	0.00
33	17.02	0.00	3.36	-1.72	0.00	-3.95	0.00
34	16.67	0.00	3.11	-0.61	0.00	-2.46	0.00
***35**	***16.33**	***0.00**	***2.87**	***0.00**	***0.00**	***0.00**	***0.00***
36	15.93	0.00	2.59	0.00	0.00	0.00	0.00
37	15.52	0.00	2.29	0.00	0.00	0.00	0.00
38	15.13	0.00	1.97	0.00	0.00	0.00	0.00
39	14.73	0.00	1.62	0.00	0.00	0.00	0.00
40	14.32	0.00	1.22	0.00	0.00	0.00	0.00
41	13.93	0.00	0.74	0.00	0.00	0.00	0.00
42	13.52	0.00	0.00	0.00	0.00	0.00	0.00

INITIAL DATA

Notes
600 mm dia at 750 centres.

Soil properties

No.	Description	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
2	London Clay - Und	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
3	London Clay - Drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
4	RiverTerrace	19.00	0.50	0.25	5.66	1.00	4.76	0.25	Calculated
5	Made Ground behind lightwell	19.00	0.40	0.29	4.64	1.07	4.31	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	0.00	0.00	0.00	10000.	0.00	Drained
2	100.00	18.50	6.50	100000.	6500.00	Undrained
3	0.00	18.50	0.00	80000.	5200.00	Drained
4	0.00	0.00	0.00	20000.	0.00	Drained
5	0.00	0.00	0.00	20000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	25.00	0.67	0.00	0.00
2	0.00	0.67	0.00	0.50
3	24.00	0.67	0.00	0.00
4	33.00	0.67	0.00	0.00
5	30.00	0.67	0.00	0.00

Soil Strength Partial Factors

Document and case:	tan Phi'	c'	Cu	E
EC7 DA1 Combination 1 (2011)	1.00	1.00	1.00	1.00

Note: Only the parameters in bold have been affected by Partial Factors,
No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	19.00	0.58	**0.35**	**3.42**	**1.19**	**3.70**	0.25	Calculated
2	20.00	1.00	**1.00**	**1.00**	**2.45**	**2.45**	1.00	Calculated
3	20.00	1.00	**0.37**	**3.22**	**1.21**	**3.59**	0.25	Calculated
4	19.00	0.50	**0.25**	**5.66**	**1.00**	**4.76**	0.25	Calculated
5	19.00	0.40	**0.29**	**4.64**	**1.07**	**4.31**	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	**0.00**	0.00	**0.00**	**10000.**	**0.00**	Drained
2	**100.00**	18.50	**6.50**	**100000.**	**6500.00**	Undrained
3	**0.00**	18.50	**0.00**	**80000.**	**5200.00**	Drained
4	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained
5	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	**25.00**	0.67	0.00	0.00
2	**0.00**	0.67	0.00	0.50
3	**24.00**	0.67	0.00	0.00
4	**33.00**	0.67	0.00	0.00
5	**30.00**	0.67	0.00	0.00

Surcharge properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Partial Factor	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	20.00	1.00			
2	4	-	Right	23.00	0.00	1.00			

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

Surcharge Design properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	20.00			
2	4	-	Right	23.00	0.00			

Strut properties

No.	Stage In	Stage Out	Node	Level [m]	Prestress [kN/m]	Stiffness [kN/m/m]	Angle [°]	Lever arm [m]
1	2	5	2	27.40	0.00	50000.00	0.00	0.00
2	-	-	3	27.10	0.00	50000.00	0.00	0.00
3	-	-	4	26.80	0.00	50000.00	0.00	0.00
4	-	-	5	26.45	0.00	50000.00	0.00	0.00
5	-	-	6	26.10	0.00	50000.00	0.00	0.00
6	-	-	7	25.75	0.00	50000.00	0.00	0.00
7	-	-	9	25.00	0.00	50000.00	0.00	0.00
8	4	-	13	23.50	0.00	194444.00	0.00	0.00
9	-	-	4	26.80	0.00	50000.00	0.00	0.00
10	2	5	8	25.40	0.00	50000.00	0.00	0.00

STAGE 0 : INITIAL CONDITION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	5	50.00	50.00	149330.
2	27.40	5	5	50.00	50.00	149330.
3	27.10	5	5	50.00	50.00	149330.
4	26.80	5	5	50.00	50.00	149330.
5	26.45	5	5	50.00	50.00	149330.
6	26.10	5	5	50.00	50.00	149330.
7	25.75	5	5	50.00	50.00	149330.
8	25.40	5	5	50.00	50.00	237500.
9	25.00	1	1	50.00	50.00	237500.
10	24.60	1	1	50.00	50.00	237500.
11	24.20	1	1	50.00	50.00	237500.
12	23.85	1	1	50.00	50.00	237500.
13	23.50	1	1	50.00	50.00	237500.
14	23.17	1	1	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
29	18.33	3	3	50.00	50.00	237500.
30	18.00	3	3	50.00	50.00	237500.
31	17.65	3	3	50.00	50.00	237500.
32	17.35	3	3	50.00	50.00	237500.
33	17.02	3	3	50.00	50.00	237500.
34	16.67	3	3	50.00	50.00	237500.
*	***35 16.33***	***3***	***3***	***50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

E profile Generated

Boundary distances [m] :	Left	Right
	50.00	50.00

Convergence control parameters

Maximum number of iterations : 9000
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 0 : Initial condition

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.57	0.57	0.00	5	5	1.43	1.43	0.57	0.57	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	2.28	2.28	0.00	5	5	5.70	5.70	2.28	2.28	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	4.56	4.56	0.00	5	5	11.40	11.40	4.56	4.56	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	6.84	6.84	0.00	5	5	17.10	17.10	6.84	6.84	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	9.50	9.50	0.00	5	5	23.75	23.75	9.50	9.50	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	12.16	12.16	0.00	5	5	30.40	30.40	12.16	12.16	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	14.82	14.82	0.00	5	5	37.05	37.05	14.82	14.82	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	17.48	17.48	0.00	5	5	43.70	43.70	17.48	17.48	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	36.75	3	3	178.30	141.55	178.30	141.55	36.75	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	40.00	3	3	184.80	144.80	184.80	144.80	40.00	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	43.50	3	3	191.80	148.30	191.80	148.30	43.50	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	46.50	3	3	197.80	151.30	197.80	151.30	46.50	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	49.75	3	3	204.30	154.55	204.30	154.55	49.75	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	53.25	3	3	211.30	158.05	211.30	158.05	53.25	**0.00**	**0.00**
35	16.33	0.00	218.30	161.55	218.30	161.55	56.75	3	3	218.30	161.55	218.30	161.55	56.75	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	60.75	3	3	226.30	165.55	226.30	165.55	60.75	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	64.75	3	3	234.30	169.55	234.30	169.55	64.75	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	68.75	3	3	242.30	173.55	242.30	173.55	68.75	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	72.75	3	3	250.30	177.55	250.30	177.55	72.75	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	76.75	3	3	258.30	181.55	258.30	181.55	76.75	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	80.75	3	3	266.30	185.55	266.30	185.55	80.75	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	84.75	3	3	274.30	189.55	274.30	189.55	84.75	**0.00**	**0.00**

NOTE: Displacements from STAGE 0 are disregarded in later stages

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

STAGE 1 : ADD RETAINING WALL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	5	50.00	50.00	149330.
2	27.40	5	5	50.00	50.00	149330.
3	27.10	5	5	50.00	50.00	149330.
4	26.80	5	5	50.00	50.00	149330.
5	26.45	5	5	50.00	50.00	149330.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
6	26.10	5	5	50.00	50.00	149330.
7	25.75	5	5	50.00	50.00	149330.
8	25.40	5	5	50.00	50.00	237500.
9	25.00	1	1	50.00	50.00	237500.
10	24.60	1	1	50.00	50.00	237500.
11	24.20	1	1	50.00	50.00	237500.
12	23.85	1	1	50.00	50.00	237500.
13	23.50	1	1	50.00	50.00	237500.
14	23.17	1	1	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

**** Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 1 : Add retaining wall

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	1	0.00	1
2	0.0	1	0.0000	1	0.00	1
3	0.0	1	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.57	0.57	0.00	5	5	1.43	1.43	0.57	0.57	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	2.28	2.28	0.00	5	5	5.70	5.70	2.28	2.28	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	4.56	4.56	0.00	5	5	11.40	11.40	4.56	4.56	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	6.84	6.84	0.00	5	5	17.10	17.10	6.84	6.84	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	9.50	9.50	0.00	5	5	23.75	23.75	9.50	9.50	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	12.16	12.16	0.00	5	5	30.40	30.40	12.16	12.16	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	14.82	14.82	0.00	5	5	37.05	37.05	14.82	14.82	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	17.48	17.48	0.00	5	5	43.70	43.70	17.48	17.48	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	*36.75*	2	2	178.30	141.55	178.30	141.55	*36.75*	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	*40.00*	2	2	184.80	144.80	184.80	144.80	*40.00*	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	*43.50*	2	2	191.80	148.30	191.80	148.30	*43.50*	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	*46.50*	2	2	197.80	151.30	197.80	151.30	*46.50*	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	*49.75*	2	2	204.30	154.55	204.30	154.55	*49.75*	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	*53.25*	2	2	211.30	158.05	211.30	158.05	*53.25*	**0.00**	**0.00**
***35**	16.33	0.00	218.30	161.55	218.30	161.55	*56.75*	2	2	218.30	161.55	218.30	161.55	*56.75*	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	*60.75*	2	2	226.30	165.55	226.30	165.55	*60.75*	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	*64.75*	2	2	234.30	169.55	234.30	169.55	*64.75*	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	*68.75*	2	2	242.30	173.55	242.30	173.55	*68.75*	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	*72.75*	2	2	250.30	177.55	250.30	177.55	*72.75*	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	*76.75*	2	2	258.30	181.55	258.30	181.55	*76.75*	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	*80.75*	2	2	266.30	185.55	266.30	185.55	*80.75*	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	*84.75*	2	2	274.30	189.55	274.30	189.55	*84.75*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
0.00	0.00	0.00	0.00	0.00	0.00

STAGE 2 : PROP AND SURCHARGE

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 2 : prop and surcharge

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 1 inserted at this stage
Strut no 10 inserted at this stage
Surcharge no. 1 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.8549	21	0.54	1
2	0.9	21	0.0006	1	0.56	1
3	0.9	21	0.0006	1	0.73	1
4	0.9	21	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.06	21.43	21.43	6.30	6.30	0.00	5	5 a	1.43	1.43	0.41	0.41	0.00	**0.00**	**0.00**
2	27.40	0.11	25.70	25.70	7.64	7.64	0.00	5	5	5.70	5.70	1.70	1.70	0.00	**-0.27**	**1.77**
	27.40														**-0.27**	**-3.52**
3	27.10	0.15	31.40	31.40	9.94	9.94	0.00	5	5	11.40	11.40	4.19	4.19	0.00	**0.52**	**-1.76**
4	26.80	0.20	37.10	37.10	12.19	12.19	0.00	5	5	17.10	17.10	6.49	6.49	0.00	**0.79**	**0.02**
5	26.45	0.25	43.75	43.75	14.80	14.80	0.00	5	5	23.75	23.75	9.20	9.20	0.00	**0.46**	**1.93**
6	26.10	0.30	50.40	50.40	17.36	17.36	0.00	5	5	30.40	30.40	11.96	11.96	0.00	**-0.56**	**3.86**
7	25.75	0.36	57.05	57.05	19.88	19.88	0.00	5	5	37.05	37.05	14.76	14.76	0.00	**-2.24**	**5.70**
8	25.40	0.41	63.70	63.70	22.70	22.70	0.00	5	5	43.70	43.70	17.26	17.26	0.00	**-4.55**	**7.61**
	25.40														**-4.55**	**-13.05**
9	25.00	0.48	71.30	71.30	35.01	35.01	0.00	1	1	51.30	51.30	29.50	29.50	0.00	**0.27**	**-10.93**
10	24.60	0.55	78.90	78.90	39.17	39.17	0.00	1	1	58.90	58.90	34.15	34.15	0.00	**4.20**	**-8.82**
11	24.20	0.61	86.50	86.50	43.34	43.34	0.00	1	1	66.50	66.50	38.80	38.80	0.00	**7.32**	**-6.96**
12	23.85	0.66	93.15	93.15	47.02	47.02	0.00	1	1	73.15	73.15	42.83	42.83	0.00	**9.46**	**-5.38**
13	23.50	0.71	99.80	99.80	50.72	50.72	0.00	1	1	79.80	79.80	46.85	46.85	0.00	**11.08**	**-3.99**
14	23.17	0.74	105.98	105.98	54.15	54.15	0.00	1	1	85.98	85.98	50.58	50.58	0.00	**12.17**	**-2.73**
15	22.83	0.78	112.63	112.63	57.86	57.86	0.00	1	1	92.63	92.63	54.58	54.58	0.00	**12.92**	**-1.60**
16	22.52	0.80	118.33	118.33	61.08	61.08	0.00	1	1	98.33	98.33	57.97	57.97	0.00	**13.24**	**-0.56**
17	22.17	0.83	124.98	124.98	64.73	64.73	0.00	1	1	104.98	104.98	62.05	62.05	0.00	**13.25**	**0.41**
18	21.83	0.84	131.63	129.88	69.34	67.59	1.75	1	1	111.63	109.88	66.61	64.86	1.75	**12.95**	**1.26**
19	21.62	0.85	135.52	131.72	72.60	68.80	3.80	1	1	115.52	111.72	69.60	65.80	3.80	**12.61**	**1.97**
20	21.38	0.85	140.08	133.88	65.91	59.71	6.20	4	4	120.08	113.88	65.37	59.17	6.20	**12.05**	**2.38**
21	21.10	0.86	145.40	136.40	69.52	60.52	9.00	4	4	125.40	116.40	69.88	60.88	9.00	**11.37**	**2.40**
22	20.80	0.85	151.10	139.10	73.93	61.93	12.00	4	4	131.10	119.10	74.17	62.17	12.00	**10.66**	**2.31**
23	20.45	0.84	157.75	142.25	79.00	63.50	15.50	4	4	137.75	122.25	79.25	63.75	15.50	**9.87**	**2.22**
24	20.05	0.83	165.35	145.85	84.83	65.33	19.50	4	4	145.35	125.85	85.02	65.52	19.50	**9.00**	**2.14**
25	19.65	0.81	172.95	149.45	90.81	67.31	23.50	4	4	152.95	129.45	90.64	67.14	23.50	**8.16**	**2.13**
26	19.30	0.78	179.60	152.60	96.24	69.24	27.00	4	4	159.60	132.60	95.36	68.36	27.00	**7.40**	**2.31**
27	18.98	0.76	185.78	155.53	101.44	71.19	30.25	4	4	165.78	135.53	99.58	69.33	30.25	**6.60**	**2.75**
28	18.67	0.73	191.48	158.23	104.29	71.04	33.25	4	4	171.48	138.23	105.44	72.19	33.25	**5.69**	**2.86**
29	18.33	0.70	198.30	145.51	190.50	137.71	*52.79*	2	2	178.30	137.69	186.10	145.50	*40.61*	**4.75**	**3.41**
30	18.00	0.67	204.80	150.34	193.96	139.50	*54.46*	2	2	184.80	139.47	195.63	150.30	*45.33*	**3.40**	**3.87**
31	17.65	0.63	211.80	154.27	200.14	142.60	*57.53*	2	2	191.80	142.57	203.46	154.23	*49.23*	**2.15**	**3.05**
32	17.35	0.60	217.80	156.94	206.75	145.89	*60.86*	2	2	197.80	145.86	208.85	156.91	*51.94*	**1.39**	**2.18**
33	17.02	0.56	224.30	160.02	213.58	149.30	*64.28*	2	2	204.30	149.27	215.02	159.99	*55.03*	**0.79**	**1.61**
34	16.67	0.52	231.30	163.50	220.62	152.81	*67.80*	2	2	211.30	152.79	221.98	163.47	*58.51*	**0.31**	**1.13**
***35**	16.33	0.48	238.30	167.26	227.11	156.07	*71.04*	2	2	218.30	156.04	229.49	167.23	*62.26*	**0.00**	**0.00**
36	15.93	0.43	246.30	170.64	236.30	160.64	*75.66*	2	2	226.30	160.62	236.30	170.61	*65.68*	**0.00**	**0.00**
37	15.52	0.38	254.30	174.64	244.30	164.64	*79.66*	2	2	234.30	164.61	244.30	174.61	*69.69*	**0.00**	**0.00**
38	15.13	0.32	262.30	178.63	252.30	168.63	*83.67*	2	2	242.30	168.61	252.30	178.61	*73.69*	**0.00**	**0.00**
39	14.73	0.26	270.30	182.63	260.30	172.63	*87.67*	2	2	250.30	172.61	260.30	182.61	*77.69*	**0.00**	**0.00**
40	14.32	0.20	278.30	186.63	268.30	176.63	*91.67*	2	2	258.30	176.61	268.30	186.61	*81.69*	**0.00**	**0.00**
41	13.93	0.12	286.30	190.63	276.30	180.63	*95.67*	2	2	266.30	180.61	276.30	190.61	*85.69*	**0.00**	**0.00**
42	13.52	0.00	294.30	194.63	284.30	184.63	*99.67*	2	2	274.30	184.61	284.30	194.61	*89.69*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

***** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
0.00	0.86	-4.55	13.25	-13.05	7.61

Surcharge 1 present in this stage

Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	5.29	5.29	0.00	5.29
10	8	20.66	20.66	0.00	20.66

STAGE 3 : EXCAVATION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	0	50.00	50.00	149330.
2	27.40	5	0	50.00	50.00	149330.
3	27.10	5	0	50.00	50.00	149330.
4	26.80	5	0	50.00	50.00	149330.
5	26.45	5	0	50.00	50.00	149330.
6	26.10	5	0	50.00	50.00	149330.
7	25.75	5	0	50.00	50.00	149330.
8	25.40	5	0	50.00	50.00	237500.
9	25.00	1	0	50.00	50.00	237500.
10	24.60	1	0	50.00	50.00	237500.
11	24.20	1	0	50.00	50.00	237500.
12	23.85	1	0	50.00	50.00	237500.
13	23.50	1	0	50.00	50.00	237500.
14	23.17	1	0	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*****	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

***** *Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay	5.00	25.40	0.00	5.00	25.40	0.00
- Und						
London Clay	5.00	25.40	0.00	5.00	25.40	0.00
- Drained						
RiverTerrace	0.00	0.00	0.00	0.00	0.00	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 3 : Excavation

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	4.5089	19	20.90	15
2	4.5	19	0.0180	13	18.24	16
3	4.5	19	0.0065	13	7.33	16
4	4.5	19	0.0046	14	3.49	17
5	4.5	19	0.0024	14	1.61	17
9	4.5	19	0.0000	13	0.05	16

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-0.18	21.43	21.43	11.83	11.83	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	0.17	25.70	25.70	10.29	10.29	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-0.53**	**3.32**
	27.40															**-0.53**	**-5.33**
3	27.10	0.53	31.40	31.40	12.80	12.80	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.60**	**-1.87**
4	26.80	0.88	37.10	37.10	14.83	14.83	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.59**	**2.46**
5	26.45	1.29	43.75	43.75	17.07	17.07	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-1.12**	**7.86**
6	26.10	1.70	50.40	50.40	18.81	18.81	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-4.91**	**14.14**
7	25.75	2.12	57.05	57.05	20.23	20.23	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-11.01**	**20.97**
8	25.40	2.54	63.70	63.70	23.74	23.74	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-19.59**	**28.96**
	25.40															**-19.59**	**-98.20**
9	25.00	3.04	71.30	71.30	36.19	36.19	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**17.91**	**-86.51**
10	24.60	3.53	78.90	78.90	38.76	38.76	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**49.62**	**-71.52**
11	24.20	3.98	86.50	86.50	41.35	41.35	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**75.13**	**-56.02**
12	23.85	4.33	93.15	93.15	43.90	43.90	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**92.02**	**-40.58**
13	23.50	4.64	99.80	99.80	46.61	46.61	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**103.54**	**-25.04**
14	23.17	4.88	105.98	105.98	49.16	49.16	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**109.12**	**-8.87**
15	22.83	5.09	112.63	112.63	52.20	52.20	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	**109.32**	**6.06**
16	22.52	5.22	118.33	118.33	55.07	55.07	0.00	1	1	P	9.03	9.03	30.79	30.79	0.00	**105.51**	**16.64**
17	22.17	5.32	124.98	124.98	57.67	57.67	0.00	1	1	P	15.68	15.68	53.53	53.53	0.00	**98.30**	**21.31**
18	21.83	5.37	131.63	129.88	62.90	61.15	1.75	1	1		22.32	20.57	54.65	52.90	1.75	**90.59**	**23.18**
19	21.62	5.38	135.52	131.72	67.12	63.32	3.80	1	1		26.22	22.42	54.81	51.01	3.80	**85.61**	**25.69**
20	21.38	5.37	140.08	133.88	53.17	46.97	6.20	4	4		30.78	24.58	57.99	51.79	6.20	**79.11**	**26.44**
21	21.10	5.33	145.40	136.40	54.33	45.33	9.00	4	4		36.10	27.10	62.19	53.19	9.00	**71.88**	**24.67**
22	20.80	5.27	151.10	139.10	59.53	47.53	12.00	4	4		41.80	29.80	64.29	52.29	12.00	**64.82**	**22.76**
23	20.45	5.16	157.75	142.25	65.06	49.56	15.50	4	4		48.45	32.95	69.63	54.13	15.50	**57.13**	**21.13**
24	20.05	5.00	165.35	145.85	71.60	52.10	19.50	4	4		56.05	36.55	75.90	56.40	19.50	**49.02**	**19.41**
25	19.65	4.81	172.95	149.45	79.08	55.58	23.50	4	4		63.65	40.15	81.13	57.63	23.50	**41.60**	**18.17**
26	19.30	4.62	179.60	152.60	86.78	59.78	27.00	4	4		70.30	43.30	84.93	57.93	27.00	**35.37**	**18.10**
27	18.98	4.43	185.78	155.53	94.94	64.69	30.25	4	4		76.48	46.23	84.38	54.13	30.25	**29.39**	**20.06**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
28	18.67	4.24	191.48	158.23	89.97	56.72	33.25	4	4	82.18	48.93	95.80	62.55	33.25	**22.88**	**20.76**
29	18.33	4.01	198.30	166.23	153.17	121.10	*32.07*	2	2	89.00	118.01	140.10	169.11	*-29.01*	**15.94**	**22.02**
30	18.00	3.79	204.80	179.87	142.57	117.64	*24.93*	2	2	95.50	113.65	165.19	183.34	*-18.15*	**8.07**	**20.41**
31	17.65	3.54	211.80	185.45	146.11	119.76	*26.35*	2	2	102.50	116.86	172.67	187.03	*-14.36*	**2.27**	**12.27**
32	17.35	3.33	217.80	185.57	156.57	124.34	*32.23*	2	2	108.50	121.83	173.57	186.90	*-13.33*	**-0.12**	**5.30**
33	17.02	3.10	224.30	186.76	166.29	128.75	*37.54*	2	2	115.00	126.75	175.81	187.56	*-11.75*	**-0.98**	**1.04**
34	16.67	2.86	231.30	189.26	174.82	132.78	*42.04*	2	2	122.00	131.54	179.57	189.11	*-9.54*	**-0.78**	**-1.40**
***35**	16.33	2.61	238.30	189.88	186.52	138.09	*48.42*	2	2	129.00	137.55	180.57	189.12	*-8.55*	**0.00**	**0.00**
36	15.93	2.35	246.30	195.72	191.32	140.74	*50.58*	2	2	137.00	140.32	191.32	194.64	*-3.32*	**0.00**	**0.00**
37	15.52	2.08	254.30	199.88	198.94	144.52	*54.42*	2	2	145.00	144.44	198.94	198.37	*0.56*	**0.00**	**0.00**
38	15.13	1.78	262.30	203.98	206.67	148.35	*58.32*	2	2	153.00	148.51	206.67	202.18	*4.49*	**0.00**	**0.00**
39	14.73	1.46	270.30	208.03	214.48	152.21	*62.27*	2	2	161.00	152.55	214.48	206.02	*8.45*	**0.00**	**0.00**
40	14.32	1.10	278.30	212.13	222.21	156.04	*66.17*	2	2	169.00	156.62	222.21	209.83	*12.38*	**0.00**	**0.00**
41	13.93	0.67	286.30	216.32	229.80	159.82	*69.98*	2	2	177.00	160.77	229.80	213.56	*16.23*	**0.00**	**0.00**
42	13.52	0.00	294.30	218.99	239.98	164.67	*75.31*	2	2	185.00	163.77	239.98	218.75	*21.23*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.18	5.38	-19.59	109.32	-98.20	28.96

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	8.65	8.65	0.00	8.65
10	8	127.16	127.16	0.00	127.16

STAGE 4 : ADD B1 BASE SLAB

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay	5.00	27.75	0.00	5.00	27.75	0.00
- Und						
London Clay	5.00	27.75	0.00	5.00	27.75	0.00
- Drained						
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 4 : Add B1 base slab

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require.
Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 8 inserted at this stage
Surcharge no. 2 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	7	0.00	1
2	0.0	7	0.0000	7	0.00	1
3	0.0	7	0.0000	7	0.00	1

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-0.18	21.43	21.43	11.83	11.83	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	0.17	25.70	25.70	10.29	10.29	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-0.53**	**3.32**
	27.40															**-0.53**	**-5.33**
3	27.10	0.53	31.40	31.40	12.80	12.80	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.60**	**-1.87**
4	26.80	0.88	37.10	37.10	14.83	14.83	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.59**	**2.46**
5	26.45	1.29	43.75	43.75	17.07	17.07	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-1.12**	**7.86**
6	26.10	1.70	50.40	50.40	18.81	18.81	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-4.91**	**14.14**
7	25.75	2.12	57.05	57.05	20.23	20.23	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-11.01**	**20.97**
8	25.40	2.54	63.70	63.70	23.74	23.74	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-19.59**	**28.96**
	25.40															**-19.59**	**-98.20**
9	25.00	3.04	71.30	71.30	36.19	36.19	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**17.91**	**-86.51**
10	24.60	3.53	78.90	78.90	38.76	38.76	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**49.62**	**-71.52**
11	24.20	3.98	86.50	86.50	41.35	41.35	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**75.13**	**-56.02**
12	23.85	4.33	93.15	93.15	43.90	43.90	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**92.02**	**-40.58**
13	23.50	4.64	99.80	99.80	46.61	46.61	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**103.54**	**-25.04**
	23.50															**103.54**	**-25.04**
14	23.17	4.88	105.98	105.98	49.16	49.16	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**109.12**	**-8.87**
15	22.83	5.09	112.63	112.63	52.20	52.20	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	**109.32**	**6.06**
16	22.52	5.22	118.33	118.33	55.07	55.07	0.00	1	1	P	9.03	9.03	30.79	30.79	0.00	**105.51**	**16.64**
17	22.17	5.32	124.98	124.98	57.67	57.67	0.00	1	1	P	15.68	15.68	53.53	53.53	0.00	**98.30**	**21.31**
18	21.83	5.37	131.63	129.88	62.90	61.15	1.75	1	1		22.32	20.57	54.65	52.90	1.75	**90.59**	**23.18**
19	21.62	5.38	135.52	131.72	67.12	63.32	3.80	1	1		26.22	22.42	54.81	51.01	3.80	**85.61**	**25.69**
20	21.38	5.37	140.08	133.88	53.17	46.97	6.20	4	4		30.78	24.58	57.99	51.79	6.20	**79.11**	**26.44**
21	21.10	5.33	145.40	136.40	54.33	45.33	9.00	4	4		36.10	27.10	62.19	53.19	9.00	**71.88**	**24.67**
22	20.80	5.27	151.10	139.10	59.53	47.53	12.00	4	4		41.80	29.80	64.29	52.29	12.00	**64.82**	**22.76**
23	20.45	5.16	157.75	142.25	65.06	49.56	15.50	4	4		48.45	32.95	69.63	54.13	15.50	**57.13**	**21.13**
24	20.05	5.00	165.35	145.85	71.60	52.10	19.50	4	4		56.05	36.55	75.90	56.40	19.50	**49.02**	**19.41**
25	19.65	4.81	172.95	149.45	79.08	55.58	23.50	4	4		63.65	40.15	81.13	57.63	23.50	**41.60**	**18.17**
26	19.30	4.62	179.60	152.60	86.78	59.78	27.00	4	4		70.30	43.30	84.93	57.93	27.00	**35.37**	**18.10**
27	18.98	4.43	185.78	155.53	94.94	64.69	30.25	4	4		76.48	46.23	84.38	54.13	30.25	**29.39**	**20.06**
28	18.67	4.24	191.48	158.23	89.97	56.72	33.25	4	4		82.18	48.93	95.80	62.55	33.25	**22.88**	**20.76**
29	18.33	4.01	198.30	166.23	153.17	121.10	*32.07*	2	2		89.00	118.01	140.10	169.11	*-29.01*	**15.94**	**22.02**
30	18.00	3.79	204.80	179.87	142.57	117.64	*24.93*	2	2		95.50	113.65	165.19	183.34	*-18.15*	**8.07**	**20.41**
31	17.65	3.54	211.80	185.45	146.11	119.76	*26.35*	2	2		102.50	116.86	172.67	187.03	*-14.36*	**2.27**	**12.27**
32	17.35	3.33	217.80	185.57	156.57	124.34	*32.23*	2	2		108.50	121.83	173.57	186.90	*-13.33*	**-0.12**	**5.30**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
33	17.02	3.10	224.30	186.76	166.29	128.75	*37.54*	2	2	115.00	126.75	175.81	187.56	*-11.75*	**-0.98**	**1.04**
34	16.67	2.86	231.30	189.26	174.82	132.78	*42.04*	2	2	122.00	131.54	179.57	189.11	*-9.54*	**-0.78**	**-1.40**
***35**	16.33	2.61	238.30	189.88	186.52	138.09	*48.42*	2	2	129.00	137.55	180.57	189.12	*-8.55*	**0.00**	**0.00**
36	15.93	2.35	246.30	195.72	191.32	140.74	*50.58*	2	2	137.00	140.32	191.32	194.64	*-3.32*	**0.00**	**0.00**
37	15.52	2.08	254.30	199.88	198.94	144.52	*54.42*	2	2	145.00	144.44	198.94	198.37	*0.56*	**0.00**	**0.00**
38	15.13	1.78	262.30	203.98	206.67	148.35	*58.32*	2	2	153.00	148.51	206.67	202.18	*4.49*	**0.00**	**0.00**
39	14.73	1.46	270.30	208.03	214.48	152.21	*62.27*	2	2	161.00	152.55	214.48	206.02	*8.45*	**0.00**	**0.00**
40	14.32	1.10	278.30	212.13	222.21	156.04	*66.17*	2	2	169.00	156.62	222.21	209.83	*12.38*	**0.00**	**0.00**
41	13.93	0.67	286.30	216.32	229.80	159.82	*69.98*	2	2	177.00	160.77	229.80	213.56	*16.23*	**0.00**	**0.00**
42	13.52	0.00	294.30	218.99	239.98	164.67	*75.31*	2	2	185.00	163.77	239.98	218.75	*21.23*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.18	5.38	-19.59	109.32	-98.20	28.96

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	8.65	8.65	0.00	8.65
8	13	0.00	0.00	0.00	0.00
10	8	127.16	127.16	0.00	127.16

STAGE 5 : REMOVE PROP1

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 5 : Remove prop1

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no. 1 removed at this stage
Strut no. 10 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	8.5935	1	0.00	1
2	8.6	1	0.4578	1	21.74	1
3	9.1	1	0.3961	1	12.29	2
4	9.4	1	0.3576	1	10.22	3
5	9.8	1	0.3231	1	7.71	4
10	11.1	1	0.1504	1	2.92	7
15	11.6	1	0.0481	1	0.90	10
20	11.7	1	0.0057	1	0.23	5
29	11.7	1	0.0038	1	0.08	7

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	11.51	21.43	21.43	6.12	6.12	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	11.04	25.70	25.70	7.34	7.34	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-0.28**	**2.02**
3	27.10	10.56	31.40	31.40	8.97	8.97	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-1.21**	**4.46**
4	26.80	10.09	37.10	37.10	10.61	10.61	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-2.95**	**7.53**
5	26.45	9.53	43.75	43.75	12.52	12.52	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-6.19**	**11.45**
6	26.10	8.99	50.40	50.40	14.43	14.43	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-10.97**	**16.16**
7	25.75	8.45	57.05	57.05	16.34	16.34	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-17.51**	**21.55**
8	25.40	7.93	63.70	63.70	18.23	18.23	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-26.05**	**27.83**
9	25.00	7.35	71.30	71.30	25.19	25.19	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-38.55**	**36.28**
10	24.60	6.80	78.90	78.90	27.86	27.86	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-55.08**	**46.90**
11	24.20	6.29	86.50	86.50	30.53	30.53	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-76.07**	**58.19**
12	23.85	5.88	93.15	93.15	40.20	40.20	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-98.44**	**70.95**
13	23.50	5.53	99.80	99.80	46.07	46.07	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-125.73**	**85.76**
	23.50																**-125.73**	**-86.23**
14	23.17	5.25	105.98	105.98	50.67	50.67	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-100.23**	**-69.91**
15	22.83	5.00	112.63	112.63	55.05	55.05	0.00		1	1	P	3.32	3.32	11.36	11.36	0.00	**-78.76**	**-54.26**
16	22.52	4.83	118.33	118.33	58.76	58.76	0.00		1	1	P	9.03	9.03	30.83	30.83	0.00	**-64.61**	**-42.62**
17	22.17	4.65	124.98	124.98	62.57	62.57	0.00		1	1	P	15.68	15.68	53.55	53.55	0.00	**-51.28**	**-36.50**
18	21.83	4.50	131.63	129.88	67.59	65.84	1.75		1	1		22.32	20.57	56.56	54.81	1.75	**-39.06**	**-33.39**
19	21.62	4.42	135.52	131.72	72.12	68.32	3.80		1	1		26.22	22.42	54.02	50.22	3.80	**-32.53**	**-29.85**
20	21.38	4.33	140.08	133.88	62.29	56.08	6.20		4	4		30.78	24.58	54.54	48.34	6.20	**-25.85**	**-26.83**
21	21.10	4.24	145.40	136.40	63.22	54.22	9.00		4	4		36.10	27.10	57.50	48.50	9.00	**-18.62**	**-24.99**
22	20.80	4.15	151.10	139.10	67.73	55.73	12.00		4	4		41.80	29.80	59.31	47.31	12.00	**-11.37**	**-22.79**
23	20.45	4.05	157.75	142.25	72.91	57.41	15.50		4	4		48.45	32.95	64.32	48.82	15.50	**-3.87**	**-19.81**
24	20.05	3.94	165.35	145.85	78.71	59.21	19.50		4	4		56.05	36.55	70.51	51.01	19.50	**3.41**	**-16.56**
25	19.65	3.82	172.95	149.45	85.01	61.51	23.50		4	4		63.65	40.15	76.20	52.70	23.50	**9.38**	**-13.27**
26	19.30	3.72	179.60	152.60	91.35	64.35	27.00		4	4		70.30	43.30	80.76	53.76	27.00	**13.44**	**-9.83**
27	18.98	3.61	185.78	155.53	98.00	67.75	30.25		4	4		76.48	46.23	82.29	52.04	30.25	**16.06**	**-5.59**
28	18.67	3.51	191.48	158.23	95.49	62.24	33.25		4	4		82.18	48.93	92.47	59.22	33.25	**17.00**	**-2.64**
29	18.33	3.38	198.30	161.07	163.49	126.26	*37.23*		2	2		89.00	123.44	129.25	163.69	*-34.44*	**17.75**	**3.63**
30	18.00	3.26	204.80	173.70	154.91	123.81	*31.10*		2	2		95.50	120.63	151.21	176.35	*-25.13*	**14.69**	**10.03**
31	17.65	3.11	211.80	180.17	156.67	125.04	*31.63*		2	2		102.50	122.47	161.45	181.42	*-19.97*	**10.97**	**9.88**
32	17.35	2.99	217.80	181.67	164.38	128.25	*36.13*		2	2		108.50	125.71	165.81	183.02	*-17.21*	**8.24**	**8.88**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
33	17.02	2.84	224.30	184.45	170.92	131.06	*39.85*	2	2	115.00	128.74	171.83	185.57	*-13.74*	**5.42**	**8.50**
34	16.67	2.69	231.30	188.56	176.21	133.47	*42.74*	2	2	122.00	131.52	179.62	189.14	*-9.52*	**2.50**	**7.75**
***35**	16.33	2.53	238.30	196.93	174.88	133.51	*41.37*	2	2	129.00	131.92	193.94	196.86	*-2.92*	**0.00**	**0.00**
36	15.93	2.27	246.30	195.40	191.96	141.06	*50.90*	2	2	137.00	140.04	191.96	195.01	*-3.04*	**0.00**	**0.00**
37	15.52	2.00	254.30	199.63	199.45	144.78	*54.67*	2	2	145.00	144.21	199.45	198.67	*0.79*	**0.00**	**0.00**
38	15.13	1.72	262.30	203.71	207.21	148.62	*58.59*	2	2	153.00	148.27	207.21	202.48	*4.73*	**0.00**	**0.00**
39	14.73	1.41	270.30	207.75	215.04	152.49	*62.55*	2	2	161.00	152.30	215.04	206.34	*8.70*	**0.00**	**0.00**
40	14.32	1.07	278.30	211.81	222.85	156.37	*66.49*	2	2	169.00	156.34	222.85	210.20	*12.66*	**0.00**	**0.00**
41	13.93	0.65	286.30	215.90	230.64	160.24	*70.40*	2	2	177.00	160.40	230.64	214.04	*16.60*	**0.00**	**0.00**
42	13.52	0.00	294.30	218.99	239.98	164.67	*75.31*	2	2	185.00	163.77	239.98	218.75	*21.23*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.18	11.51	-125.73	109.32	-98.20	85.76

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				8.65
8	13	171.99	171.99	0.00	171.99
10	8				127.16

STAGE 6 : LONG TERM

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	0	50.00	50.00	74666.
2	27.40	5	0	50.00	50.00	74666.
3	27.10	5	0	50.00	50.00	74666.
4	26.80	5	0	50.00	50.00	74666.
5	26.45	5	0	50.00	50.00	74666.
6	26.10	5	0	50.00	50.00	74666.
7	25.75	5	0	50.00	50.00	74666.
8	25.40	5	0	50.00	50.00	118750.
9	25.00	1	0	50.00	50.00	118750.
10	24.60	1	0	50.00	50.00	118750.
11	24.20	1	0	50.00	50.00	118750.
12	23.85	1	0	50.00	50.00	118750.
13	23.50	1	0	50.00	50.00	118750.
14	23.17	1	0	50.00	50.00	118750.
15	22.83	1	1	50.00	50.00	118750.
16	22.52	1	1	50.00	50.00	118750.
17	22.17	1	1	50.00	50.00	118750.
18	21.83	1	1	50.00	50.00	118750.
19	21.62	1	1	50.00	50.00	118750.
20	21.38	4	4	50.00	50.00	118750.
21	21.10	4	4	50.00	50.00	118750.
22	20.80	4	4	50.00	50.00	118750.
23	20.45	4	4	50.00	50.00	118750.
24	20.05	4	4	50.00	50.00	118750.
25	19.65	4	4	50.00	50.00	118750.
26	19.30	4	4	50.00	50.00	118750.
27	18.98	4	4	50.00	50.00	118750.
28	18.67	4	4	50.00	50.00	118750.
29	18.33	3	3	50.00	50.00	118750.
30	18.00	3	3	50.00	50.00	118750.
31	17.65	3	3	50.00	50.00	118750.
32	17.35	3	3	50.00	50.00	118750.
33	17.02	3	3	50.00	50.00	118750.
34	16.67	3	3	50.00	50.00	118750.
*****	***35 16.33***	***3***	***3***	***50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Analysis details
SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00
Wall relaxation 50%		

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 6 : Long term

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 70884. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 119530. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no. error. [mm]	Disp Node no.	Press Node error [kN/m²]	Node no.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	2.1970	1	0.00	1
2	2.2	1	0.2728	1	8.77	1
3	2.5	1	0.2577	1	5.31	2
4	2.7	1	0.2504	1	4.72	3
5	3.0	1	0.2400	1	3.80	4
10	4.0	1	0.1515	1	1.83	7
15	4.6	1	0.0742	1	0.78	8
20	4.9	1	0.0302	1	0.32	12
26	5.0	1	0.0071	1	0.08	12

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Right		Stress Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN]
1	27.70	16.50	21.43	21.43	6.08	6.08	0.00	a	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	15.62	25.70	25.70	7.31	7.31	0.00	a	5	0		0.00	0.00	0.00	0.00	0.00	**-0.27**	**2.01**
3	27.10	14.74	31.40	31.40	8.95	8.95	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-1.21**	**4.45**
4	26.80	13.86	37.10	37.10	10.60	10.60	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-2.94**	**7.51**
5	26.45	12.84	43.75	43.75	12.50	12.50	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-6.18**	**11.42**
6	26.10	11.83	50.40	50.40	14.40	14.40	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-10.94**	**16.13**
7	25.75	10.83	57.05	57.05	16.28	16.28	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-17.47**	**21.50**
8	25.40	9.87	63.70	63.70	18.16	18.16	0.00	a	5	0		0.00	0.00	0.00	0.00	0.00	**-25.99**	**27.75**
9	25.00	8.81	71.30	71.30	25.12	25.12	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-38.45**	**36.18**
10	24.60	7.80	78.90	78.90	27.78	27.78	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-54.93**	**46.76**
11	24.20	6.87	86.50	86.50	30.44	30.44	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-75.86**	**58.02**
12	23.85	6.14	93.15	93.15	32.76	32.76	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-98.16**	**69.46**
13	23.50	5.51	99.80	99.80	43.30	43.30	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-124.48**	**82.50**
	23.50																**-124.48**	**-86.30**
14	23.17	5.03	105.98	105.98	50.19	50.19	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-98.81**	**-70.52**
15	22.83	4.62	112.63	112.63	55.42	55.42	0.00		1	1	p	3.32	3.32	11.36	11.36	0.00	**-77.09**	**-54.89**
16	22.52	4.33	118.33	118.33	59.56	59.56	0.00		1	1	p	9.03	9.03	30.83	30.83	0.00	**-62.77**	**-43.06**
17	22.17	4.05	124.98	124.98	63.80	63.80	0.00		1	1	p	15.68	15.68	53.55	53.55	0.00	**-49.33**	**-36.60**
18	21.83	3.82	131.63	129.88	68.95	67.20	1.75		1	1		22.32	20.57	57.72	55.97	1.75	**-37.15**	**-33.25**
19	21.62	3.70	135.52	131.72	74.02	70.22	3.80		1	1		26.22	22.42	54.23	50.43	3.80	**-30.65**	**-29.49**
20	21.38	3.58	140.08	133.88	64.03	57.83	6.20		4	4		30.78	24.58	54.18	47.98	6.20	**-24.11**	**-26.00**
21	21.10	3.45	145.40	136.40	64.94	55.94	9.00		4	4		36.10	27.10	56.76	47.76	9.00	**-17.18**	**-23.54**
22	20.80	3.33	151.10	139.10	69.55	57.55	12.00		4	4		41.80	29.80	58.40	46.40	12.00	**-10.48**	**-20.54**
23	20.45	3.19	157.75	142.25	74.83	59.33	15.50		4	4		48.45	32.95	63.22	47.72	15.50	**-3.92**	**-16.55**
24	20.05	3.04	165.35	145.85	80.76	61.26	19.50		4	4		56.05	36.55	69.17	49.67	19.50	**1.83**	**-12.06**
25	19.65	2.89	172.95	149.45	87.27	63.77	23.50		4	4		63.65	40.15	74.56	51.06	23.50	**5.72**	**-7.36**
26	19.30	2.75	179.60	152.60	93.74	66.74	27.00		4	4		70.30	43.30	78.74	51.74	27.00	**7.46**	**-2.44**
27	18.98	2.62	185.78	155.53	100.59	70.34	30.25		4	4		76.48	46.23	80.03	49.78	30.25	**7.43**	**3.30**
28	18.67	2.49	191.48	158.23	99.33	66.08	33.25		4	4		82.18	48.93	88.90	55.65	33.25	**5.48**	**8.21**
29	18.33	2.33	198.30	161.55	171.90	135.15	36.75		3	3		89.00	52.25	173.76	137.01	36.75	**2.01**	**9.59**
30	18.00	2.19	204.80	164.80	174.12	134.12	40.00		3	3		95.50	55.50	187.47	147.47	40.00	**-1.00**	**7.02**
31	17.65	2.03	211.80	168.30	180.92	137.42	43.50		3	3		102.50	59.00	193.28	149.78	43.50	**-2.67**	**2.76**
32	17.35	1.89	217.80	171.30	188.28	141.78	46.50		3	3		108.50	62.00	196.19	149.69	46.50	**-2.90**	**-0.48**
33	17.02	1.75	224.30	174.55	196.29	146.54	49.75		3	3		115.00	65.25	200.44	150.69	49.75	**-2.34**	**-2.42**
34	16.67	1.60	231.30	178.05	204.31	151.06	53.25		3	3		122.00	68.75	205.56	152.31	53.25	**-1.25**	**-3.34**
***35**	16.33	1.45	238.30	181.55	217.01	160.26	56.75		3	3		129.00	72.25	207.52	150.77	56.75	**0.00**	**0.00**
36	15.93	1.31	246.30	185.55	219.40	158.65	60.75		3	3		137.00	76.25	219.40	158.65	60.75	**0.00**	**0.00**
37	15.52	1.15	254.30	189.55	227.27	162.52	64.75		3	3		145.00	80.25	227.27	162.52	64.75	**0.00**	**0.00**
38	15.13	0.98	262.30	193.55	235.15	166.40	68.75		3	3		153.00	84.25	235.15	166.40	68.75	**0.00**	**0.00**
39	14.73	0.80	270.30	197.55	243.10	170.35	72.75		3	3		161.00	88.25	243.10	170.35	72.75	**0.00**	**0.00**
40	14.32	0.61	278.30	201.55	251.03	174.28	76.75		3	3		169.00	92.25	251.03	174.28	76.75	**0.00**	**0.00**
41	13.93	0.37	286.30	205.55	259.02	178.27	80.75		3	3		177.00	96.25	259.02	178.27	80.75	**0.00**	**0.00**
42	13.52	0.00	294.30	209.55	267.19	182.44	84.75		3	3		185.00	100.25	267.19	182.44	84.75	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min		Max	Min	Max	Min	Max
-0.18		16.50	-125.73	109.32	-98.20	85.76

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				8.65
8	13	168.80	168.80	0.00	171.99
10	8				127.16

Results Envelope

Node	Level [m]	Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
1	27.70	-0.18	16.50	0.00	0.00	0.00	0.00
2	27.40	0.00	15.62	-0.53	0.00	-5.33	3.32
3	27.10	0.00	14.74	-1.21	0.60	-1.87	4.46
4	26.80	0.00	13.86	-2.95	0.79	0.00	7.53
5	26.45	0.00	12.84	-6.19	0.46	0.00	11.45
6	26.10	0.00	11.83	-10.97	0.00	0.00	16.16
7	25.75	0.00	10.83	-17.51	0.00	0.00	21.55
8	25.40	0.00	9.87	-26.05	0.00	-98.20	28.96
9	25.00	0.00	8.81	-38.55	17.91	-86.51	36.28
10	24.60	0.00	7.80	-55.08	49.62	-71.52	46.90
11	24.20	0.00	6.87	-76.07	75.13	-56.02	58.19
12	23.85	0.00	6.14	-98.44	92.02	-40.58	70.95
13	23.50	0.00	5.53	-125.73	103.54	-86.30	85.76
14	23.17	0.00	5.25	-100.23	109.12	-70.52	0.00
15	22.83	0.00	5.09	-78.76	109.32	-54.89	6.06
16	22.52	0.00	5.22	-64.61	105.51	-43.06	16.64
17	22.17	0.00	5.32	-51.28	98.30	-36.60	21.31
18	21.83	0.00	5.37	-39.06	90.59	-33.39	23.18
19	21.62	0.00	5.38	-32.53	85.61	-29.85	25.69
20	21.38	0.00	5.37	-25.85	79.11	-26.83	26.44
21	21.10	0.00	5.33	-18.62	71.88	-24.99	24.67
22	20.80	0.00	5.27	-11.37	64.82	-22.79	22.76
23	20.45	0.00	5.16	-3.92	57.13	-19.81	21.13
24	20.05	0.00	5.00	0.00	49.02	-16.56	19.41
25	19.65	0.00	4.81	0.00	41.60	-13.27	18.17
26	19.30	0.00	4.62	0.00	35.37	-9.83	18.10
27	18.98	0.00	4.43	0.00	29.39	-5.59	20.06
28	18.67	0.00	4.24	0.00	22.88	-2.64	20.76
29	18.33	0.00	4.01	0.00	17.75	0.00	22.02
30	18.00	0.00	3.79	-1.00	14.69	0.00	20.41
31	17.65	0.00	3.54	-2.67	10.97	0.00	12.27
32	17.35	0.00	3.33	-2.90	8.24	-0.48	8.88
33	17.02	0.00	3.10	-2.34	5.42	-2.42	8.50
34	16.67	0.00	2.86	-1.25	2.50	-3.34	7.75
***35**	**16.33**	***0.00***	***2.61***	***0.00***	***0.00***	***0.00***	***0.00***
36	15.93	0.00	2.35	0.00	0.00	0.00	0.00
37	15.52	0.00	2.08	0.00	0.00	0.00	0.00
38	15.13	0.00	1.78	0.00	0.00	0.00	0.00
39	14.73	0.00	1.46	0.00	0.00	0.00	0.00
40	14.32	0.00	1.10	0.00	0.00	0.00	0.00
41	13.93	0.00	0.67	0.00	0.00	0.00	0.00
42	13.52	0.00	0.00	0.00	0.00	0.00	0.00

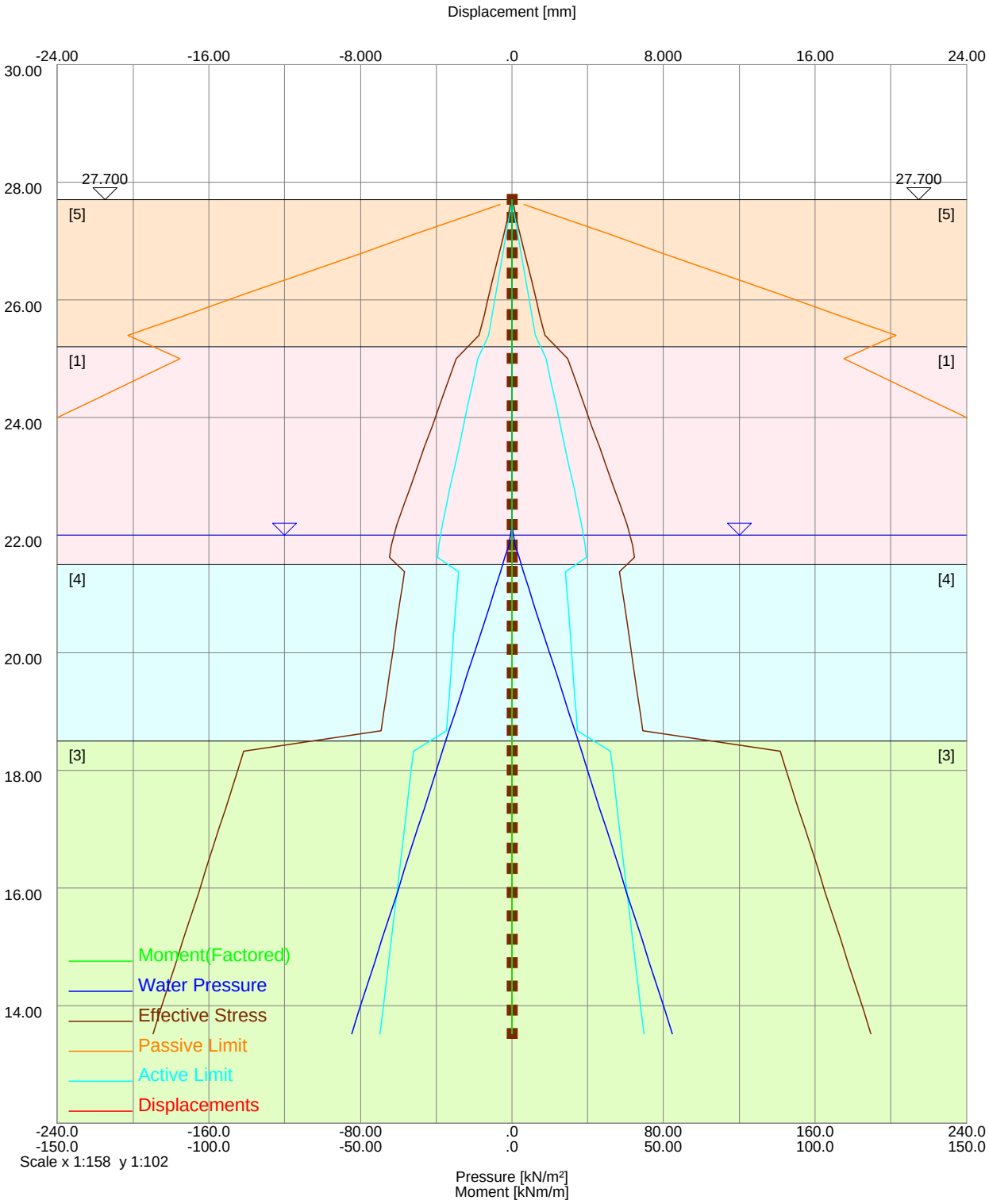
ARUP

Fitzrovia
Contigous Wall
Zone A

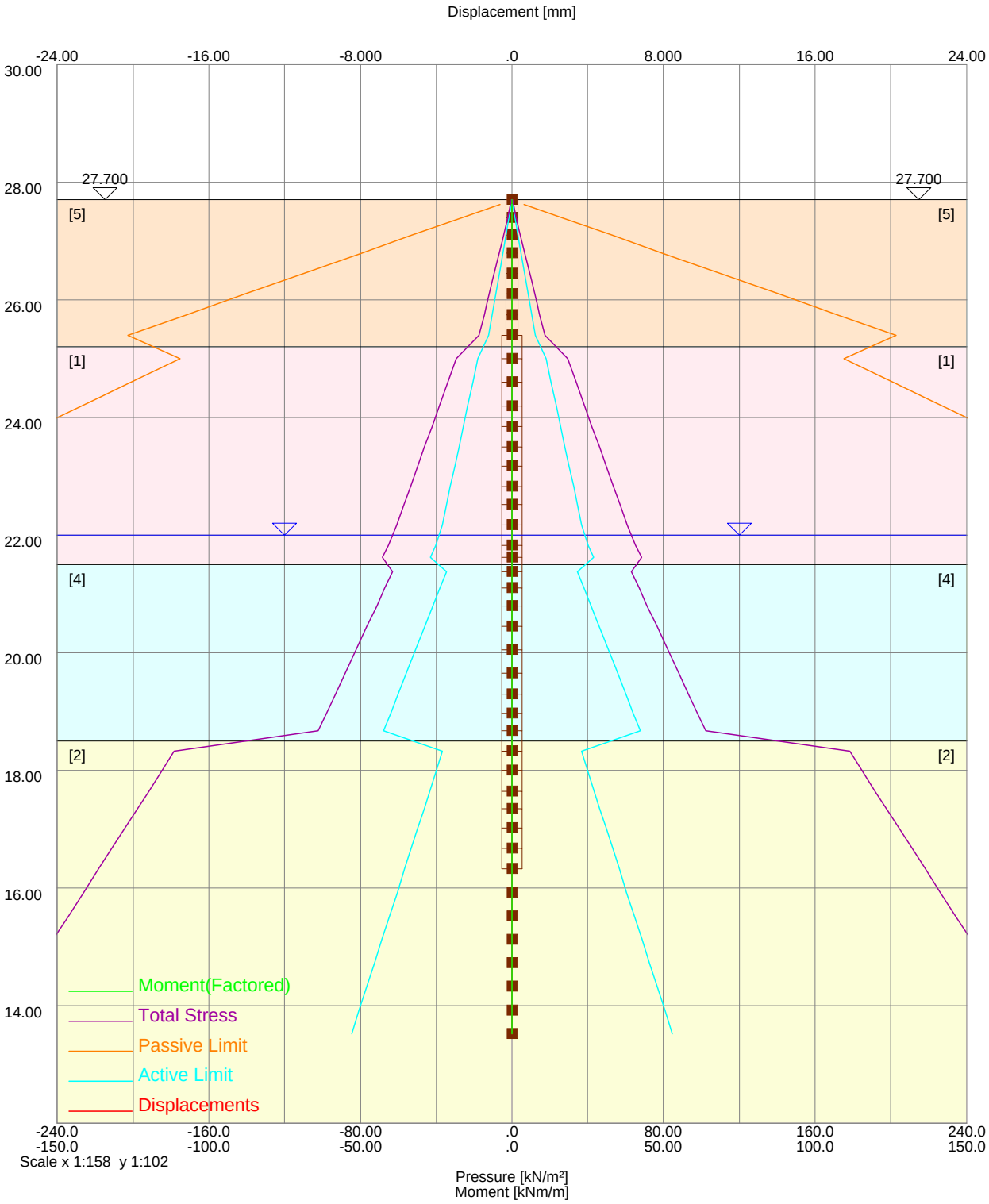
Job No.	Sheet No.	Rev.
207329		

Drg. Ref.

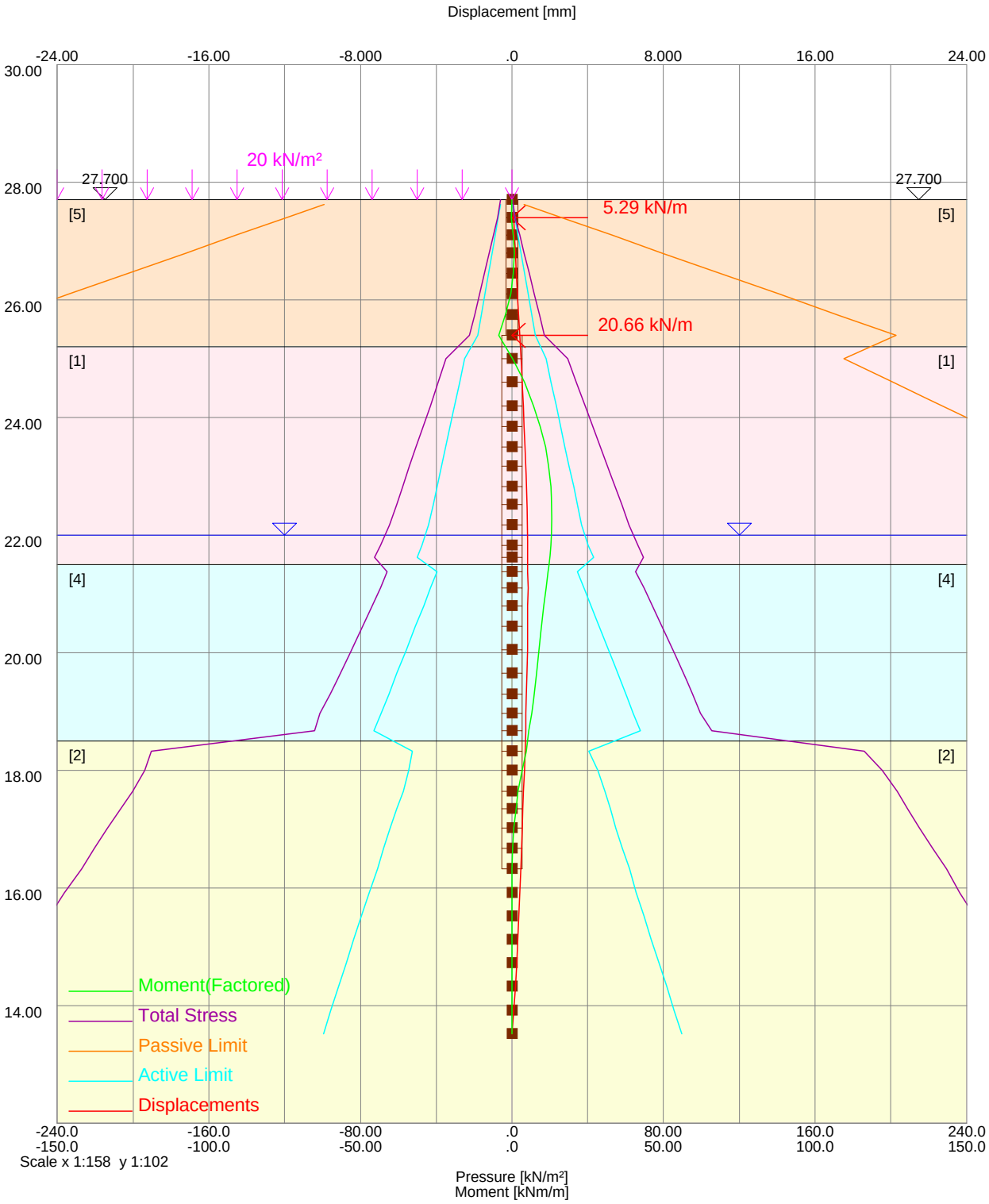
Made by	Date	Checked
SB		



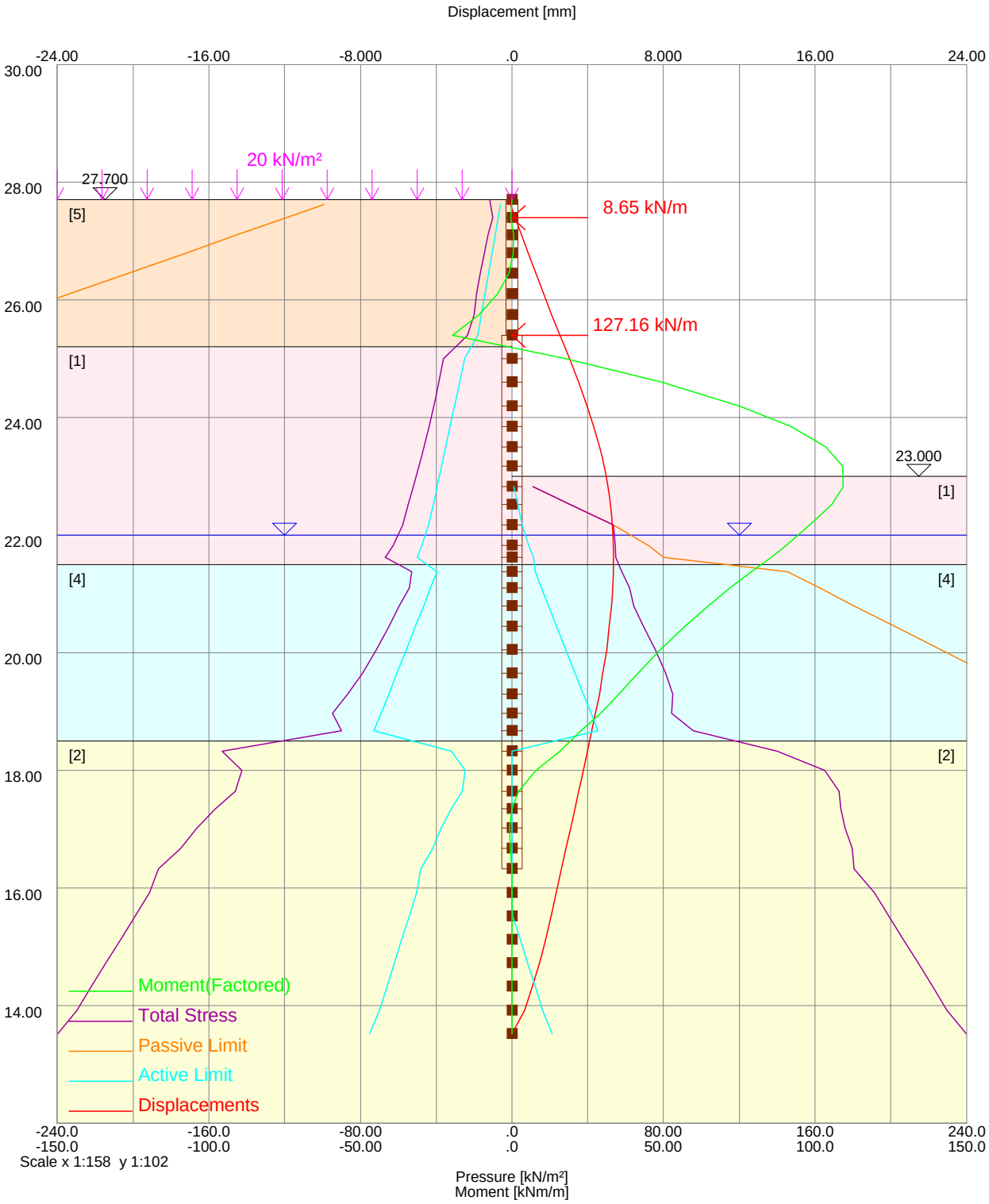
STAGE 0 : Initial condition



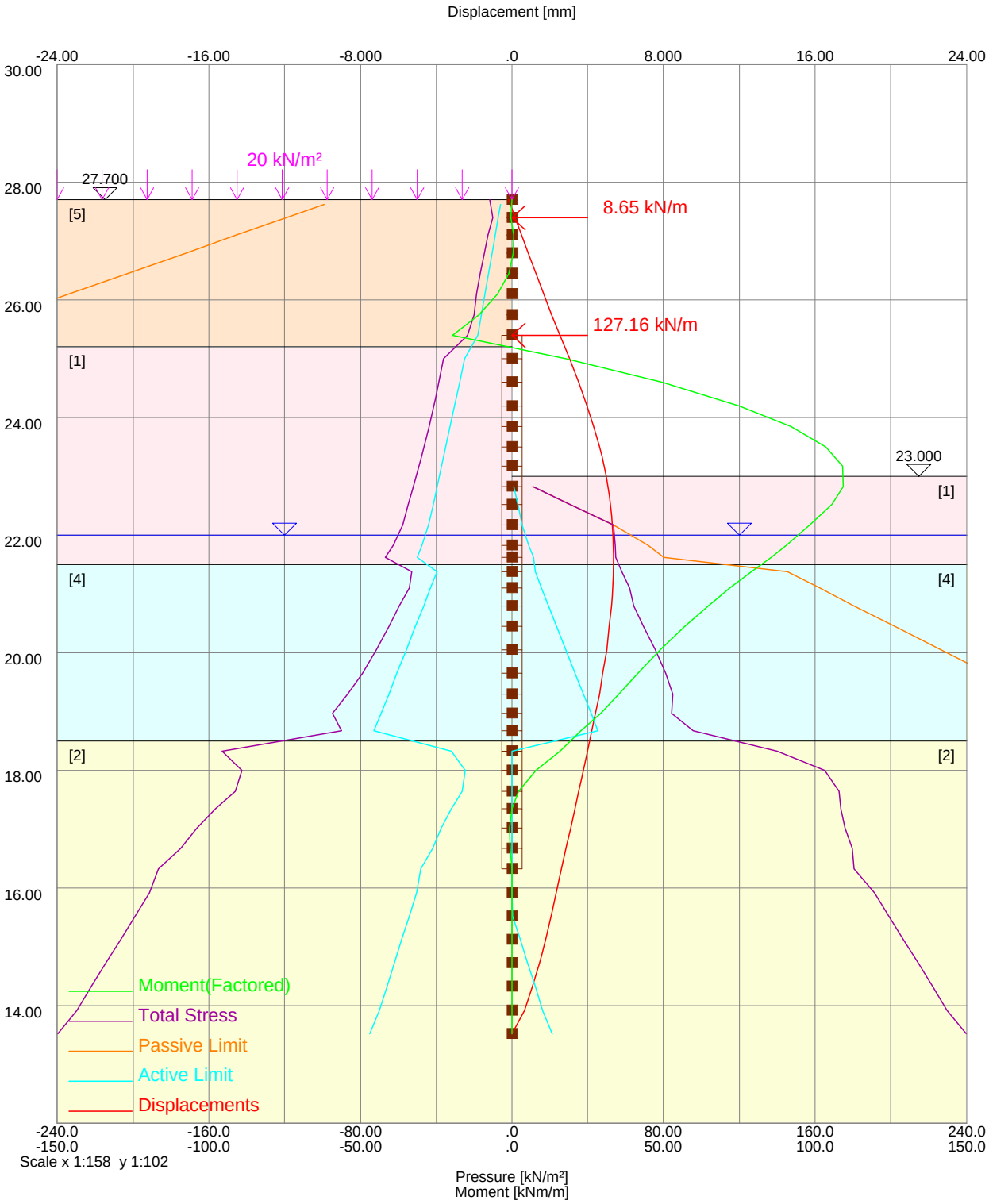
STAGE 1 : Add retaining wall



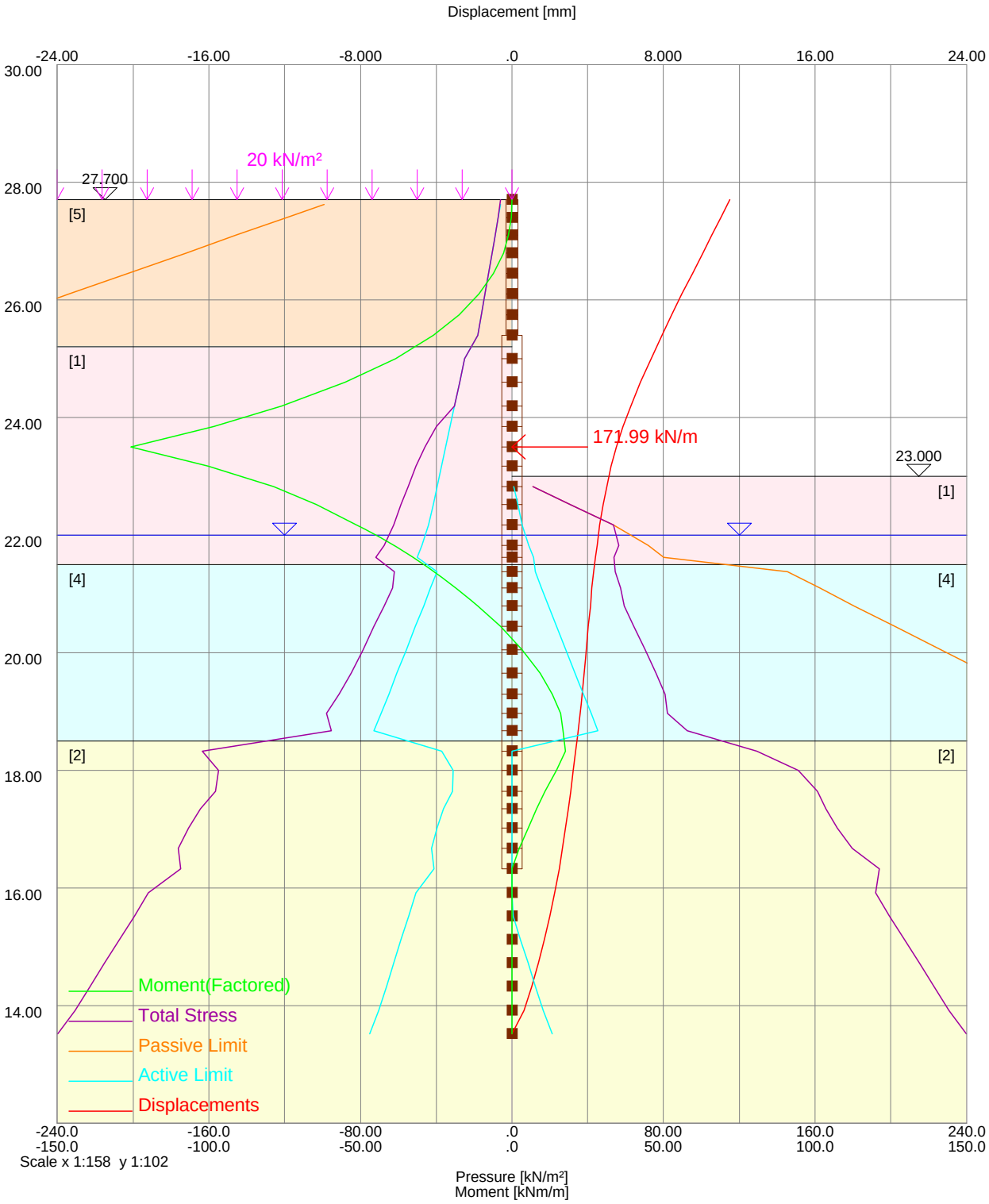
STAGE 2 : prop and surcharge



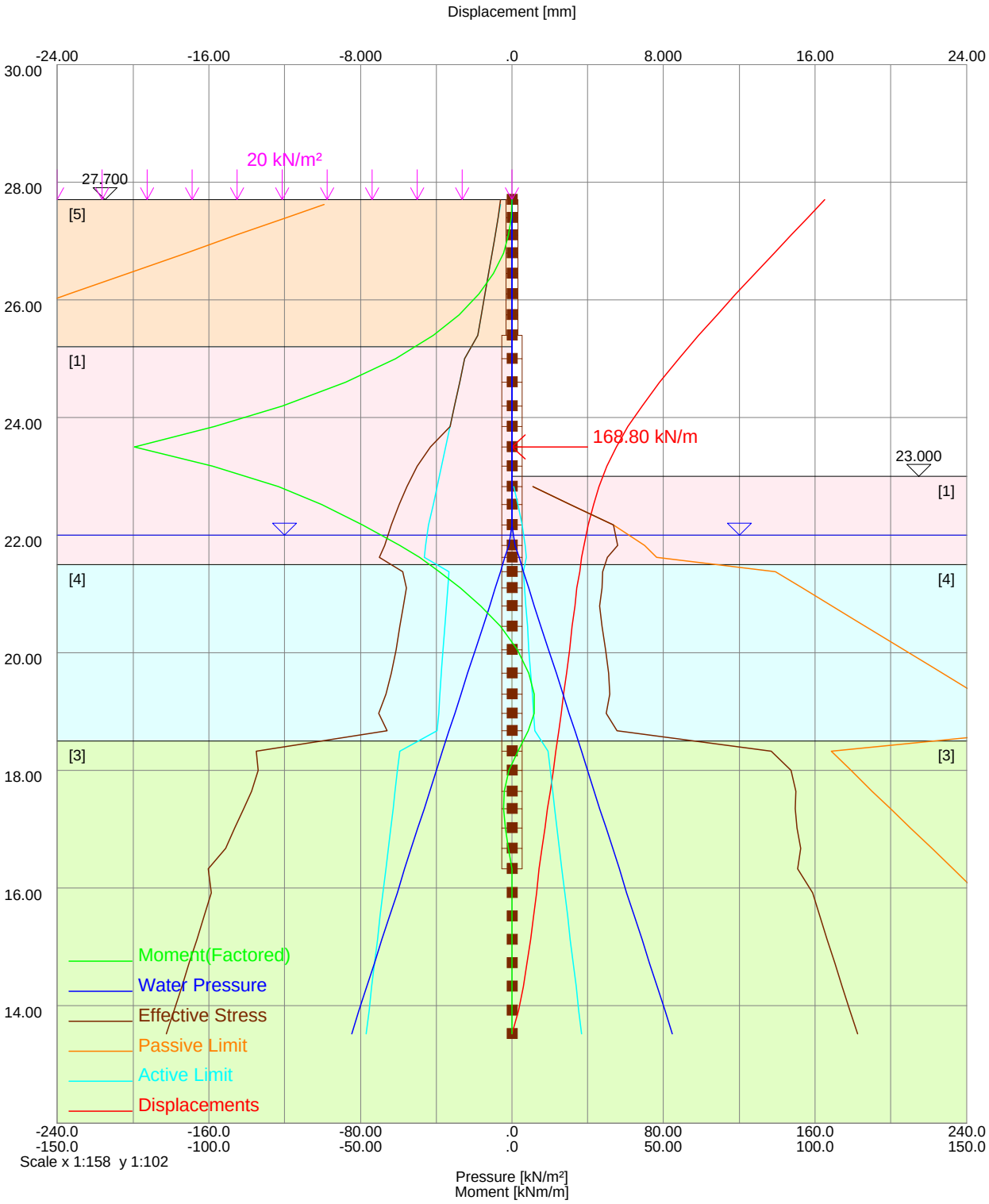
STAGE 3 : Excavation



STAGE 3 : Excavation



STAGE 5 : Remove prop1



STAGE 6 : Long term

INITIAL DATA

Notes
600 mm dia at 750 centres.

Soil properties

No.	Description	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
2	London Clay - Und	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
3	London Clay - Drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
4	RiverTerrace	19.00	0.50	0.25	5.66	1.00	4.76	0.25	Calculated
5	Made Ground behind lightwell	19.00	0.40	0.29	4.64	1.07	4.31	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	0.00	0.00	0.00	10000.	0.00	Drained
2	100.00	18.50	6.50	100000.	6500.00	Undrained
3	0.00	18.50	0.00	80000.	5200.00	Drained
4	0.00	0.00	0.00	20000.	0.00	Drained
5	0.00	0.00	0.00	20000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	25.00	0.67	0.00	0.00
2	0.00	0.67	0.00	0.50
3	24.00	0.67	0.00	0.00
4	33.00	0.67	0.00	0.00
5	30.00	0.67	0.00	0.00

Soil Strength Partial Factors

Document and case:	tan Phi'	c'	Cu	E
EC7 DA1 Combination 1 (2011)	1.00	1.00	1.00	1.00

Note: Only the parameters in bold have been affected by Partial Factors,
No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	19.00	0.58	**0.35**	**3.42**	**1.19**	**3.70**	0.25	Calculated
2	20.00	1.00	**1.00**	**1.00**	**2.45**	**2.45**	1.00	Calculated
3	20.00	1.00	**0.37**	**3.22**	**1.21**	**3.59**	0.25	Calculated
4	19.00	0.50	**0.25**	**5.66**	**1.00**	**4.76**	0.25	Calculated
5	19.00	0.40	**0.29**	**4.64**	**1.07**	**4.31**	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	**0.00**	0.00	**0.00**	**10000.**	**0.00**	Drained
2	**100.00**	18.50	**6.50**	**100000.**	**6500.00**	Undrained
3	**0.00**	18.50	**0.00**	**80000.**	**5200.00**	Drained
4	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained
5	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	**25.00**	0.67	0.00	0.00
2	**0.00**	0.67	0.00	0.50
3	**24.00**	0.67	0.00	0.00
4	**33.00**	0.67	0.00	0.00
5	**30.00**	0.67	0.00	0.00

Surcharge properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Partial Offset Factor [m]	Width [m]	Ks
1	2	-	Left	27.70	22.20	1.00		
2	4	-	Right	23.00	0.00	1.00		

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

Surcharge Design properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	22.20			
2	4	-	Right	23.00	0.00			

Strut properties

No.	Stage In	Stage Out	Node	Level [m]	Prestress [kN/m]	Stiffness [kN/m/m]	Angle [°]	Lever arm [m]
1	2	5	2	27.40	0.00	50000.00	0.00	0.00
2	-	-	3	27.10	0.00	50000.00	0.00	0.00
3	-	-	4	26.80	0.00	50000.00	0.00	0.00
4	-	-	5	26.45	0.00	50000.00	0.00	0.00
5	-	-	6	26.10	0.00	50000.00	0.00	0.00
6	-	-	7	25.75	0.00	50000.00	0.00	0.00
7	-	-	9	25.00	0.00	50000.00	0.00	0.00
8	4	-	13	23.50	0.00	194444.00	0.00	0.00
9	-	-	4	26.80	0.00	50000.00	0.00	0.00
10	2	5	8	25.40	0.00	50000.00	0.00	0.00

STAGE 0 : INITIAL CONDITION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	5	50.00	50.00	149330.
2	27.40	5	5	50.00	50.00	149330.
3	27.10	5	5	50.00	50.00	149330.
4	26.80	5	5	50.00	50.00	149330.
5	26.45	5	5	50.00	50.00	149330.
6	26.10	5	5	50.00	50.00	149330.
7	25.75	5	5	50.00	50.00	149330.
8	25.40	5	5	50.00	50.00	237500.
9	25.00	1	1	50.00	50.00	237500.
10	24.60	1	1	50.00	50.00	237500.
11	24.20	1	1	50.00	50.00	237500.
12	23.85	1	1	50.00	50.00	237500.
13	23.50	1	1	50.00	50.00	237500.
14	23.17	1	1	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
29	18.33	3	3	50.00	50.00	237500.
30	18.00	3	3	50.00	50.00	237500.
31	17.65	3	3	50.00	50.00	237500.
32	17.35	3	3	50.00	50.00	237500.
33	17.02	3	3	50.00	50.00	237500.
34	16.67	3	3	50.00	50.00	237500.
* **35**	**16.33**	**3**	**3**	**50.00**	**50.00**	**0.0**
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

** Wall toe level: 16.33*

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00

Convergence control parameters

Maximum number of iterations : 9000
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 0 : Initial condition

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.57	0.57	0.00	5	5	1.43	1.43	0.57	0.57	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	2.28	2.28	0.00	5	5	5.70	5.70	2.28	2.28	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	4.56	4.56	0.00	5	5	11.40	11.40	4.56	4.56	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	6.84	6.84	0.00	5	5	17.10	17.10	6.84	6.84	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	9.50	9.50	0.00	5	5	23.75	23.75	9.50	9.50	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	12.16	12.16	0.00	5	5	30.40	30.40	12.16	12.16	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	14.82	14.82	0.00	5	5	37.05	37.05	14.82	14.82	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	17.48	17.48	0.00	5	5	43.70	43.70	17.48	17.48	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	36.75	3	3	178.30	141.55	178.30	141.55	36.75	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	40.00	3	3	184.80	144.80	184.80	144.80	40.00	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	43.50	3	3	191.80	148.30	191.80	148.30	43.50	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	46.50	3	3	197.80	151.30	197.80	151.30	46.50	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	49.75	3	3	204.30	154.55	204.30	154.55	49.75	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	53.25	3	3	211.30	158.05	211.30	158.05	53.25	**0.00**	**0.00**
35	16.33	0.00	218.30	161.55	218.30	161.55	56.75	3	3	218.30	161.55	218.30	161.55	56.75	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	60.75	3	3	226.30	165.55	226.30	165.55	60.75	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	64.75	3	3	234.30	169.55	234.30	169.55	64.75	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	68.75	3	3	242.30	173.55	242.30	173.55	68.75	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	72.75	3	3	250.30	177.55	250.30	177.55	72.75	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	76.75	3	3	258.30	181.55	258.30	181.55	76.75	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	80.75	3	3	266.30	185.55	266.30	185.55	80.75	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	84.75	3	3	274.30	189.55	274.30	189.55	84.75	**0.00**	**0.00**

NOTE: Displacements from STAGE 0 are disregarded in later stages

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

STAGE 1 : ADD RETAINING WALL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	5	50.00	50.00	149330.
2	27.40	5	5	50.00	50.00	149330.
3	27.10	5	5	50.00	50.00	149330.
4	26.80	5	5	50.00	50.00	149330.
5	26.45	5	5	50.00	50.00	149330.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
6	26.10	5	5	50.00	50.00	149330.
7	25.75	5	5	50.00	50.00	149330.
8	25.40	5	5	50.00	50.00	237500.
9	25.00	1	1	50.00	50.00	237500.
10	24.60	1	1	50.00	50.00	237500.
11	24.20	1	1	50.00	50.00	237500.
12	23.85	1	1	50.00	50.00	237500.
13	23.50	1	1	50.00	50.00	237500.
14	23.17	1	1	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

**** Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 1 : Add retaining wall

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc Node max displ [mm]	Node no. error. [mm]	Disp Node no.	Press Node error [kN/m²]	Node no.
1	0.0	1 0.0000	1	0.00	1
2	0.0	1 0.0000	1	0.00	1
3	0.0	1 0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.00	1.43	1.43	0.57	0.57	0.00	5	5	1.43	1.43	0.57	0.57	0.00	**0.00**	**0.00**
2	27.40	0.00	5.70	5.70	2.28	2.28	0.00	5	5	5.70	5.70	2.28	2.28	0.00	**0.00**	**0.00**
3	27.10	0.00	11.40	11.40	4.56	4.56	0.00	5	5	11.40	11.40	4.56	4.56	0.00	**0.00**	**0.00**
4	26.80	0.00	17.10	17.10	6.84	6.84	0.00	5	5	17.10	17.10	6.84	6.84	0.00	**0.00**	**0.00**
5	26.45	0.00	23.75	23.75	9.50	9.50	0.00	5	5	23.75	23.75	9.50	9.50	0.00	**0.00**	**0.00**
6	26.10	0.00	30.40	30.40	12.16	12.16	0.00	5	5	30.40	30.40	12.16	12.16	0.00	**0.00**	**0.00**
7	25.75	0.00	37.05	37.05	14.82	14.82	0.00	5	5	37.05	37.05	14.82	14.82	0.00	**0.00**	**0.00**
8	25.40	0.00	43.70	43.70	17.48	17.48	0.00	5	5	43.70	43.70	17.48	17.48	0.00	**0.00**	**0.00**
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	**0.00**	**0.00**
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	**0.00**	**0.00**
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	**0.00**	**0.00**
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	**0.00**	**0.00**
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	**0.00**	**0.00**
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	**0.00**	**0.00**
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	**0.00**	**0.00**
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	**0.00**	**0.00**
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	**0.00**	**0.00**
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	**0.00**	**0.00**
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	**0.00**	**0.00**
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	**0.00**	**0.00**
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	**0.00**	**0.00**
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	**0.00**	**0.00**
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	**0.00**	**0.00**
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	**0.00**	**0.00**
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	**0.00**	**0.00**
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	**0.00**	**0.00**
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	**0.00**	**0.00**
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	**0.00**	**0.00**
29	18.33	0.00	178.30	141.55	178.30	141.55	*36.75*	2	2	178.30	141.55	178.30	141.55	*36.75*	**0.00**	**0.00**
30	18.00	0.00	184.80	144.80	184.80	144.80	*40.00*	2	2	184.80	144.80	184.80	144.80	*40.00*	**0.00**	**0.00**
31	17.65	0.00	191.80	148.30	191.80	148.30	*43.50*	2	2	191.80	148.30	191.80	148.30	*43.50*	**0.00**	**0.00**
32	17.35	0.00	197.80	151.30	197.80	151.30	*46.50*	2	2	197.80	151.30	197.80	151.30	*46.50*	**0.00**	**0.00**
33	17.02	0.00	204.30	154.55	204.30	154.55	*49.75*	2	2	204.30	154.55	204.30	154.55	*49.75*	**0.00**	**0.00**
34	16.67	0.00	211.30	158.05	211.30	158.05	*53.25*	2	2	211.30	158.05	211.30	158.05	*53.25*	**0.00**	**0.00**
***35**	16.33	0.00	218.30	161.55	218.30	161.55	*56.75*	2	2	218.30	161.55	218.30	161.55	*56.75*	**0.00**	**0.00**
36	15.93	0.00	226.30	165.55	226.30	165.55	*60.75*	2	2	226.30	165.55	226.30	165.55	*60.75*	**0.00**	**0.00**
37	15.52	0.00	234.30	169.55	234.30	169.55	*64.75*	2	2	234.30	169.55	234.30	169.55	*64.75*	**0.00**	**0.00**
38	15.13	0.00	242.30	173.55	242.30	173.55	*68.75*	2	2	242.30	173.55	242.30	173.55	*68.75*	**0.00**	**0.00**
39	14.73	0.00	250.30	177.55	250.30	177.55	*72.75*	2	2	250.30	177.55	250.30	177.55	*72.75*	**0.00**	**0.00**
40	14.32	0.00	258.30	181.55	258.30	181.55	*76.75*	2	2	258.30	181.55	258.30	181.55	*76.75*	**0.00**	**0.00**
41	13.93	0.00	266.30	185.55	266.30	185.55	*80.75*	2	2	266.30	185.55	266.30	185.55	*80.75*	**0.00**	**0.00**
42	13.52	0.00	274.30	189.55	274.30	189.55	*84.75*	2	2	274.30	189.55	274.30	189.55	*84.75*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
-0.17	17.14	-177.21	149.64	-134.57	118.87

STAGE 2 : PROP AND SURCHARGE

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 2 : prop and surcharge

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 1 inserted at this stage
Strut no 10 inserted at this stage
Surcharge no. 1 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc displ [mm]	Node max [mm]	Disp no. error.	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.9489	21	0.61	1
2	0.9	21	0.0006	1	0.64	1
3	0.9	21	0.0008	1	0.81	1
4	0.9	21	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	0.07	23.63	23.63	6.93	6.93	0.00	5	5 a	1.43	1.43	0.41	0.41	0.00	**0.00**	**0.00**
2	27.40	0.12	27.90	27.90	8.23	8.23	0.00	5	5 A	5.70	5.70	1.63	1.63	0.00	**-0.40**	**2.66**
	27.40														**-0.40**	**-5.27**
3	27.10	0.17	33.60	33.60	10.53	10.53	0.00	5	5	11.40	11.40	4.15	4.15	0.00	**0.78**	**-2.64**
4	26.80	0.22	39.30	39.30	12.78	12.78	0.00	5	5	17.10	17.10	6.45	6.45	0.00	**1.19**	**0.04**
5	26.45	0.28	45.95	45.95	15.39	15.39	0.00	5	5	23.75	23.75	9.16	9.16	0.00	**0.69**	**2.89**
6	26.10	0.34	52.60	52.60	17.93	17.93	0.00	5	5	30.40	30.40	11.94	11.94	0.00	**-0.84**	**5.78**
7	25.75	0.40	59.25	59.25	20.44	20.44	0.00	5	5	37.05	37.05	14.75	14.75	0.00	**-3.35**	**8.54**
8	25.40	0.46	65.90	65.90	23.27	23.27	0.00	5	5	43.70	43.70	17.24	17.24	0.00	**-6.81**	**11.40**
	25.40														**-6.81**	**-19.55**
9	25.00	0.53	73.50	73.50	35.59	35.59	0.00	1	1	51.30	51.30	29.47	29.47	0.00	**0.40**	**-16.37**
10	24.60	0.61	81.10	81.10	39.72	39.72	0.00	1	1	58.90	58.90	34.15	34.15	0.00	**6.29**	**-13.22**
11	24.20	0.68	88.70	88.70	43.87	43.87	0.00	1	1	66.50	66.50	38.82	38.82	0.00	**10.97**	**-10.43**
12	23.85	0.73	95.35	95.35	47.53	47.53	0.00	1	1	73.15	73.15	42.87	42.87	0.00	**14.18**	**-8.06**
13	23.50	0.78	102.00	102.00	51.21	51.21	0.00	1	1	79.80	79.80	46.91	46.91	0.00	**16.61**	**-5.98**
14	23.17	0.83	108.18	108.18	54.62	54.62	0.00	1	1	85.98	85.98	50.66	50.66	0.00	**18.24**	**-4.10**
15	22.83	0.87	114.83	114.83	58.32	58.32	0.00	1	1	92.63	92.63	54.68	54.68	0.00	**19.35**	**-2.40**
16	22.52	0.89	120.53	120.53	61.53	61.53	0.00	1	1	98.33	98.33	58.08	58.08	0.00	**19.83**	**-0.84**
17	22.17	0.92	127.18	127.18	65.15	65.15	0.00	1	1	104.98	104.98	62.17	62.17	0.00	**19.86**	**0.62**
18	21.83	0.94	133.83	132.08	69.77	68.02	1.75	1	1	111.63	109.88	66.74	64.99	1.75	**19.40**	**1.89**
19	21.62	0.94	137.72	133.92	73.04	69.24	3.80	1	1	115.52	111.72	69.71	65.91	3.80	**18.89**	**2.96**
20	21.38	0.95	142.28	136.08	66.22	60.02	6.20	4	4	120.08	113.88	65.61	59.41	6.20	**18.06**	**3.57**
21	21.10	0.95	147.60	138.60	69.78	60.78	9.00	4	4	125.40	116.40	70.17	61.17	9.00	**17.04**	**3.60**
22	20.80	0.95	153.30	141.30	74.19	62.19	12.00	4	4	131.10	119.10	74.46	62.46	12.00	**15.98**	**3.46**
23	20.45	0.94	159.95	144.45	79.26	63.76	15.50	4	4	137.75	122.25	79.54	64.04	15.50	**14.79**	**3.33**
24	20.05	0.92	167.55	148.05	85.09	65.59	19.50	4	4	145.35	125.85	85.31	65.81	19.50	**13.48**	**3.21**
25	19.65	0.90	175.15	151.65	91.10	67.60	23.50	4	4	152.95	129.45	90.90	67.40	23.50	**12.22**	**3.20**
26	19.30	0.87	181.80	154.80	96.56	69.56	27.00	4	4	159.60	132.60	95.59	68.59	27.00	**11.09**	**3.47**
27	18.98	0.84	187.97	157.72	101.82	71.57	30.25	4	4	165.78	135.53	99.75	69.50	30.25	**9.89**	**4.13**
28	18.67	0.81	193.68	160.43	104.50	71.25	33.25	4	4	171.48	138.23	105.78	72.53	33.25	**8.52**	**4.28**
29	18.33	0.78	200.50	145.96	191.84	137.30	*54.54*	2	2	178.30	137.28	186.96	145.94	*41.02*	**7.12**	**5.11**
30	18.00	0.74	207.00	150.96	194.97	138.93	*56.04*	2	2	184.80	138.90	196.82	150.92	*45.90*	**5.10**	**5.80**
31	17.65	0.70	214.00	154.94	201.05	141.99	*59.06*	2	2	191.80	141.95	204.74	154.89	*49.85*	**3.21**	**4.57**
32	17.35	0.66	220.00	157.58	207.73	145.31	*62.42*	2	2	197.80	145.27	210.07	157.54	*52.53*	**2.09**	**3.27**
33	17.02	0.62	226.50	160.63	214.60	148.74	*65.87*	2	2	204.30	148.70	216.19	160.60	*55.60*	**1.18**	**2.41**
34	16.67	0.58	233.50	164.11	221.64	152.25	*69.39*	2	2	211.30	152.22	223.16	164.07	*59.08*	**0.47**	**1.69**
***35**	16.33	0.54	240.50	167.90	228.08	155.48	*72.60*	2	2	218.30	155.44	230.72	167.86	*62.86*	**0.00**	**0.00**
36	15.93	0.48	248.50	171.21	237.40	160.11	*77.29*	2	2	226.30	160.08	237.40	171.18	*66.22*	**0.00**	**0.00**
37	15.52	0.42	256.50	175.21	245.40	164.11	*81.29*	2	2	234.30	164.08	245.40	175.18	*70.22*	**0.00**	**0.00**
38	15.13	0.36	264.50	179.20	253.40	168.10	*85.30*	2	2	242.30	168.08	253.40	179.18	*74.22*	**0.00**	**0.00**
39	14.73	0.29	272.50	183.20	261.40	172.10	*89.30*	2	2	250.30	172.07	261.40	183.17	*78.23*	**0.00**	**0.00**
40	14.32	0.22	280.50	187.20	269.40	176.10	*93.30*	2	2	258.30	176.07	269.40	187.17	*82.23*	**0.00**	**0.00**
41	13.93	0.13	288.50	191.20	277.40	180.10	*97.30*	2	2	266.30	180.07	277.40	191.17	*86.23*	**0.00**	**0.00**
42	13.52	0.00	296.50	195.19	285.40	184.09	*101.31*	2	2	274.30	184.07	285.40	195.17	*90.23*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

***** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
-0.17	17.14	-177.21	149.64	-134.57	118.87

Surcharge 1 present in this stage

Displacements [mm] Moments [kNm/m] Shears [kN/m]
Min Max Min Max Min Max

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	5.87	5.87	0.00	5.87
10	8	22.93	22.93	0.00	22.93

STAGE 3 : EXCAVATION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	0	50.00	50.00	149330.
2	27.40	5	0	50.00	50.00	149330.
3	27.10	5	0	50.00	50.00	149330.
4	26.80	5	0	50.00	50.00	149330.
5	26.45	5	0	50.00	50.00	149330.
6	26.10	5	0	50.00	50.00	149330.
7	25.75	5	0	50.00	50.00	149330.
8	25.40	5	0	50.00	50.00	237500.
9	25.00	1	0	50.00	50.00	237500.
10	24.60	1	0	50.00	50.00	237500.
11	24.20	1	0	50.00	50.00	237500.
12	23.85	1	0	50.00	50.00	237500.
13	23.50	1	0	50.00	50.00	237500.
14	23.17	1	0	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*****	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

***** *Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	25.40	0.00	5.00	25.40	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	0.00	0.00	0.00	0.00	0.00	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 3 : Excavation

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	4.5101	19	20.99	15
2	4.5	19	0.0180	13	18.34	16
3	4.5	19	0.0067	13	7.36	16
4	4.5	19	0.0047	14	3.54	17
5	4.5	19	0.0024	14	1.64	17
9	4.5	19	0.0000	13	0.05	16

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-0.17	23.63	23.63	12.46	12.46	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	0.18	27.90	27.90	10.88	10.88	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-0.76**	**4.73**
	27.40															**-0.76**	**-7.67**
3	27.10	0.54	33.60	33.60	13.39	13.39	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.88**	**-2.76**
4	26.80	0.90	39.30	39.30	15.42	15.42	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.90**	**3.34**
5	26.45	1.32	45.95	45.95	17.65	17.65	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-1.46**	**10.89**
6	26.10	1.73	52.60	52.60	19.38	19.38	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-6.73**	**19.64**
7	25.75	2.16	59.25	59.25	20.79	20.79	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-15.21**	**29.13**
8	25.40	2.59	65.90	65.90	24.31	24.31	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-27.12**	**40.20**
	25.40															**-27.12**	**-134.57**
9	25.00	3.09	73.50	73.50	36.77	36.77	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**24.25**	**-118.49**
10	24.60	3.59	81.10	81.10	39.31	39.31	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**67.67**	**-97.95**
11	24.20	4.05	88.70	88.70	41.87	41.87	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**102.61**	**-76.74**
12	23.85	4.41	95.35	95.35	44.40	44.40	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**125.75**	**-55.65**
13	23.50	4.72	102.00	102.00	47.09	47.09	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**141.56**	**-34.43**
14	23.17	4.97	108.18	108.18	49.63	49.63	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**149.26**	**-12.39**
15	22.83	5.17	114.83	114.83	52.65	52.65	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	**149.64**	**7.97**
16	22.52	5.31	120.53	120.53	55.51	55.51	0.00	1	1	P	9.03	9.03	30.78	30.78	0.00	**144.53**	**22.45**
17	22.17	5.41	127.18	127.18	58.09	58.09	0.00	1	1	P	15.68	15.68	53.53	53.53	0.00	**134.78**	**28.95**
18	21.83	5.46	133.83	132.08	63.32	61.57	1.75	1	1		22.32	20.57	54.97	53.22	1.75	**124.27**	**31.59**
19	21.62	5.47	137.72	133.92	67.56	63.76	3.80	1	1		26.22	22.42	54.97	51.17	3.80	**117.47**	**35.05**
20	21.38	5.46	142.28	136.08	53.47	47.27	6.20	4	4		30.78	24.58	58.28	52.08	6.20	**108.60**	**36.10**
21	21.10	5.43	147.60	138.60	54.58	45.58	9.00	4	4		36.10	27.10	62.52	53.52	9.00	**98.73**	**33.70**
22	20.80	5.36	153.30	141.30	59.79	47.79	12.00	4	4		41.80	29.80	64.60	52.60	12.00	**89.09**	**31.09**
23	20.45	5.25	159.95	144.45	65.32	49.82	15.50	4	4		48.45	32.95	69.92	54.42	15.50	**78.58**	**28.87**
24	20.05	5.09	167.55	148.05	71.86	52.36	19.50	4	4		56.05	36.55	76.20	56.70	19.50	**67.49**	**26.53**
25	19.65	4.90	175.15	151.65	79.37	55.87	23.50	4	4		63.65	40.15	81.40	57.90	23.50	**57.35**	**24.85**
26	19.30	4.71	181.80	154.80	87.10	60.10	27.00	4	4		70.30	43.30	85.16	58.16	27.00	**48.83**	**24.78**
27	18.98	4.51	187.97	157.72	95.32	65.07	30.25	4	4		76.48	46.23	84.55	54.30	30.25	**40.63**	**27.49**

Fitzrovia
Contigous Wall
Zone A DA1C1

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
28	18.67	4.32	193.68	160.43	90.18	56.93	33.25	4	4	82.18	48.93	96.15	62.90	33.25	**31.70**	**28.45**
29	18.33	4.09	200.50	166.74	154.51	120.75	*33.76*	2	2	89.00	117.65	140.97	169.62	*-28.65*	**22.20**	**30.23**
30	18.00	3.86	207.00	180.63	143.57	117.20	*26.37*	2	2	95.50	113.18	166.39	184.07	*-17.68*	**11.38**	**28.11**
31	17.65	3.61	214.00	186.27	147.02	119.29	*27.73*	2	2	102.50	116.36	173.96	187.81	*-13.86*	**3.36**	**17.01**
32	17.35	3.40	220.00	186.33	157.55	123.88	*33.67*	2	2	108.50	121.33	174.79	187.63	*-12.83*	**0.03**	**7.46**
33	17.02	3.17	226.50	187.48	167.32	128.30	*39.02*	2	2	115.00	126.27	176.99	188.26	*-11.27*	**-1.22**	**1.62**
34	16.67	2.92	233.50	189.97	175.85	132.32	*43.53*	2	2	122.00	131.05	180.74	189.80	*-9.05*	**-1.01**	**-1.74**
***35**	16.33	2.67	240.50	190.60	187.50	137.60	*49.90*	2	2	129.00	137.03	181.78	189.81	*-8.03*	**0.00**	**0.00**
36	15.93	2.40	248.50	196.38	192.42	140.30	*52.12*	2	2	137.00	139.85	192.42	195.27	*-2.85*	**0.00**	**0.00**
37	15.52	2.12	256.50	200.54	200.04	144.08	*55.96*	2	2	145.00	143.96	200.04	199.00	*1.04*	**0.00**	**0.00**
38	15.13	1.82	264.50	204.63	207.77	147.91	*59.87*	2	2	153.00	148.03	207.77	202.80	*4.97*	**0.00**	**0.00**
39	14.73	1.49	272.50	208.69	215.58	151.76	*63.81*	2	2	161.00	152.07	215.58	206.65	*8.93*	**0.00**	**0.00**
40	14.32	1.12	280.50	212.79	223.31	155.59	*67.71*	2	2	169.00	156.15	223.31	210.45	*12.85*	**-0.00**	**0.00**
41	13.93	0.68	288.50	216.97	230.90	159.37	*71.53*	2	2	177.00	160.28	230.90	214.18	*16.72*	**-0.00**	**0.00**
42	13.52	0.00	296.50	219.63	241.08	164.21	*76.87*	2	2	185.00	163.29	241.08	219.37	*21.71*	**-0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.17	17.14	-177.21	149.64	-134.57	118.87

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	9.18	9.18	0.00	9.18
10	8	129.46	129.46	0.00	129.46

STAGE 4 : ADD B1 BASE SLAB

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay	5.00	27.75	0.00	5.00	27.75	0.00
- Und						
London Clay	5.00	27.75	0.00	5.00	27.75	0.00
- Drained						
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 4 : Add B1 base slab

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no 8 inserted at this stage
Surcharge no. 2 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	7	0.00	1
2	0.0	7	0.0000	7	0.00	1
3	0.0	7	0.0000	7	0.00	1

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	-0.17	23.63	23.63	12.46	12.46	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	0.18	27.90	27.90	10.88	10.88	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-0.76**	**4.73**
	27.40															**-0.76**	**-7.67**
3	27.10	0.54	33.60	33.60	13.39	13.39	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.88**	**-2.76**
4	26.80	0.90	39.30	39.30	15.42	15.42	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**0.90**	**3.34**
5	26.45	1.32	45.95	45.95	17.65	17.65	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-1.46**	**10.89**
6	26.10	1.73	52.60	52.60	19.38	19.38	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-6.73**	**19.64**
7	25.75	2.16	59.25	59.25	20.79	20.79	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-15.21**	**29.13**
8	25.40	2.59	65.90	65.90	24.31	24.31	0.00	5	0		0.00	0.00	0.00	0.00	0.00	**-27.12**	**40.20**
	25.40															**-27.12**	**-134.57**
9	25.00	3.09	73.50	73.50	36.77	36.77	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**24.25**	**-118.49**
10	24.60	3.59	81.10	81.10	39.31	39.31	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**67.67**	**-97.95**
11	24.20	4.05	88.70	88.70	41.87	41.87	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**102.61**	**-76.74**
12	23.85	4.41	95.35	95.35	44.40	44.40	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**125.75**	**-55.65**
13	23.50	4.72	102.00	102.00	47.09	47.09	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**141.56**	**-34.43**
	23.50															**141.56**	**-34.43**
14	23.17	4.97	108.18	108.18	49.63	49.63	0.00	1	0		0.00	0.00	0.00	0.00	0.00	**149.26**	**-12.39**
15	22.83	5.17	114.83	114.83	52.65	52.65	0.00	1	1	P	3.32	3.32	11.36	11.36	0.00	**149.64**	**7.97**
16	22.52	5.31	120.53	120.53	55.51	55.51	0.00	1	1	P	9.03	9.03	30.78	30.78	0.00	**144.53**	**22.45**
17	22.17	5.41	127.18	127.18	58.09	58.09	0.00	1	1	P	15.68	15.68	53.53	53.53	0.00	**134.78**	**28.95**
18	21.83	5.46	133.83	132.08	63.32	61.57	1.75	1	1		22.32	20.57	54.97	53.22	1.75	**124.27**	**31.59**
19	21.62	5.47	137.72	133.92	67.56	63.76	3.80	1	1		26.22	22.42	54.97	51.17	3.80	**117.47**	**35.05**
20	21.38	5.46	142.28	136.08	53.47	47.27	6.20	4	4		30.78	24.58	58.28	52.08	6.20	**108.60**	**36.10**
21	21.10	5.43	147.60	138.60	54.58	45.58	9.00	4	4		36.10	27.10	62.52	53.52	9.00	**98.73**	**33.70**
22	20.80	5.36	153.30	141.30	59.79	47.79	12.00	4	4		41.80	29.80	64.60	52.60	12.00	**89.09**	**31.09**
23	20.45	5.25	159.95	144.45	65.32	49.82	15.50	4	4		48.45	32.95	69.92	54.42	15.50	**78.58**	**28.87**
24	20.05	5.09	167.55	148.05	71.86	52.36	19.50	4	4		56.05	36.55	76.20	56.70	19.50	**67.49**	**26.53**
25	19.65	4.90	175.15	151.65	79.37	55.87	23.50	4	4		63.65	40.15	81.40	57.90	23.50	**57.35**	**24.85**
26	19.30	4.71	181.80	154.80	87.10	60.10	27.00	4	4		70.30	43.30	85.16	58.16	27.00	**48.83**	**24.78**
27	18.98	4.51	187.97	157.72	95.32	65.07	30.25	4	4		76.48	46.23	84.55	54.30	30.25	**40.63**	**27.49**
28	18.67	4.32	193.68	160.43	90.18	56.93	33.25	4	4		82.18	48.93	96.15	62.90	33.25	**31.70**	**28.45**
29	18.33	4.09	200.50	166.74	154.51	120.75	*33.76*	2	2		89.00	117.65	140.97	169.62	*-28.65*	**22.20**	**30.23**
30	18.00	3.86	207.00	180.63	143.57	117.20	*26.37*	2	2		95.50	113.18	166.39	184.07	*-17.68*	**11.38**	**28.11**
31	17.65	3.61	214.00	186.27	147.02	119.29	*27.73*	2	2		102.50	116.36	173.96	187.81	*-13.86*	**3.36**	**17.01**
32	17.35	3.40	220.00	186.33	157.55	123.88	*33.67*	2	2		108.50	121.33	174.79	187.63	*-12.83*	**0.03**	**7.46**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
33	17.02	3.17	226.50	187.48	167.32	128.30	*39.02*	2	2	115.00	126.27	176.99	188.26	*-11.27*	**-1.22**	**1.62**
34	16.67	2.92	233.50	189.97	175.85	132.32	*43.53*	2	2	122.00	131.05	180.74	189.80	*-9.05*	**-1.01**	**-1.74**
***35**	16.33	2.67	240.50	190.60	187.50	137.60	*49.90*	2	2	129.00	137.03	181.78	189.81	*-8.03*	**0.00**	**0.00**
36	15.93	2.40	248.50	196.38	192.42	140.30	*52.12*	2	2	137.00	139.85	192.42	195.27	*-2.85*	**0.00**	**0.00**
37	15.52	2.12	256.50	200.54	200.04	144.08	*55.96*	2	2	145.00	143.96	200.04	199.00	*1.04*	**0.00**	**0.00**
38	15.13	1.82	264.50	204.63	207.77	147.91	*59.87*	2	2	153.00	148.03	207.77	202.80	*4.97*	**0.00**	**0.00**
39	14.73	1.49	272.50	208.69	215.58	151.76	*63.81*	2	2	161.00	152.07	215.58	206.65	*8.93*	**0.00**	**0.00**
40	14.32	1.12	280.50	212.79	223.31	155.59	*67.71*	2	2	169.00	156.15	223.31	210.45	*12.85*	**0.00**	**0.00**
41	13.93	0.68	288.50	216.97	230.90	159.37	*71.53*	2	2	177.00	160.28	230.90	214.18	*16.72*	**0.00**	**0.00**
42	13.52	0.00	296.50	219.63	241.08	164.21	*76.87*	2	2	185.00	163.29	241.08	219.37	*21.71*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-0.17	17.14	-177.21	149.64	-134.57	118.87

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	9.18	9.18	0.00	9.18
8	13	0.00	0.00	0.00	0.00
10	8	129.46	129.46	0.00	129.46

STAGE 5 : REMOVE PROP1

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 5 : Remove prop1

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Surcharge or strut changes
Strut no. 1 removed at this stage
Strut no. 10 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	8.8035	1	0.00	1
2	8.8	1	0.4760	1	22.42	1
3	9.3	1	0.4125	1	12.71	2
4	9.7	1	0.3725	1	10.60	3
5	10.1	1	0.3384	1	8.00	4
10	11.4	1	0.1595	1	3.08	7
15	11.9	1	0.0509	1	0.95	10
20	12.1	1	0.0078	1	0.27	11
30	12.1	1	0.0036	1	0.07	7

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
1	27.70	11.89	23.63	23.63	6.75	6.75	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	11.39	27.90	27.90	7.96	7.96	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-0.41**	**2.98**
3	27.10	10.89	33.60	33.60	9.59	9.59	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-1.79**	**6.53**
4	26.80	10.39	39.30	39.30	11.23	11.23	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-4.33**	**10.94**
5	26.45	9.81	45.95	45.95	13.14	13.14	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-9.02**	**16.51**
6	26.10	9.24	52.60	52.60	15.05	15.05	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-15.89**	**23.17**
7	25.75	8.68	59.25	59.25	16.96	16.96	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-25.24**	**30.73**
8	25.40	8.13	65.90	65.90	18.86	18.86	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-37.40**	**39.51**
9	25.00	7.53	73.50	73.50	25.97	25.97	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-55.11**	**51.29**
10	24.60	6.96	81.10	81.10	28.64	28.64	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-78.43**	**66.03**
11	24.20	6.42	88.70	88.70	31.31	31.31	0.00	A	1	0		0.00	0.00	0.00	0.00	0.00	**-107.94**	**81.69**
12	23.85	6.00	95.35	95.35	39.57	39.57	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-139.30**	**98.96**
13	23.50	5.63	102.00	102.00	46.33	46.33	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-177.21**	**118.87**
	23.50																**-177.21**	**-119.30**
14	23.17	5.34	108.18	108.18	51.04	51.04	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-141.87**	**-97.12**
15	22.83	5.09	114.83	114.83	55.50	55.50	0.00		1	1	P	3.32	3.32	11.36	11.36	0.00	**-111.95**	**-75.81**
16	22.52	4.90	120.53	120.53	59.25	59.25	0.00		1	1	P	9.03	9.03	30.83	30.83	0.00	**-92.11**	**-59.89**
17	22.17	4.72	127.18	127.18	63.09	63.09	0.00		1	1	P	15.68	15.68	53.55	53.55	0.00	**-73.33**	**-51.40**
18	21.83	4.56	133.83	132.08	68.15	66.40	1.75		1	1		22.32	20.57	56.92	55.17	1.75	**-56.13**	**-47.04**
19	21.62	4.48	137.72	133.92	72.77	68.97	3.80		1	1		26.22	22.42	54.15	50.35	3.80	**-46.92**	**-42.14**
20	21.38	4.39	142.28	136.08	62.74	56.54	6.20		4	4		30.78	24.58	54.72	48.52	6.20	**-37.47**	**-37.94**
21	21.10	4.30	147.60	138.60	63.65	54.65	9.00		4	4		36.10	27.10	57.66	48.66	9.00	**-27.25**	**-35.36**
22	20.80	4.21	153.30	141.30	68.19	56.19	12.00		4	4		41.80	29.80	59.45	47.45	12.00	**-16.99**	**-32.27**
23	20.45	4.11	159.95	144.45	73.37	57.87	15.50		4	4		48.45	32.95	64.44	48.94	15.50	**-6.36**	**-28.10**
24	20.05	3.99	167.55	148.05	79.16	59.66	19.50		4	4		56.05	36.55	70.62	51.12	19.50	**3.97**	**-23.53**
25	19.65	3.88	175.15	151.65	85.46	61.96	23.50		4	4		63.65	40.15	76.31	52.81	23.50	**12.46**	**-18.91**
26	19.30	3.77	181.80	154.80	91.79	64.79	27.00		4	4		70.30	43.30	80.85	53.85	27.00	**18.27**	**-14.11**
27	18.98	3.67	187.97	157.72	98.45	68.20	30.25		4	4		76.48	46.23	82.39	52.14	30.25	**22.05**	**-8.23**
28	18.67	3.57	193.68	160.43	95.82	62.57	33.25		4	4		82.18	48.93	92.71	59.46	33.25	**23.50**	**-4.15**
29	18.33	3.44	200.50	161.43	165.13	126.06	*39.07*		2	2		89.00	123.26	129.75	164.01	*-34.26*	**24.71**	**4.59**
30	18.00	3.31	207.00	174.26	156.31	123.57	*32.74*		2	2		95.50	120.40	151.94	176.84	*-24.90*	**20.60**	**13.64**
31	17.65	3.17	214.00	180.82	157.92	124.74	*33.18*		2	2		102.50	122.16	162.36	182.01	*-19.66*	**15.48**	**13.66**
32	17.35	3.04	220.00	182.30	165.62	127.91	*37.70*		2	2		108.50	125.35	166.76	183.61	*-16.85*	**11.68**	**12.44**

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN/m]
33	17.02	2.90	226.50	185.10	172.08	130.68	*41.40*	2	2	115.00	128.33	172.87	186.19	*-13.33*	**7.71**	**12.02**
34	16.67	2.74	233.50	189.26	177.28	133.03	*44.24*	2	2	122.00	131.03	180.79	189.82	*-9.03*	**3.57**	**11.02**
***35**	16.33	2.58	240.50	197.93	175.47	132.90	*42.57*	2	2	129.00	131.25	195.59	197.84	*-2.25*	**0.00**	**0.00**
36	15.93	2.31	248.50	196.05	193.08	140.63	*52.45*	2	2	137.00	139.57	193.08	195.65	*-2.57*	**0.00**	**0.00**
37	15.52	2.04	256.50	200.28	200.56	144.34	*56.22*	2	2	145.00	143.74	200.56	199.30	*1.26*	**0.00**	**0.00**
38	15.13	1.75	264.50	204.36	208.32	148.18	*60.14*	2	2	153.00	147.79	208.32	203.11	*5.21*	**0.00**	**0.00**
39	14.73	1.44	272.50	208.40	216.15	152.05	*64.10*	2	2	161.00	151.82	216.15	206.97	*9.18*	**0.00**	**0.00**
40	14.32	1.09	280.50	212.46	223.96	155.92	*68.04*	2	2	169.00	155.86	223.96	210.82	*13.14*	**0.00**	**0.00**
41	13.93	0.66	288.50	216.54	231.76	159.80	*71.96*	2	2	177.00	159.91	231.76	214.67	*17.09*	**0.00**	**0.00**
42	13.52	0.00	296.50	219.63	241.08	164.21	*76.87*	2	2	185.00	163.29	241.08	219.37	*21.71*	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state
**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
-0.17	17.14	-177.21	149.64	-134.57	118.87

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				9.18
8	13	176.42	176.42	0.00	176.42
10	8				129.46

STAGE 6 : LONG TERM

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	0	50.00	50.00	74666.
2	27.40	5	0	50.00	50.00	74666.
3	27.10	5	0	50.00	50.00	74666.
4	26.80	5	0	50.00	50.00	74666.
5	26.45	5	0	50.00	50.00	74666.
6	26.10	5	0	50.00	50.00	74666.
7	25.75	5	0	50.00	50.00	74666.
8	25.40	5	0	50.00	50.00	118750.
9	25.00	1	0	50.00	50.00	118750.
10	24.60	1	0	50.00	50.00	118750.
11	24.20	1	0	50.00	50.00	118750.
12	23.85	1	0	50.00	50.00	118750.
13	23.50	1	0	50.00	50.00	118750.
14	23.17	1	0	50.00	50.00	118750.
15	22.83	1	1	50.00	50.00	118750.
16	22.52	1	1	50.00	50.00	118750.
17	22.17	1	1	50.00	50.00	118750.
18	21.83	1	1	50.00	50.00	118750.
19	21.62	1	1	50.00	50.00	118750.
20	21.38	4	4	50.00	50.00	118750.
21	21.10	4	4	50.00	50.00	118750.
22	20.80	4	4	50.00	50.00	118750.
23	20.45	4	4	50.00	50.00	118750.
24	20.05	4	4	50.00	50.00	118750.
25	19.65	4	4	50.00	50.00	118750.
26	19.30	4	4	50.00	50.00	118750.
27	18.98	4	4	50.00	50.00	118750.
28	18.67	4	4	50.00	50.00	118750.
29	18.33	3	3	50.00	50.00	118750.
30	18.00	3	3	50.00	50.00	118750.
31	17.65	3	3	50.00	50.00	118750.
32	17.35	3	3	50.00	50.00	118750.
33	17.02	3	3	50.00	50.00	118750.
34	16.67	3	3	50.00	50.00	118750.
*****	***35 16.33***	***3***	***3***	***50.00***	***50.00***	***0.0***
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

**** Wall toe level: 16.33***

Analysis details
SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00
Wall relaxation 50%		

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 6 : Long term

Warning: Frew has had new features added to simplify application of partial factors in line with EC7. However, there are alternative ways of complying with EC7 including manual adjustment of certain values. The features in the program do not automatically make a design EC7 compliant and the user must continue to check the output carefully to ensure the assumptions and adjustments to characteristic values are as they require. Note that pore pressures and strut pre-stress are not factored. If a strut pre-stress is used to model a structural force, and other effects of actions are being factored, the user may wish to factor the input value of strut pre-stress.

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 70884. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 119530. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no. error. [mm]	Disp Node no.	Press Node error [kN/m²]	no.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	2.3056	1	0.00	1
2	2.3	1	0.2855	1	9.19	1
3	2.6	1	0.2697	1	5.57	2
4	2.9	1	0.2620	1	4.95	3
5	3.1	1	0.2511	1	3.98	4
10	4.2	1	0.1586	1	1.92	7
15	4.8	1	0.0793	1	0.83	8
20	5.1	1	0.0333	1	0.35	12
27	5.2	1	0.0057	1	0.06	12

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Right		Stress Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM** [kNm/m]	SF** [kN]
1	27.70	17.14	23.63	23.63	6.71	6.71	0.00	a	5	0		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	27.40	16.21	27.90	27.90	7.94	7.94	0.00	a	5	0		0.00	0.00	0.00	0.00	0.00	**-0.41**	**2.97**
3	27.10	15.29	33.60	33.60	9.58	9.58	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-1.78**	**6.52**
4	26.80	14.36	39.30	39.30	11.23	11.23	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-4.32**	**10.92**
5	26.45	13.29	45.95	45.95	13.13	13.13	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-9.00**	**16.48**
6	26.10	12.23	52.60	52.60	15.03	15.03	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-15.86**	**23.14**
7	25.75	11.19	59.25	59.25	16.92	16.92	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-25.20**	**30.68**
8	25.40	10.18	65.90	65.90	18.79	18.79	0.00	A	5	0		0.00	0.00	0.00	0.00	0.00	**-37.34**	**39.44**
9	25.00	9.07	73.50	73.50	25.90	25.90	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-55.01**	**51.19**
10	24.60	8.01	81.10	81.10	28.57	28.57	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-78.29**	**65.90**
11	24.20	7.04	88.70	88.70	31.23	31.23	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-107.73**	**81.51**
12	23.85	6.27	95.35	95.35	33.55	33.55	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	**-139.03**	**97.35**
13	23.50	5.61	102.00	102.00	42.34	42.34	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-175.87**	**114.92**
	23.50																**-175.87**	**-119.30**
14	23.17	5.12	108.18	108.18	50.43	50.43	0.00		1	0		0.00	0.00	0.00	0.00	0.00	**-140.23**	**-98.17**
15	22.83	4.68	114.83	114.83	55.81	55.81	0.00		1	1	p	3.32	3.32	11.36	11.36	0.00	**-109.90**	**-76.93**
16	22.52	4.38	120.53	120.53	60.06	60.06	0.00		1	1	p	9.03	9.03	30.83	30.83	0.00	**-89.74**	**-60.77**
17	22.17	4.09	127.18	127.18	64.37	64.37	0.00		1	1	p	15.68	15.68	53.55	53.55	0.00	**-70.72**	**-51.80**
18	21.83	3.85	133.83	132.08	69.58	67.83	1.75		1	1		22.32	20.57	58.07	56.32	1.75	**-53.48**	**-47.09**
19	21.62	3.73	137.72	133.92	74.74	70.94	3.80		1	1		26.22	22.42	54.32	50.52	3.80	**-44.27**	**-41.87**
20	21.38	3.61	142.28	136.08	64.54	58.34	6.20		4	4		30.78	24.58	54.28	48.08	6.20	**-34.96**	**-37.00**
21	21.10	3.48	147.60	138.60	65.46	56.46	9.00		4	4		36.10	27.10	56.83	47.83	9.00	**-25.10**	**-33.51**
22	20.80	3.35	153.30	141.30	70.10	58.10	12.00		4	4		41.80	29.80	58.45	46.45	12.00	**-15.56**	**-29.26**
23	20.45	3.22	159.95	144.45	75.38	59.88	15.50		4	4		48.45	32.95	63.26	47.76	15.50	**-6.21**	**-23.64**
24	20.05	3.07	167.55	148.05	81.30	61.80	19.50		4	4		56.05	36.55	69.20	49.70	19.50	**2.02**	**-17.30**
25	19.65	2.92	175.15	151.65	87.78	64.28	23.50		4	4		63.65	40.15	74.59	51.09	23.50	**7.63**	**-10.70**
26	19.30	2.78	181.80	154.80	94.24	67.24	27.00		4	4		70.30	43.30	78.76	51.76	27.00	**10.21**	**-3.83**
27	18.98	2.65	187.97	157.72	101.08	70.83	30.25		4	4		76.48	46.23	80.08	49.83	30.25	**10.31**	**4.13**
28	18.67	2.52	193.68	160.43	99.75	66.50	33.25		4	4		82.18	48.93	89.06	55.81	33.25	**7.74**	**10.90**
29	18.33	2.36	200.50	163.75	172.38	135.63	36.75		3	3		89.00	52.25	173.88	137.13	36.75	**3.10**	**12.91**
30	18.00	2.22	207.00	167.00	174.60	134.60	40.00		3	3		95.50	55.50	187.70	147.70	40.00	**-0.98**	**9.58**
31	17.65	2.06	214.00	170.50	181.36	137.86	43.50		3	3		102.50	59.00	193.59	150.09	43.50	**-3.29**	**3.91**
32	17.35	1.92	220.00	173.50	188.68	142.18	46.50		3	3		108.50	62.00	196.50	150.00	46.50	**-3.66**	**-0.42**
33	17.02	1.78	226.50	176.75	196.66	146.91	49.75		3	3		115.00	65.25	200.79	151.04	49.75	**-2.99**	**-3.01**
34	16.67	1.63	233.50	180.25	204.63	151.38	53.25		3	3		122.00	68.75	205.96	152.71	53.25	**-1.60**	**-4.27**
***35**	16.33	1.48	240.50	183.75	217.20	160.45	56.75		3	3		129.00	72.25	208.15	151.40	56.75	**0.00**	**0.00**
36	15.93	1.33	248.50	187.75	219.75	159.00	60.75		3	3		137.00	76.25	219.75	159.00	60.75	**0.00**	**0.00**
37	15.52	1.17	256.50	191.75	227.62	162.87	64.75		3	3		145.00	80.25	227.62	162.87	64.75	**0.00**	**0.00**
38	15.13	1.00	264.50	195.75	235.50	166.75	68.75		3	3		153.00	84.25	235.50	166.75	68.75	**0.00**	**0.00**
39	14.73	0.82	272.50	199.75	243.45	170.70	72.75		3	3		161.00	88.25	243.45	170.70	72.75	**0.00**	**0.00**
40	14.32	0.62	280.50	203.75	251.38	174.63	76.75		3	3		169.00	92.25	251.38	174.63	76.75	**0.00**	**0.00**
41	13.93	0.38	288.50	207.75	259.37	178.62	80.75		3	3		177.00	96.25	259.37	178.62	80.75	**0.00**	**0.00**
42	13.52	0.00	296.50	211.75	267.52	182.77	84.75		3	3		185.00	100.25	267.52	182.77	84.75	**0.00**	**0.00**

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

**** The values of BM and SF are multiplied by the partial factor for effects of actions.**

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.17	17.14	-177.21	149.64	-134.57	118.87

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				9.18
8	13	173.50	173.50	0.00	176.42
10	8				129.46

Results Envelope

Node	Level [m]	Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
1	27.70	-0.17	17.14	0.00	0.00	0.00	0.00
2	27.40	0.00	16.21	-0.76	0.00	-7.67	4.73
3	27.10	0.00	15.29	-1.79	0.88	-2.76	6.53
4	26.80	0.00	14.36	-4.33	1.19	0.00	10.94
5	26.45	0.00	13.29	-9.02	0.69	0.00	16.51
6	26.10	0.00	12.23	-15.89	0.00	0.00	23.17
7	25.75	0.00	11.19	-25.24	0.00	0.00	30.73
8	25.40	0.00	10.18	-37.40	0.00	-134.57	40.20
9	25.00	0.00	9.07	-55.11	24.25	-118.49	51.29
10	24.60	0.00	8.01	-78.43	67.67	-97.95	66.03
11	24.20	0.00	7.04	-107.94	102.61	-76.74	81.69
12	23.85	0.00	6.27	-139.30	125.75	-55.65	98.96
13	23.50	0.00	5.63	-177.21	141.56	-119.30	118.87
14	23.17	0.00	5.34	-141.87	149.26	-98.17	0.00
15	22.83	0.00	5.17	-111.95	149.64	-76.93	7.97
16	22.52	0.00	5.31	-92.11	144.53	-60.77	22.45
17	22.17	0.00	5.41	-73.33	134.78	-51.80	28.95
18	21.83	0.00	5.46	-56.13	124.27	-47.09	31.59
19	21.62	0.00	5.47	-46.92	117.47	-42.14	35.05
20	21.38	0.00	5.46	-37.47	108.60	-37.94	36.10
21	21.10	0.00	5.43	-27.25	98.73	-35.36	33.70
22	20.80	0.00	5.36	-16.99	89.09	-32.27	31.09
23	20.45	0.00	5.25	-6.36	78.58	-28.10	28.87
24	20.05	0.00	5.09	0.00	67.49	-23.53	26.53
25	19.65	0.00	4.90	0.00	57.35	-18.91	24.85
26	19.30	0.00	4.71	0.00	48.83	-14.11	24.78
27	18.98	0.00	4.51	0.00	40.63	-8.23	27.49
28	18.67	0.00	4.32	0.00	31.70	-4.15	28.45
29	18.33	0.00	4.09	0.00	24.71	0.00	30.23
30	18.00	0.00	3.86	-0.98	20.60	0.00	28.11
31	17.65	0.00	3.61	-3.29	15.48	0.00	17.01
32	17.35	0.00	3.40	-3.66	11.68	-0.42	12.44
33	17.02	0.00	3.17	-2.99	7.71	-3.01	12.02
34	16.67	0.00	2.92	-1.60	3.57	-4.27	11.02
***35**	**16.33**	**0.00**	**2.67**	**0.00**	**0.00**	**0.00**	**0.00**
36	15.93	0.00	2.40	0.00	0.00	0.00	0.00
37	15.52	0.00	2.12	0.00	0.00	0.00	0.00
38	15.13	0.00	1.82	0.00	0.00	0.00	0.00
39	14.73	0.00	1.49	0.00	0.00	0.00	0.00
40	14.32	0.00	1.12	-0.00	0.00	0.00	0.00
41	13.93	0.00	0.68	-0.00	0.00	0.00	0.00
42	13.52	0.00	0.00	-0.00	0.00	0.00	0.00

INITIAL DATA

Notes
600 mm dia at 750 centres.

Soil properties

No.	Description	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	Made Ground	19.00	0.58	0.35	3.42	1.19	3.70	0.25	Calculated
2	London Clay - Und	20.00	1.00	1.00	1.00	2.45	2.45	1.00	Calculated
3	London Clay - Drained	20.00	1.00	0.37	3.22	1.21	3.59	0.25	Calculated
4	RiverTerrace	19.00	0.50	0.25	5.66	1.00	4.76	0.25	Calculated
5	Made Ground behind lightwell	19.00	0.40	0.29	4.64	1.07	4.31	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	0.00	0.00	0.00	10000.	0.00	Drained
2	100.00	18.50	6.50	100000.	6500.00	Undrained
3	0.00	18.50	0.00	80000.	5200.00	Drained
4	0.00	0.00	0.00	20000.	0.00	Drained
5	0.00	0.00	0.00	20000.	0.00	Drained

Parameters used to calculate Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	25.00	0.67	0.00	0.00
2	0.00	0.67	0.00	0.50
3	24.00	0.67	0.00	0.00
4	33.00	0.67	0.00	0.00
5	30.00	0.67	0.00	0.00

Soil Strength Partial Factors

Document and case:	tan Phi'	c'	Cu	E
EC7 DA1 Combination 2 (2011)	1.25	1.25	1.40	1.00

Note: Only the parameters in bold have been affected by Partial Factors, No geometry or other factors have been changed.

Design Soil properties after applying Partial Factors

No.	Unit Wt [kN/m³]	K0	Ka	Kp	Kac	Kpc	Kr	Earth pressure coefficients.
1	19.00	0.58	**0.43**	**2.65**	**1.31**	**3.25**	0.25	Calculated
2	20.00	1.00	**1.00**	**1.00**	**2.45**	**2.45**	1.00	Calculated
3	20.00	1.00	**0.44**	**2.53**	**1.33**	**3.18**	0.25	Calculated
4	19.00	0.50	**0.32**	**3.95**	**1.13**	**3.98**	0.25	Calculated
5	19.00	0.40	**0.36**	**3.37**	**1.19**	**3.67**	0.25	Calculated

No.	c0 [kN/m²]	y0 [m]	Gradient of c [kN/m²/m]	E0 [kN/m²]	Gradient of E [kN/m²/m]	Drained/ Undrained
1	**0.00**	0.00	**0.00**	**10000.**	**0.00**	Drained
2	**71.43**	18.50	**4.64**	**100000.**	**6500.00**	Undrained
3	**0.00**	18.50	**0.00**	**80000.**	**5200.00**	Drained
4	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained
5	**0.00**	0.00	**0.00**	**20000.**	**0.00**	Drained

Parameters used to calculate design Earth pressure coefficients

No.	Phi [°]	Delta/Phi Ratio	Beta [°]	Cw/C Ratio
1	**20.46**	0.67	0.00	0.00
2	**0.00**	0.67	0.00	0.50
3	**19.61**	0.67	0.00	0.00
4	**27.45**	0.67	0.00	0.00
5	**24.79**	0.67	0.00	0.00

Surcharge properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Partial Offset Factor [m]	Width [m]	Ks
1	2	-	Left	27.70	26.00	1.00		
2	4	-	Right	22.67	0.00	1.00		

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

Surcharge Design properties

No.	Stage In	Stage Out	Side	Level [m]	Pressure [kN/m²]	Offset [m]	Width [m]	Ks
1	2	-	Left	27.70	26.00			
2	4	-	Right	22.67	0.00			

Strut properties

No.	Stage In	Stage Out	Node	Level [m]	Prestress [kN/m]	Stiffness [kN/m/m]	Angle [°]	Lever arm [m]
1	2	5	2	27.40	0.00	50000.00	0.00	0.00
2	-	-	3	27.10	0.00	50000.00	0.00	0.00
3	-	-	4	26.80	0.00	50000.00	0.00	0.00
4	-	-	5	26.45	0.00	50000.00	0.00	0.00
5	-	-	6	26.10	0.00	50000.00	0.00	0.00
6	-	-	7	25.75	0.00	50000.00	0.00	0.00
7	-	-	9	25.00	0.00	50000.00	0.00	0.00
8	4	-	13	23.50	0.00	194444.00	0.00	0.00
9	-	-	4	26.80	0.00	50000.00	0.00	0.00
10	2	5	8	25.40	0.00	50000.00	0.00	0.00

STAGE 0 : INITIAL CONDITION

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	5	50.00	50.00	149330.
2	27.40	5	5	50.00	50.00	149330.
3	27.10	5	5	50.00	50.00	149330.
4	26.80	5	5	50.00	50.00	149330.
5	26.45	5	5	50.00	50.00	149330.
6	26.10	5	5	50.00	50.00	149330.
7	25.75	5	5	50.00	50.00	149330.
8	25.40	5	5	50.00	50.00	237500.
9	25.00	1	1	50.00	50.00	237500.
10	24.60	1	1	50.00	50.00	237500.
11	24.20	1	1	50.00	50.00	237500.
12	23.85	1	1	50.00	50.00	237500.
13	23.50	1	1	50.00	50.00	237500.
14	23.17	1	1	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
29	18.33	3	3	50.00	50.00	237500.
30	18.00	3	3	50.00	50.00	237500.
31	17.65	3	3	50.00	50.00	237500.
32	17.35	3	3	50.00	50.00	237500.
33	17.02	3	3	50.00	50.00	237500.
34	16.67	3	3	50.00	50.00	237500.
***35**	***16.33**	***3**	***3**	***50.00**	***50.00**	***0.0**
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

Wall toe level: 16.33

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00

Convergence control parameters

Maximum number of iterations : 9000
Tolerance for displacement convergence [mm] : 0.01
Tolerance for pressure convergence [kN/m²] : 0.10
Damping coefficient : 1.00
Maximum incremental displacement [m] : 1.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 0 : Initial condition

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Vt [kN/m²]	Ve [kN/m²]	Pt [kN/m²]	Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	0.00	1.43	1.43	0.57	0.57	0.00	5	5	1.43	1.43	0.57	0.57	0.00	0.00	0.00
2	27.40	0.00	5.70	5.70	2.28	2.28	0.00	5	5	5.70	5.70	2.28	2.28	0.00	0.00	0.00
3	27.10	0.00	11.40	11.40	4.56	4.56	0.00	5	5	11.40	11.40	4.56	4.56	0.00	0.00	0.00
4	26.80	0.00	17.10	17.10	6.84	6.84	0.00	5	5	17.10	17.10	6.84	6.84	0.00	0.00	0.00
5	26.45	0.00	23.75	23.75	9.50	9.50	0.00	5	5	23.75	23.75	9.50	9.50	0.00	0.00	0.00
6	26.10	0.00	30.40	12.16	12.16	0.00	0.00	5	5	30.40	30.40	12.16	12.16	0.00	0.00	0.00
7	25.75	0.00	37.05	37.05	14.82	14.82	0.00	5	5	37.05	37.05	14.82	14.82	0.00	0.00	0.00
8	25.40	0.00	43.70	43.70	17.48	17.48	0.00	5	5	43.70	43.70	17.48	17.48	0.00	0.00	0.00
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	0.00	0.00
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	0.00	0.00
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	0.00	0.00
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	0.00	0.00
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	0.00	0.00
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	0.00	0.00
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	0.00	0.00
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	0.00	0.00
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	0.00	0.00
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	0.00	0.00
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	0.00	0.00
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	0.00	0.00
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	0.00	0.00
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	0.00	0.00
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	0.00	0.00
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	0.00	0.00
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	0.00	0.00
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	0.00	0.00
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	0.00	0.00
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	0.00	0.00
29	18.33	0.00	178.30	141.55	178.30	141.55	36.75	3	3	178.30	141.55	178.30	141.55	36.75	0.00	0.00
30	18.00	0.00	184.80	144.80	184.80	144.80	40.00	3	3	184.80	144.80	184.80	144.80	40.00	0.00	0.00
31	17.65	0.00	191.80	148.30	191.80	148.30	43.50	3	3	191.80	148.30	191.80	148.30	43.50	0.00	0.00
32	17.35	0.00	197.80	151.30	197.80	151.30	46.50	3	3	197.80	151.30	197.80	151.30	46.50	0.00	0.00
33	17.02	0.00	204.30	154.55	204.30	154.55	49.75	3	3	204.30	154.55	204.30	154.55	49.75	0.00	0.00
34	16.67	0.00	211.30	158.05	211.30	158.05	53.25	3	3	211.30	158.05	211.30	158.05	53.25	0.00	0.00
35	16.33	0.00	218.30	161.55	218.30	161.55	56.75	3	3	218.30	161.55	218.30	161.55	56.75	0.00	0.00
36	15.93	0.00	226.30	165.55	226.30	165.55	60.75	3	3	226.30	165.55	226.30	165.55	60.75	0.00	0.00
37	15.52	0.00	234.30	169.55	234.30	169.55	64.75	3	3	234.30	169.55	234.30	169.55	64.75	0.00	0.00
38	15.13	0.00	242.30	173.55	242.30	173.55	68.75	3	3	242.30	173.55	242.30	173.55	68.75	0.00	0.00
39	14.73	0.00	250.30	177.55	250.30	177.55	72.75	3	3	250.30	177.55	250.30	177.55	72.75	0.00	0.00
40	14.32	0.00	258.30	181.55	258.30	181.55	76.75	3	3	258.30	181.55	258.30	181.55	76.75	0.00	0.00
41	13.93	0.00	266.30	185.55	266.30	185.55	80.75	3	3	266.30	185.55	266.30	185.55	80.75	0.00	0.00
42	13.52	0.00	274.30	189.55	274.30	189.55	84.75	3	3	274.30	189.55	274.30	189.55	84.75	0.00	0.00

NOTE: Displacements from STAGE 0 are disregarded in later stages

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

STAGE 1 : ADD RETAINING WALL

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	5	50.00	50.00	149330.
2	27.40	5	5	50.00	50.00	149330.
3	27.10	5	5	50.00	50.00	149330.
4	26.80	5	5	50.00	50.00	149330.
5	26.45	5	5	50.00	50.00	149330.
6	26.10	5	5	50.00	50.00	149330.
7	25.75	5	5	50.00	50.00	149330.
8	25.40	5	5	50.00	50.00	237500.
9	25.00	1	1	50.00	50.00	237500.
10	24.60	1	1	50.00	50.00	237500.
11	24.20	1	1	50.00	50.00	237500.
12	23.85	1	1	50.00	50.00	237500.
13	23.50	1	1	50.00	50.00	237500.
14	23.17	1	1	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

**** Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 1 : Add retaining wall

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	0.0000	1	0.00	1
2	0.0	1	0.0000	1	0.00	1
3	0.0	1	0.0000	1	0.00	1

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN]
1	27.70	0.00	1.43	1.43	0.57	0.57	0.00 A	5	5 A	1.43	1.43	0.57	0.57	0.00	0.00	0.00
2	27.40	0.00	5.70	5.70	2.28	2.28	0.00	5	5	5.70	5.70	2.28	2.28	0.00	0.00	0.00
3	27.10	0.00	11.40	11.40	4.56	4.56	0.00	5	5	11.40	11.40	4.56	4.56	0.00	0.00	0.00
4	26.80	0.00	17.10	17.10	6.84	6.84	0.00	5	5	17.10	17.10	6.84	6.84	0.00	0.00	0.00
5	26.45	0.00	23.75	23.75	9.50	9.50	0.00	5	5	23.75	23.75	9.50	9.50	0.00	0.00	0.00
6	26.10	0.00	30.40	30.40	12.16	12.16	0.00	5	5	30.40	30.40	12.16	12.16	0.00	0.00	0.00
7	25.75	0.00	37.05	37.05	14.82	14.82	0.00	5	5	37.05	37.05	14.82	14.82	0.00	0.00	0.00
8	25.40	0.00	43.70	43.70	17.48	17.48	0.00	5	5	43.70	43.70	17.48	17.48	0.00	0.00	0.00
9	25.00	0.00	51.30	51.30	29.75	29.75	0.00	1	1	51.30	51.30	29.75	29.75	0.00	0.00	0.00
10	24.60	0.00	58.90	58.90	34.16	34.16	0.00	1	1	58.90	58.90	34.16	34.16	0.00	0.00	0.00
11	24.20	0.00	66.50	66.50	38.57	38.57	0.00	1	1	66.50	66.50	38.57	38.57	0.00	0.00	0.00
12	23.85	0.00	73.15	73.15	42.43	42.43	0.00	1	1	73.15	73.15	42.43	42.43	0.00	0.00	0.00
13	23.50	0.00	79.80	79.80	46.28	46.28	0.00	1	1	79.80	79.80	46.28	46.28	0.00	0.00	0.00
14	23.17	0.00	85.98	85.98	49.87	49.87	0.00	1	1	85.98	85.98	49.87	49.87	0.00	0.00	0.00
15	22.83	0.00	92.63	92.63	53.72	53.72	0.00	1	1	92.63	92.63	53.72	53.72	0.00	0.00	0.00
16	22.52	0.00	98.33	98.33	57.03	57.03	0.00	1	1	98.33	98.33	57.03	57.03	0.00	0.00	0.00
17	22.17	0.00	104.98	104.98	60.89	60.89	0.00	1	1	104.98	104.98	60.89	60.89	0.00	0.00	0.00
18	21.83	0.00	111.63	109.88	65.48	63.73	1.75	1	1	111.63	109.88	65.48	63.73	1.75	0.00	0.00
19	21.62	0.00	115.52	111.72	68.60	64.80	3.80	1	1	115.52	111.72	68.60	64.80	3.80	0.00	0.00
20	21.38	0.00	120.08	113.88	63.14	56.94	6.20	4	4	120.08	113.88	63.14	56.94	6.20	0.00	0.00
21	21.10	0.00	125.40	116.40	67.20	58.20	9.00	4	4	125.40	116.40	67.20	58.20	9.00	0.00	0.00
22	20.80	0.00	131.10	119.10	71.55	59.55	12.00	4	4	131.10	119.10	71.55	59.55	12.00	0.00	0.00
23	20.45	0.00	137.75	122.25	76.63	61.13	15.50	4	4	137.75	122.25	76.63	61.13	15.50	0.00	0.00
24	20.05	0.00	145.35	125.85	82.43	62.93	19.50	4	4	145.35	125.85	82.43	62.93	19.50	0.00	0.00
25	19.65	0.00	152.95	129.45	88.23	64.73	23.50	4	4	152.95	129.45	88.23	64.73	23.50	0.00	0.00
26	19.30	0.00	159.60	132.60	93.30	66.30	27.00	4	4	159.60	132.60	93.30	66.30	27.00	0.00	0.00
27	18.98	0.00	165.78	135.53	98.01	67.76	30.25	4	4	165.78	135.53	98.01	67.76	30.25	0.00	0.00
28	18.67	0.00	171.48	138.23	102.36	69.11	33.25	4	4	171.48	138.23	102.36	69.11	33.25	0.00	0.00
29	18.33	0.00	178.30	141.55	178.30	141.55	*36.75*	2	2	178.30	141.55	178.30	141.55	*36.75*	0.00	0.00
30	18.00	0.00	184.80	144.80	184.80	144.80	*40.00*	2	2	184.80	144.80	184.80	144.80	*40.00*	0.00	0.00
31	17.65	0.00	191.80	148.30	191.80	148.30	*43.50*	2	2	191.80	148.30	191.80	148.30	*43.50*	0.00	0.00
32	17.35	0.00	197.80	151.30	197.80	151.30	*46.50*	2	2	197.80	151.30	197.80	151.30	*46.50*	0.00	0.00
33	17.02	0.00	204.30	154.55	204.30	154.55	*49.75*	2	2	204.30	154.55	204.30	154.55	*49.75*	0.00	0.00
34	16.67	0.00	211.30	158.05	211.30	158.05	*53.25*	2	2	211.30	158.05	211.30	158.05	*53.25*	0.00	0.00
*35	16.33	0.00	218.30	161.55	218.30	161.55	*56.75*	2	2	218.30	161.55	218.30	161.55	*56.75*	0.00	0.00
36	15.93	0.00	226.30	165.55	226.30	165.55	*60.75*	2	2	226.30	165.55	226.30	165.55	*60.75*	0.00	0.00
37	15.52	0.00	234.30	169.55	234.30	169.55	*64.75*	2	2	234.30	169.55	234.30	169.55	*64.75*	0.00	0.00
38	15.13	0.00	242.30	173.55	242.30	173.55	*68.75*	2	2	242.30	173.55	242.30	173.55	*68.75*	0.00	0.00
39	14.73	0.00	250.30	177.55	250.30	177.55	*72.75*	2	2	250.30	177.55	250.30	177.55	*72.75*	0.00	0.00
40	14.32	0.00	258.30	181.55	258.30	181.55	*76.75*	2	2	258.30	181.55	258.30	181.55	*76.75*	0.00	0.00
41	13.93	0.00	266.30	185.55	266.30	185.55	*80.75*	2	2	266.30	185.55	266.30	185.55	*80.75*	0.00	0.00
42	13.52	0.00	274.30	189.55	274.30	189.55	*84.75*	2	2	274.30	189.55	274.30	189.55	*84.75*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-0.18	22.42	-219.08	131.69	-144.88	150.12

STAGE 2 : PROP AND SURCHARGE

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 2 : prop and surcharge

Surcharge or strut changes
Strut no 1 inserted at this stage
Strut no 10 inserted at this stage
Surcharge no. 1 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.1071	21	2.68	1
2	1.1	21	0.0063	1	1.72	3
3	1.1	21	0.0052	1	1.28	4
4	1.1	21	0.0044	1	1.01	4
5	1.1	21	0.0035	1	0.73	4
10	1.1	21	0.0004	4	0.19	8
15	1.1	21	0.0002	1	0.07	6

Ground level left = 27.70 Ground level right = 27.70

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	0.12	27.43	27.43	9.75	9.75	0.00	A	5	5	a	1.43	1.43	0.51	0.51	0.00	0.00	0.00
2	27.40	0.17	31.70	31.70	11.28	11.28	0.00	A	5	5	a	5.70	5.70	2.03	2.03	0.00	-0.42	2.77
	27.40																-0.42	-5.83
3	27.10	0.23	37.40	37.40	13.33	13.33	0.00	A	5	5	a	11.40	11.40	4.05	4.05	0.00	0.92	-3.06
4	26.80	0.28	43.10	43.10	15.39	15.39	0.00	A	5	5		17.10	17.10	6.28	6.28	0.00	1.42	-0.19
5	26.45	0.35	49.75	49.75	17.76	17.76	0.00	A	5	5		23.75	23.75	9.14	9.14	0.00	0.96	2.80
6	26.10	0.41	56.40	56.40	20.13	20.13	0.00	A	5	5		30.40	30.40	11.94	11.94	0.00	-0.54	5.75
7	25.75	0.48	63.05	63.05	22.48	22.48	0.00	A	5	5		37.05	37.05	14.77	14.77	0.00	-3.06	8.53
8	25.40	0.54	69.70	69.70	24.81	24.81	0.00	A	5	5		43.70	43.70	17.22	17.22	0.00	-6.51	11.30
	25.40																-6.51	-15.89
9	25.00	0.62	77.30	77.30	34.13	34.13	0.00		1	1		51.30	51.30	29.43	29.43	0.00	-0.73	-13.53
10	24.60	0.71	84.90	84.90	40.13	40.13	0.00		1	1		58.90	58.90	34.14	34.14	0.00	4.31	-11.39
11	24.20	0.78	92.50	92.50	44.43	44.43	0.00		1	1		66.50	66.50	38.85	38.85	0.00	8.38	-9.15
12	23.85	0.85	99.15	99.15	48.19	48.19	0.00		1	1		73.15	73.15	42.93	42.93	0.00	11.22	-7.18
13	23.50	0.91	105.80	105.80	51.91	51.91	0.00		1	1		79.80	79.80	46.99	46.99	0.00	13.41	-5.43
14	23.17	0.95	111.98	111.98	55.35	55.35	0.00		1	1		85.98	85.98	50.77	50.77	0.00	14.90	-3.82
15	22.83	1.00	118.63	118.63	59.06	59.06	0.00		1	1		92.63	92.63	54.80	54.80	0.00	15.97	-2.36
16	22.52	1.03	124.33	124.33	62.27	62.27	0.00		1	1		98.33	98.33	58.22	58.22	0.00	16.47	-1.01
17	22.17	1.06	130.98	130.98	65.87	65.87	0.00		1	1		104.98	104.98	62.35	62.35	0.00	16.59	0.27
18	21.83	1.08	137.63	135.88	70.53	68.78	1.75		1	1		111.63	109.88	66.92	65.17	1.75	16.28	1.38
19	21.62	1.09	141.52	137.72	73.86	70.06	3.80		1	1		115.52	111.72	69.87	66.07	3.80	15.90	2.33
20	21.38	1.09	146.08	139.88	66.79	60.59	6.20		4	4		120.08	113.88	65.97	59.77	6.20	15.23	2.88
21	21.10	1.10	151.40	142.40	70.23	61.23	9.00		4	4		125.40	116.40	70.60	61.60	9.00	14.40	2.93
22	20.80	1.09	157.10	145.10	74.59	62.59	12.00		4	4		131.10	119.10	74.88	62.88	12.00	13.53	2.83
23	20.45	1.08	163.75	148.25	79.69	64.19	15.50		4	4		137.75	122.25	79.97	64.47	15.50	12.56	2.73
24	20.05	1.06	171.35	151.85	85.55	66.05	19.50		4	4		145.35	125.85	85.74	66.24	19.50	11.49	2.64
25	19.65	1.04	178.95	155.45	91.61	68.11	23.50		4	4		152.95	129.45	91.31	67.81	23.50	10.45	2.66
26	19.30	1.01	185.60	158.60	97.17	70.17	27.00		4	4		159.60	132.60	95.95	68.95	27.00	9.50	2.92
27	18.98	0.97	191.78	161.53	102.52	72.27	30.25		4	4		165.78	135.53	100.03	69.78	30.25	8.48	3.52
28	18.67	0.94	197.48	164.23	104.56	71.31	33.25		4	4		171.48	138.23	106.31	73.06	33.25	7.31	3.62
29	18.33	0.90	204.30	146.88	193.94	136.52	*57.42*		2	2		178.30	136.65	188.29	146.65	*41.65*	6.14	4.29
30	18.00	0.86	210.80	152.11	196.72	138.03	*58.69*		2	2		184.80	138.04	198.70	151.94	*46.76*	4.44	4.91
31	17.65	0.81	217.80	156.16	202.68	141.04	*61.64*		2	2		191.80	141.01	206.80	156.01	*50.79*	2.84	3.90
32	17.35	0.77	223.80	158.73	209.47	144.40	*65.07*		2	2		197.80	144.37	212.04	158.61	*53.43*	1.87	2.83
33	17.02	0.73	230.30	161.75	216.38	147.83	*68.55*		2	2		204.30	147.80	218.14	161.64	*56.50*	1.08	2.14
34	16.67	0.68	237.30	165.24	223.40	151.34	*72.06*		2	2		211.30	151.31	225.13	165.13	*59.99*	0.43	1.54
***35**	16.33	0.63	244.30	169.15	229.62	154.47	*75.15*		2	2		218.30	154.43	232.91	169.04	*63.87*	0.00	0.00
36	15.93	0.56	252.30	172.27	239.27	159.23	*80.03*		2	2		226.30	159.21	239.27	172.17	*67.09*	0.00	0.00
37	15.52	0.49	260.30	176.26	247.27	163.23	*84.04*		2	2		234.30	163.20	247.27	176.17	*71.10*	0.00	0.00
38	15.13	0.42	268.30	180.26	255.26	167.22	*88.04*		2	2		242.30	167.20	255.26	180.17	*75.10*	0.00	0.00
39	14.73	0.34	276.30	184.26	263.26	171.21	*92.04*		2	2		250.30	171.20	263.26	184.16	*79.10*	0.00	0.00
40	14.32	0.26	284.30	188.26	271.25	175.21	*96.04*		2	2		258.30	175.20	271.25	188.15	*83.10*	0.00	0.00
41	13.93	0.15	292.30	192.26	279.23	179.19	*100.04*		2	2		266.30	179.21	279.23	192.14	*87.09*	0.00	0.00
42	13.52	0.00	300.30	196.22	287.30	183.22	*104.08*		2	2		274.30	183.17	287.30	196.17	*91.13*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-0.18	22.42	-219.08	131.69	-144.88	150.12

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	8.61	8.61	0.00	8.61
10	8	27.19	27.19	0.00	27.19

STAGE 3 : EXCAVATION

Geometry

Node	Level [m]	Soil	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	0	50.00	149330.
2	27.40	5	0	50.00	149330.
3	27.10	5	0	50.00	149330.
4	26.80	5	0	50.00	149330.
5	26.45	5	0	50.00	149330.
6	26.10	5	0	50.00	149330.
7	25.75	5	0	50.00	149330.
8	25.40	5	0	50.00	237500.
9	25.00	1	0	50.00	237500.
10	24.60	1	0	50.00	237500.
11	24.20	1	0	50.00	237500.
12	23.85	1	0	50.00	237500.
13	23.50	1	0	50.00	237500.
14	23.17	1	0	50.00	237500.
15	22.83	1	0	50.00	237500.
16	22.52	1	1	50.00	237500.
17	22.17	1	1	50.00	237500.
18	21.83	1	1	50.00	237500.
19	21.62	1	1	50.00	237500.
20	21.38	4	4	50.00	237500.
21	21.10	4	4	50.00	237500.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*	*35 16.33*	*2*	*2*	*50.00*	*50.00*	*0.0*
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

Wall toe level: 16.33

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	25.40	0.00	5.00	25.40	0.00
London Clay - Drained	5.00	25.40	0.00	5.00	25.40	0.00
RiverTerrace	0.00	0.00	0.00	0.00	0.00	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 3 : Excavation

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 153840. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	4.9673	19	26.80	16
2	5.0	19	0.0370	14	23.88	17
3	5.0	18	0.0233	15	16.12	18
4	5.0	18	0.0149	15	16.07	19
5	5.0	18	0.0092	15	10.60	19
10	5.0	18	0.0004	17	0.63	20
15	5.0	18	0.0002	16	0.17	19
17	5.0	18	0.0001	16	0.04	20

Ground level left = 27.70 Ground level right = 22.67

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	-0.18	27.43	27.43	15.90	15.90	0.00	5	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	0.21	31.70	31.70	14.24	14.24	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-0.72	4.52
	27.40															-0.72	-6.11
3	27.10	0.61	37.40	37.40	16.53	16.53	0.00	5	0		0.00	0.00	0.00	0.00	0.00	0.48	-1.50
4	26.80	1.01	43.10	43.10	18.36	18.36	0.00	5	0		0.00	0.00	0.00	0.00	0.00	0.18	3.97
5	26.45	1.47	49.75	49.75	20.33	20.33	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-2.25	10.51
6	26.10	1.93	56.40	56.40	21.79	21.79	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-7.18	17.88
7	25.75	2.40	63.05	63.05	22.91	22.91	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-14.77	25.70
8	25.40	2.89	69.70	69.70	26.00	26.00	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-25.17	34.59
	25.40															-25.17	-109.85
9	25.00	3.46	77.30	77.30	35.49	35.49	0.00	1	0		0.00	0.00	0.00	0.00	0.00	16.82	-97.88
10	24.60	4.01	84.90	84.90	39.70	39.70	0.00	1	0		0.00	0.00	0.00	0.00	0.00	53.13	-82.84
11	24.20	4.53	92.50	92.50	42.19	42.19	0.00	1	0		0.00	0.00	0.00	0.00	0.00	83.09	-66.99
12	23.85	4.94	99.15	99.15	44.65	44.65	0.00	1	0		0.00	0.00	0.00	0.00	0.00	103.77	-51.26
13	23.50	5.30	105.80	105.80	47.21	47.21	0.00	1	0		0.00	0.00	0.00	0.00	0.00	118.97	-35.48
14	23.17	5.58	111.98	111.98	49.60	49.60	0.00	1	0		0.00	0.00	0.00	0.00	0.00	127.92	-19.14
15	22.83	5.82	118.63	118.63	52.50	52.50	0.00	1	0		0.00	0.00	0.00	0.00	0.00	131.69	-2.24
16	22.52	5.97	124.33	124.33	55.28	55.28	0.00	1	1	P	2.85	2.85	7.55	7.55	0.00	129.80	14.04
17	22.17	6.08	130.98	130.98	57.68	57.68	0.00	1	1	p	9.50	9.50	25.17	25.17	0.00	122.17	27.49
18	21.83	6.13	137.63	135.88	63.15	61.40	1.75	1	1	p	16.15	14.40	39.90	38.15	1.75	110.56	36.41
19	21.62	6.13	141.52	137.72	67.62	63.82	3.80	1	1	P	20.04	16.24	46.81	43.01	3.80	102.43	41.95
20	21.38	6.11	146.08	139.88	52.29	46.09	6.20	4	4	P	24.61	18.41	78.94	72.74	6.20	91.81	40.80
21	21.10	6.06	151.40	142.40	53.06	44.06	9.00	4	4	a	29.92	20.93	74.19	65.19	9.00	81.35	34.27
22	20.80	5.97	157.10	145.10	58.47	46.47	12.00	4	4		35.63	23.63	69.59	57.59	12.00	71.99	29.40
23	20.45	5.84	163.75	148.25	64.23	48.73	15.50	4	4		42.27	26.77	72.71	57.21	15.50	62.33	26.00
24	20.05	5.64	171.35	151.85	71.03	51.53	19.50	4	4		49.88	30.38	77.90	58.40	19.50	52.57	23.04
25	19.65	5.42	178.95	155.45	78.90	55.40	23.50	4	4		57.48	33.98	82.48	58.98	23.50	43.90	20.99
26	19.30	5.19	185.60	158.60	87.05	60.05	27.00	4	4		64.13	37.13	85.98	58.98	27.00	36.79	20.50
27	18.98	4.97	191.78	161.53	95.76	65.51	30.25	4	4		70.30	40.05	85.36	55.11	30.25	30.07	22.31
28	18.67	4.75	197.48	164.23	89.18	55.93	33.25	4	4		76.00	42.75	95.69	62.44	33.25	22.89	22.88
29	18.33	4.48	204.30	170.59	153.51	119.80	*33.71*	2	2		82.82	116.06	140.69	173.92	*-33.23*	15.25	23.98
30	18.00	4.23	210.80	186.48	141.10	116.78	*24.32*	2	2		89.33	112.16	166.93	189.77	*-22.84*	6.75	21.79
31	17.65	3.95	217.80	192.34	144.49	119.03	*25.46*	2	2		96.33	115.11	175.04	193.83	*-18.79*	0.65	12.46
32	17.35	3.71	223.80	191.58	155.64	123.43	*32.22*	2	2		102.33	119.93	175.37	192.97	*-17.60*	-1.60	4.42
33	17.02	3.45	230.30	192.10	165.95	127.76	*38.20*	2	2		108.83	125.05	176.36	192.59	*-16.22*	-2.03	-0.42
34	16.67	3.17	237.30	194.20	174.86	131.76	*43.10*	2	2		115.83	130.09	178.98	193.25	*-14.27*	-1.27	-2.90
*35	16.33	2.90	244.30	193.44	188.24	137.38	*50.86*	2	2		122.82	136.40	178.59	192.17	*-13.58*	0.00	0.00
36	15.93	2.61	252.30	200.63	191.12	139.46	*51.67*	2	2		130.82	138.52	191.12	198.82	*-7.70*	0.00	0.00
37	15.52	2.30	260.30	204.68	198.87	143.25	*55.62*	2	2		138.83	142.54	198.87	202.59	*-3.71*	0.00	0.00
38	15.13	1.98	268.30	208.72	206.64	147.06	*59.58*	2	2		146.83	146.55	206.64	206.37	*0.27*	0.00	0.00
39	14.73	1.62	276.30	212.79	214.36	150.85	*63.51*	2	2		154.82	150.59	214.36	210.13	*4.24*	0.00	0.00
40	14.32	1.22	284.30	216.90	222.03	154.63	*67.40*	2	2		162.83	154.65	222.03	213.86	*8.17*	0.00	0.00
41	13.93	0.74	292.30	221.05	229.64	158.38	*71.25*	2	2		170.83	158.75	229.64	217.56	*12.08*	0.00	0.00
42	13.52	0.00	300.30	223.50	239.95	163.15	*76.80*	2	2		178.83	161.74	239.95	222.86	*17.09*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

Wall toe level: 16.33

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
-0.18	22.42	-219.08	131.69	-144.88	150.12

Surcharge 1 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2	10.63	10.63	0.00	10.63
10	8	144.44	144.44	0.00	144.44

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

STAGE 4 : ADD B1 BASE SLAB

Minimum equivalent fluid pressure parameters

Material	Left a	Left yo	Left b	Right a	Right yo	Right b
	[kN/m²/m]	[m]	[kN/m²]	[kN/m²/m]	[m]	[kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay	5.00	27.75	0.00	5.00	27.75	0.00
- Und						
London Clay	5.00	27.75	0.00	5.00	27.75	0.00
- Drained						
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground	5.00	27.70	0.00	5.00	27.70	0.00
behind						
lightwell						

RESULTS FOR STAGE 4 : Add B1 base slab

Surcharge or strut changes
Strut no 8 inserted at this stage
Surcharge no. 2 applied at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 153840. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ	Node no.	Disp error.	Node no.	Press error	Node no.
	[mm]		[mm]		[kN/m²]	
1	0.0	1	0.0000	26	0.01	18
2	0.0	26	0.0000	26	0.00	18
3	0.0	26	0.0000	26	0.00	18

Ground level left = 27.70 Ground level right = 22.67

Node	Level	Disp	Stress Vt	Stress Ve	Pore Pt	Pore Pe	Pore Pressure	Soil Left	Soil Right		Stress Vt	Stress Ve	Pore Pt	Pore Pe	Pore Pressure	BM	SF
	[m]	[mm]	[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]				[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]	[kN/m²]	[kNm/m]	[kN/m]
1	27.70	-0.18	27.43	27.43	15.90	15.90	0.00	5	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	0.21	31.70	31.70	14.24	14.24	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-0.72	4.52
	27.40															-0.72	-6.11
3	27.10	0.61	37.40	37.40	16.53	16.53	0.00	5	0		0.00	0.00	0.00	0.00	0.00	0.48	-1.50
4	26.80	1.01	43.10	43.10	18.36	18.36	0.00	5	0		0.00	0.00	0.00	0.00	0.00	0.18	3.97
5	26.45	1.47	49.75	49.75	20.33	20.33	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-2.25	10.51
6	26.10	1.93	56.40	56.40	21.79	21.79	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-7.18	17.88
7	25.75	2.40	63.05	63.05	22.91	22.91	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-14.77	25.70
8	25.40	2.89	69.70	69.70	26.00	26.00	0.00	5	0		0.00	0.00	0.00	0.00	0.00	-25.17	34.59
	25.40															-25.17	-109.85
9	25.00	3.46	77.30	77.30	35.49	35.49	0.00	1	0		0.00	0.00	0.00	0.00	0.00	16.82	-97.88
10	24.60	4.01	84.90	84.90	39.70	39.70	0.00	1	0		0.00	0.00	0.00	0.00	0.00	53.13	-82.84
11	24.20	4.53	92.50	92.50	42.19	42.19	0.00	1	0		0.00	0.00	0.00	0.00	0.00	83.09	-66.99
12	23.85	4.94	99.15	99.15	44.65	44.65	0.00	1	0		0.00	0.00	0.00	0.00	0.00	103.77	-51.26
13	23.50	5.30	105.80	105.80	47.21	47.21	0.00	1	0		0.00	0.00	0.00	0.00	0.00	118.97	-35.48
	23.50															118.97	-35.48
14	23.17	5.58	111.98	111.98	49.60	49.60	0.00	1	0		0.00	0.00	0.00	0.00	0.00	127.92	-19.15
15	22.83	5.82	118.63	118.63	52.50	52.50	0.00	1	0		0.00	0.00	0.00	0.00	0.00	131.69	-2.24
16	22.52	5.97	124.33	124.33	55.28	55.28	0.00	1	1	P	2.85	2.85	7.55	7.55	0.00	129.80	14.04
17	22.17	6.08	130.98	130.98	57.68	57.68	0.00	1	1	p	9.50	9.50	25.16	25.16	0.00	122.17	27.49
18	21.83	6.13	137.63	135.88	63.15	61.40	1.75	1	1	p	16.15	14.40	39.89	38.14	1.75	110.56	36.41
19	21.62	6.13	141.52	137.72	67.62	63.82	3.80	1	1	P	20.04	16.24	46.82	43.02	3.80	102.43	41.95
20	21.38	6.11	146.08	139.88	52.29	46.09	6.20	4	4	P	24.61	18.41	78.94	72.74	6.20	91.81	40.80
21	21.10	6.06	151.40	142.40	53.06	44.06	9.00	4	4	a	29.92	20.93	74.19	65.19	9.00	81.35	34.27
22	20.80	5.97	157.10	145.10	58.47	46.47	12.00	4	4		35.63	23.63	69.59	57.59	12.00	71.99	29.40
23	20.45	5.84	163.75	148.25	64.23	48.73	15.50	4	4		42.27	26.77	72.71	57.21	15.50	62.33	26.00
24	20.05	5.64	171.35	151.85	71.03	51.53	19.50	4	4		49.88	30.38	77.90	58.40	19.50	52.57	23.04
25	19.65	5.42	178.95	155.45	78.90	55.40	23.50	4	4		57.48	33.98	82.48	58.98	23.50	43.90	20.99
26	19.30	5.19	185.60	158.60	87.05	60.05	27.00	4	4		64.13	37.13	85.98	58.98	27.00	36.79	20.50
27	18.98	4.97	191.78	161.53	95.76	65.51	30.25	4	4		70.30	40.05	85.36	55.11	30.25	30.07	22.31
28	18.67	4.75	197.48	164.23	89.18	55.93	33.25	4	4		76.00	42.75	95.69	62.44	33.25	22.89	22.88
29	18.33	4.48	204.30	170.59	153.51	119.80	*33.71*	2	2		82.82	116.06	140.69	173.92	*-33.23*	15.25	23.98
30	18.00	4.23	210.80	186.48	141.10	116.78	*24.32*	2	2		89.33	112.16	166.93	189.77	*-22.84*	6.75	21.79
31	17.65	3.95	217.80	192.34	144.49	119.03	*25.46*	2	2		96.33	115.11	175.04	193.83	*-18.79*	0.65	12.46
32	17.35	3.71	223.80	191.58	155.64	123.43	*32.22*	2	2		102.33	119.93	175.37	192.97	*-17.60*	-1.60	4.42
33	17.02	3.45	230.30	192.10	165.95	127.76	*38.20*	2	2		108.83	125.05	176.36	192.59	*-16.22*	-2.03	-0.42
34	16.67	3.17	237.30	194.20	174.86	131.76	*43.10*	2	2		115.83	130.09	178.98	193.25	*-14.27*	-1.27	-2.90
***35**	16.33	2.90	244.30	193.44	188.24	137.38	*50.86*	2	2		122.82	136.40	178.59	192.17	*-13.58*	0.00	0.00
36	15.93	2.61	252.30	200.63	191.12	139.46	*51.67*	2	2		130.82	138.52	191.12	198.82	*-7.70*	0.00	0.00
37	15.52	2.30	260.30	204.68	198.87	143.25	*55.62*	2	2		138.83	142.54	198.87	202.59	*-3.71*	0.00	0.00
38	15.13	1.98	268.30	208.72	206.64	147.06	*59.58*	2	2		146.83	146.55	206.64	206.37	*0.27*	0.00	0.00
39	14.73	1.62	276.30	212.79	214.36	150.85	*63.51*	2	2		154.83	150.59	214.36	210.13	*4.24*	0.00	0.00
40	14.32	1.22	284.30	216.90	222.03	154.63	*67.40*	2	2		162.83	154.65	222.03	213.86	*8.17*	0.00	0.00
41	13.93	0.74	292.30	221.05	229.64	158.38	*71.25*	2	2		170.83	158.75	229.64	217.56	*12.08*	0.00	0.00
42	13.52	0.00	300.30	223.50	239.95	163.15	*76.80*	2	2		178.83	161.74	239.95	222.86	*17.09*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
-0.18	22.42	-219.08	131.69	-144.88	150.12

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2	10.63	10.63	0.00	10.63
8	13	0.00	0.00	0.00	0.00
10	8	144.44	144.44	0.00	144.44

STAGE 5 : REMOVE PROP1

Geometry

Node	Level	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node
	[m]					[kNm2/m]
1	27.70	5	0	50.00	50.00	149330.
2	27.40	5	0	50.00	50.00	149330.
3	27.10	5	0	50.00	50.00	149330.
4	26.80	5	0	50.00	50.00	149330.
5	26.45	5	0	50.00	50.00	149330.
6	26.10	5	0	50.00	50.00	149330.
7	25.75	5	0	50.00	50.00	149330.
8	25.40	5	0	50.00	50.00	237500.
9	25.00	1	0	50.00	50.00	237500.
10	24.60	1	0	50.00	50.00	237500.

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
11	24.20	1	0	50.00	50.00	237500.
12	23.85	1	0	50.00	50.00	237500.
13	23.50	1	0	50.00	50.00	237500.
14	23.17	1	0	50.00	50.00	237500.
15	22.83	1	1	50.00	50.00	237500.
16	22.52	1	1	50.00	50.00	237500.
17	22.17	1	1	50.00	50.00	237500.
18	21.83	1	1	50.00	50.00	237500.
19	21.62	1	1	50.00	50.00	237500.
20	21.38	4	4	50.00	50.00	237500.
21	21.10	4	4	50.00	50.00	237500.
22	20.80	4	4	50.00	50.00	237500.
23	20.45	4	4	50.00	50.00	237500.
24	20.05	4	4	50.00	50.00	237500.
25	19.65	4	4	50.00	50.00	237500.
26	19.30	4	4	50.00	50.00	237500.
27	18.98	4	4	50.00	50.00	237500.
28	18.67	4	4	50.00	50.00	237500.
29	18.33	2	2	50.00	50.00	237500.
30	18.00	2	2	50.00	50.00	237500.
31	17.65	2	2	50.00	50.00	237500.
32	17.35	2	2	50.00	50.00	237500.
33	17.02	2	2	50.00	50.00	237500.
34	16.67	2	2	50.00	50.00	237500.
*	***35 16.33***	***2***	***2***	***50.00***	***50.00***	***0.0***
36	15.93	2	2	50.00	50.00	0.0
37	15.52	2	2	50.00	50.00	0.0
38	15.13	2	2	50.00	50.00	0.0
39	14.73	2	2	50.00	50.00	0.0
40	14.32	2	2	50.00	50.00	0.0
41	13.93	2	2	50.00	50.00	0.0
42	13.52	2	2	50.00	50.00	0.0

**** Wall toe level: 16.33***

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 5 : Remove prop1

Surcharge or strut changes
Strut no. 1 removed at this stage
Strut no. 10 removed at this stage

Calculation details
E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 60000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 60000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc displ [mm]	Node max displ	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	10	0.0071	1	0.00	1
2	10.0	1	1	0.6590	1	25.99	1
3	10.7	1	1	0.6125	1	15.34	2
4	11.3	1	1	0.5787	1	13.53	3
5	11.9	1	1	0.5368	1	10.75	4
10	14.0	1	1	0.2832	1	4.53	7
15	15.1	1	1	0.1110	1	1.81	12
20	15.4	1	1	0.0288	1	0.79	14
30	15.5	1	1	0.0068	1	0.20	7
35	15.4	1	1	0.0050	1	0.08	12

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Stress Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	15.24	27.43	27.43	9.77	9.77	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	14.54	31.70	31.70	11.29	11.29	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-0.44	3.16
3	27.10	13.84	37.40	37.40	13.32	13.32	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-1.90	6.85
4	26.80	13.13	43.10	43.10	15.35	15.35	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-4.55	11.34
5	26.45	12.32	49.75	49.75	17.73	17.73	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-9.39	16.94
6	26.10	11.51	56.40	56.40	20.11	20.11	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-16.41	23.56
7	25.75	10.72	63.05	63.05	22.49	22.49	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-25.88	31.02
8	25.40	9.95	69.70	69.70	24.87	24.87	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-38.12	39.61
9	25.00	9.10	77.30	77.30	33.00	33.00	0.00	A	1	0	0.00	0.00	0.00	0.00	0.00	-55.83	50.88
10	24.60	8.29	84.90	84.90	36.24	36.24	0.00	A	1	0	0.00	0.00	0.00	0.00	0.00	-78.82	64.72
11	24.20	7.53	92.50	92.50	39.48	39.48	0.00	A	1	0	0.00	0.00	0.00	0.00	0.00	-107.61	79.37
12	23.85	6.92	99.15	99.15	42.32	42.32	0.00	A	1	0	0.00	0.00	0.00	0.00	0.00	-137.98	94.18
13	23.50	6.39	105.80	105.80	45.14	45.14	0.00	A	1	0	0.00	0.00	0.00	0.00	0.00	-173.53	109.20
	23.50															-173.53	-102.17
14	23.17	5.97	111.98	111.98	47.77	47.77	0.00	A	1	0	0.00	0.00	0.00	0.00	0.00	-142.80	-86.50
15	22.83	5.59	118.63	118.63	50.59	50.59	0.00	A	1	1	3.32	3.32	5.60	5.60	0.00	-115.35	-71.13
16	22.52	5.31	124.33	124.33	53.01	53.01	0.00	A	1	1	9.03	9.03	11.47	11.47	0.00	-96.20	-57.07
17	22.17	5.03	130.98	130.98	60.55	0.00			1	1	15.68	15.68	27.75	27.75	0.00	-78.59	-44.58
18	21.83	4.79	137.63	135.88	68.17	66.42	1.75		1	1	22.32	20.57	40.84	39.09	1.75	-65.00	-35.04
19	21.62	4.67	141.52	137.72	73.04	69.24	3.80		1	1	26.22	22.42	46.39	42.59	3.80	-58.59	-28.29
20	21.38	4.54	146.08	139.88	60.16	53.96	6.20		4	4	30.78	24.58	74.71	68.51	6.20	-52.52	-27.21
21	21.10	4.40	151.40	142.40	62.07	53.07	9.00		4	4	36.10	27.10	68.56	59.56	9.00	-44.37	-30.05
22	20.80	4.27	157.10	145.10	67.78	55.78	12.00		4	4	41.80	29.80	63.79	51.79	12.00	-35.07	-30.34
23	20.45	4.13	163.75	148.25	73.64	58.14	15.50		4	4	48.45	32.95	66.52	51.02	15.50	-24.68	-28.36
24	20.05	3.99	171.35	151.85	79.91	60.41	19.50		4	4	56.05	36.55	71.46	51.96	19.50	-13.87	-25.33
25	19.65	3.86	178.95	155.45	86.50	63.00	23.50		4	4	63.65	40.15	76.63	53.13	23.50	-4.41	-21.79
26	19.30	3.75	185.60	158.60	92.91	65.91	27.00		4	4	70.30	43.30	81.12	54.12	27.00	2.57	-17.95
27	18.98	3.65	191.78	161.53	99.48	69.23	30.25		4	4	76.48	46.23	83.55	53.30	30.25	7.75	-13.47
28	18.67	3.55	197.48	164.23	96.18	62.93	33.25		4	4	82.18	48.93	91.52	58.27	33.25	11.05	-10.22
29	18.33	3.42	204.30	162.89	168.91	127.50	*41.41*		2	2	89.00	124.81	129.36	165.17	*-35.81*	14.36	-2.79
30	18.00	3.31	210.80	176.77	160.51	126.48	*34.03*		2	2	95.50	123.47	150.49	178.46	*-27.97*	13.10	5.57
31	17.65	3.17	217.80	183.62	161.94	127.75	*34.18*		2	2	102.50	124.67	162.10	184.27	*-22.17*	10.56	7.24
32	17.35	3.05	223.80	184.73	169.35	130.28	*39.07*		2	2	108.50	127.10	167.21	185.80	*-18.60*	8.39	7.55
33	17.02	2.92	230.30	187.40	175.36	132.46	*42.90*		2	2	115.00	129.65	173.34	187.99	*-14.65*	5.83	8.22
34	16.67	2.77	237.30	191.61	180.04	134.35	*45.69*		2	2	122.00	131.99	181.37	191.36	*-9.99*	2.83	8.33
***35**	16.33	2.62	244.30	201.05	176.65	133.40	*43.25*		2	2	129.00	131.20	198.25	200.44	*-2.20*	0.00	0.00
36	15.93	2.35	252.30	198.75	194.90	141.34	*53.55*		2	2	137.00	139.72	194.90	197.62	*-2.72*	0.00	0.00
37	15.52	2.08	260.30	202.86	202.50	145.07	*57.44*		2	2	145.00	143.81	202.50	201.31	*1.19*	0.00	0.00
38	15.13	1.79	268.30	206.89	210.29	148.88	*61.41*		2	2	153.00	147.81	210.29	205.10	*5.19*	0.00	0.00
39	14.73	1.47	276.30	210.96	218.03	152.68	*65.34*		2	2	161.00	151.84	218.03	208.87	*9.16*	0.00	0.00
40	14.32	1.11	284.30	215.03	225.77	156.50	*69.27*		2	2	169.00	155.87	225.77	212.64	*13.13*	0.00	0.00
41	13.93	0.68	292.30	219.09	233.55	160.34	*73.21*		2	2	177.00	159.88	233.55	216.43	*17.12*	0.00	0.00
42	13.52	0.00	300.30	221.96	243.02	164.68	*78.34*		2	2	185.00	163.29	243.02	221.31	*21.71*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]

'u' - undrained strength unreasonably low for stress state

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.18	22.42	-219.08	131.69	-144.88	150.12

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				10.63
8	13	211.38	211.38	0.00	211.38
10	8				144.44

STAGE 6 : ACCIDENTAL WATER RISE

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	27.00	0.00	10.00
2	22.50	45.00	10.00
3	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 6 : accidental water rise

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 87948. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 149520. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.5794	1	0.00	1
2	1.6	1	0.0948	1	4.79	1
3	1.7	1	0.0802	1	2.74	2
4	1.8	1	0.0726	1	2.26	3
5	1.8	1	0.0654	1	1.71	4
10	2.1	1	0.0266	1	0.60	7
15	2.2	1	0.0072	1	0.18	8
17	2.2	1	0.0033	1	0.06	9

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]		Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Pore Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	17.42	27.43	27.43	9.74	9.74	0.00	a	5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	16.58	31.70	31.70	11.27	11.27	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-0.44	3.15
3	27.10	15.74	37.36	37.36	13.31	13.31	0.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-1.89	6.85
4	26.80	14.91	43.10	41.10	16.67	14.67	2.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-4.55	11.56
5	26.45	13.94	49.75	44.25	21.28	15.78	5.50	A	5	0	0.00	0.00	0.00	0.00	0.00	-9.54	17.99
6	26.10	12.98	56.40	47.40	25.89	16.89	9.00	A	5	0	0.00	0.00	0.00	0.00	0.00	-17.14	26.25
7	25.75	12.03	63.05	50.55	30.47	17.97	12.50	a	5	0	0.00	0.00	0.00	0.00	0.00	-27.91	36.11
8	25.40	11.10	69.70	53.70	35.05	19.05	16.00	a	5	0	0.00	0.00	0.00	0.00	0.00	-42.42	48.01
9	25.00	10.08	77.30	57.30	44.35	24.35	20.00	a	1	0	0.00	0.00	0.00	0.00	0.00	-64.25	63.46
10	24.60	9.10	84.90	60.90	51.77	27.77	24.00		1	0	0.00	0.00	0.00	0.00	0.00	-93.18	82.68
11	24.20	8.19	92.50	64.50	59.26	31.26	28.00		1	0	0.00	0.00	0.00	0.00	0.00	-130.40	104.15
12	23.85	7.46	99.15	67.65	65.30	33.80	31.50		1	0	0.00	0.00	0.00	0.00	0.00	-170.74	126.69
13	23.50	6.82	105.80	70.80	71.18	36.18	35.00		1	0	0.00	0.00	0.00	0.00	0.00	-219.08	150.12
	23.50															-219.08	-144.88
14	23.17	6.32	111.98	73.73	76.44	38.19	38.25		1	0	0.00	0.00	0.00	0.00	0.00	-175.89	-119.97
15	22.83	5.87	118.63	76.88	81.97	40.22	41.75		1	1	3.32	3.32	6.42	6.42	0.00	-138.42	-94.80
16	22.52	5.54	124.33	79.58	86.70	41.95	44.75		1	1	9.03	9.03	11.98	11.98	0.00	-113.66	-70.38
17	22.17	5.21	130.98	115.23	72.59	56.84	15.75		1	1	15.68	15.68	28.28	28.28	0.00	-93.28	-50.48
18	21.83	4.93	137.63	135.88	68.45	66.70	1.75		1	1	22.32	20.57	41.26	39.51	1.75	-78.32	-38.96
19	21.62	4.79	141.52	137.72	73.40	69.60	3.80		1	1	26.22	22.42	46.72	42.92	3.80	-71.11	-32.21
20	21.38	4.63	146.08	139.88	60.79	54.59	6.20		4	4	30.78	24.58	75.09	68.89	6.20	-64.09	-31.10
21	21.10	4.47	151.40	142.40	62.59	53.59	9.00		4	4	36.10	27.10	68.78	59.78	9.00	-54.86	-33.86
22	20.80	4.32	157.10	145.10	68.24	56.24	12.00		4	4	41.80	29.80	63.86	51.86	12.00	-44.43	-34.05
23	20.45	4.17	163.75	148.25	74.16	58.66	15.50		4	4	48.45	32.95	66.49	50.99	15.50	-32.77	-31.90
24	20.05	4.01	171.35	151.85	80.46	60.96	19.50		4	4	56.05	36.55	71.35	51.85	19.50	-20.58	-28.64
25	19.65	3.87	178.95	155.45	87.08	63.58	23.50		4	4	63.65	40.15	76.46	52.96	23.50	-9.86	-24.82
26	19.30	3.75	185.60	158.60	93.51	66.51	27.00		4	4	70.30	43.30	80.92	53.92	27.00	-1.86	-20.71
27	18.98	3.64	191.78	161.53	100.12	69.87	30.25		4	4	76.48	46.23	83.32	53.07	30.25	4.18	-15.96
28	18.67	3.54	197.48	164.23	96.78	63.53	33.25		4	4	82.18	48.93	91.10	57.85	33.25	8.18	-12.41
29	18.33	3.41	204.30	162.67	169.35	127.72	*41.63*		2	2	89.00	124.98	129.01	165.00	*-35.98*	12.20	-4.68
30	18.00	3.29	210.80	176.56	160.94	126.70	*34.24*		2	2	95.50	123.65	150.12	178.28	*-28.15*	11.51	3.95
31	17.65	3.16	217.80	183.39	162.40	127.98	*34.41*		2	2	102.50	124.87	161.70	184.07	*-22.37*	9.49	5.89
32	17.35	3.04	223.80	184.51	169.78	130.49	*39.29*		2	2	108.50	127.28	166.83	185.62	*-18.78*	7.69	6.46
33	17.02	2.91	230.30	187.18	175.79	132.67	*43.12*		2	2	115.00	129.83	172.98	187.81	*-14.83*	5.44	7.40
34	16.67	2.76	237.30	191.41	180.45	134.56	*45.89*		2	2	122.00	132.16	181.03	191.19	*-10.16*	2.68	7.77
***35**	16.33	2.62	244.30	200.74	177.27	133.71	*43.56*		2	2	129.00	131.47	197.71	200.17	*-2.47*	0.00	0.00
36	15.93	2.35	252.30	198.72	194.95	141.37	*53.58*		2	2	137.00	139.70	194.95	197.65	*-2.70*	0.00	0.00
37	15.52	2.08	260.30	202.84	202.56	145.09	*57.46*		2	2	145.00	143.79	202.56	201.35	*1.21*	0.00	0.00
38	15.13	1.79	268.30	206.86	210.35	148.91	*61.44*		2	2	153.00	147.79	210.35	205.14	*5.21*	0.00	0.00
39	14.73	1.47	276.30	210.93	218.09	152.71	*65.37*		2	2	161.00	151.82	218.09	208.91	*9.18*	0.00	0.00
40	14.32	1.11	284.30	214.99	225.84	156.53	*69.31*		2	2	169.00	155.84	225.84	212.68	*13.16*	0.00	0.00
41	13.93	0.68	292.30	219.05	233.64	160.39	*73.25*		2	2	177.00	159.84	233.64	216.48	*17.16*	0.00	0.00
42	13.52	0.00	300.30	221.96	243.02	164.68	*78.34*		2	2	185.00	163.29	243.02	221.31	*21.71*	0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

Undrained pore pressures calculated by the program are shown in italics.
Users are advised to inspect these and amend data if necessary.

Warnings for undrained pore pressure values:
's' - initial stress outside effective strength limits
'u' - undrained strength unreasonably low for stress state

EXTREME values so far
Displacements [mm] Moments [kNm/m] Shears [kN/m]

```
  Min          Max     Min     Max     Min    Max
-0.18        22.42 -219.08  131.69 -144.88 150.12
Surcharge 1 present in this stage
Surcharge 2 present in this stage
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Strut Forces

No.	Node no.	Strut force	Horiz force	Moment	Max strut force
		[kN/m]	[kN/m]	[kNm/m]	[kN/m]
1	2				10.63
8	13	295.01	295.01	0.00	295.01
10	8				144.44

STAGE 7 : LONG TERM

Geometry

Node	Level [m]	Soil Left	Soil Right	Boundary Left	Boundary Right	EI below node [kNm2/m]
1	27.70	5	0	50.00	50.00	74666.
2	27.40	5	0	50.00	50.00	74666.
3	27.10	5	0	50.00	50.00	74666.
4	26.80	5	0	50.00	50.00	74666.
5	26.45	5	0	50.00	50.00	74666.
6	26.10	5	0	50.00	50.00	74666.
7	25.75	5	0	50.00	50.00	74666.
8	25.40	5	0	50.00	50.00	118750.
9	25.00	1	0	50.00	50.00	118750.
10	24.60	1	0	50.00	50.00	118750.
11	24.20	1	0	50.00	50.00	118750.
12	23.85	1	0	50.00	50.00	118750.
13	23.50	1	0	50.00	50.00	118750.
14	23.17	1	0	50.00	50.00	118750.
15	22.83	1	1	50.00	50.00	118750.
16	22.52	1	1	50.00	50.00	118750.
17	22.17	1	1	50.00	50.00	118750.
18	21.83	1	1	50.00	50.00	118750.
19	21.62	1	1	50.00	50.00	118750.
20	21.38	4	4	50.00	50.00	118750.
21	21.10	4	4	50.00	50.00	118750.
22	20.80	4	4	50.00	50.00	118750.
23	20.45	4	4	50.00	50.00	118750.
24	20.05	4	4	50.00	50.00	118750.
25	19.65	4	4	50.00	50.00	118750.
26	19.30	4	4	50.00	50.00	118750.
27	18.98	4	4	50.00	50.00	118750.
28	18.67	4	4	50.00	50.00	118750.
29	18.33	3	3	50.00	50.00	118750.
30	18.00	3	3	50.00	50.00	118750.
31	17.65	3	3	50.00	50.00	118750.
32	17.35	3	3	50.00	50.00	118750.
33	17.02	3	3	50.00	50.00	118750.
34	16.67	3	3	50.00	50.00	118750.
***35**	***16.33**	***3**	***3**	***50.00**	***50.00**	***0.0**
36	15.93	3	3	50.00	50.00	0.0
37	15.52	3	3	50.00	50.00	0.0
38	15.13	3	3	50.00	50.00	0.0
39	14.73	3	3	50.00	50.00	0.0
40	14.32	3	3	50.00	50.00	0.0
41	13.93	3	3	50.00	50.00	0.0
42	13.52	3	3	50.00	50.00	0.0

Wall toe level: 16.33

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	22.00	0.00	10.00

Analysis details

SAFE model with redistribution
and without friction at wall/soil interface

	Left	Right
E profile Generated		
Boundary distances [m] :	50.00	50.00
Wall relaxation 50%		

Minimum equivalent fluid pressure parameters

Material	Left a [kN/m²/m]	Left yo [m]	Left b [kN/m²]	Right a [kN/m²/m]	Right yo [m]	Right b [kN/m²]
Made Ground	0.00	0.00	0.00	0.00	0.00	0.00
London Clay - Und	5.00	27.75	0.00	5.00	27.75	0.00
London Clay - Drained	5.00	27.75	0.00	5.00	27.75	0.00
RiverTerrace	5.00	25.40	0.00	5.00	25.40	0.00
Made Ground behind lightwell	5.00	27.70	0.00	5.00	27.70	0.00

RESULTS FOR STAGE 7 : Long term

Calculation details

E Profiles assumed for calculation (generated):
On the LEFT: E at ground level = 6000.0 E at bottom node = 70884. kN/m²
On the RIGHT: E at ground level = 6000.0 E at bottom node = 119530. kN/m²
Minimum equivalent fluid pressure used in this stage.

Iter no.	Inc max displ [mm]	Node no.	Disp error. [mm]	Node no.	Press error [kN/m²]	Node no.
1	0.0	1	1.8288	1	3.58	9
2	1.8	1	0.2972	1	8.03	1
3	2.1	1	0.2847	1	5.06	2
4	2.4	1	0.2764	1	4.65	3
5	2.7	1	0.2640	1	3.81	4
10	3.8	1	0.1681	1	1.89	7
15	4.5	1	0.0883	1	0.84	8
20	4.8	1	0.0397	1	0.37	14
28	5.0	1	0.0063	1	0.07	16

Ground level left = 27.70 Ground level right = 23.00

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe Pressure [kN/m²]	Soil	Soil Left	Soil Right	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
1	27.70	22.42	27.43	27.43	9.73	9.73	0.00 a	5	0	0.00	0.00	0.00	0.00	0.00	0.00
2	27.40	21.13	31.70	31.70	11.26	11.26	0.00 a	5	0	0.00	0.00	0.00	0.00	-0.44	3.15
3	27.10	19.85	37.40	37.40	13.31	13.31	0.00 A	5	0	0.00	0.00	0.00	0.00	-1.89	6.83
4	26.80	18.57	43.10	43.10	15.35	15.35	0.00 A	5	0	0.00	0.00	0.00	0.00	-4.54	11.32
5	26.45	17.08	49.75	49.75	17.72	17.72	0.00 A	5	0	0.00	0.00	0.00	0.00	-9.38	16.92
6	26.10	15.60	56.40	56.40	20.10	20.10	0.00 A	5	0	0.00	0.00	0.00	0.00	-16.38	23.54
7	25.75	14.16	63.05	63.05	22.46	22.46	0.00 A	5	0	0.00	0.00	0.00	0.00	-25.85	30.99
8	25.40	12.76	69.70	69.70	24.81	24.81	0.00 A	5	0	0.00	0.00	0.00	0.00	-38.07	39.57
9	25.00	11.22	77.30	77.30	32.94	32.94	0.00 A	1	0	0.00	0.00	0.00	0.00	-55.76	50.81
10	24.60	9.75	84.90	84.90	36.16	36.16	0.00 a	1	0	0.00	0.00	0.00	0.00	-78.72	64.63

Node	Level [m]	Disp [mm]	Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	Soil	Left	Right		Stress Vt [kN/m²]	Stress Ve [kN/m²]	Stress Pt [kN/m²]	Pore Pe [kN/m²]	Pore Pressure [kN/m²]	BM [kNm/m]	SF [kN/m]
11	24.20	8.39	92.50	92.50	39.39	39.39	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	-107.46	79.25
12	23.85	7.32	99.15	99.15	42.22	42.22	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	-137.78	94.02
13	23.50	6.40	105.80	105.80	45.04	45.04	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	-173.28	109.01
	23.50																-173.28	-104.01
14	23.17	5.69	111.98	111.98	47.66	47.66	0.00	a	1	0		0.00	0.00	0.00	0.00	0.00	-141.94	-88.37
15	22.83	5.06	118.63	118.63	50.48	50.48	0.00	a	1	1		3.32	3.32	7.02	7.02	0.00	-113.83	-73.26
16	22.52	4.62	124.33	124.33	52.89	52.89	0.00	a	1	1		9.03	9.03	12.21	12.21	0.00	-93.97	-59.59
17	22.17	4.20	130.98	130.98	59.61	59.61	0.00		1	1		15.68	15.68	28.09	28.09	0.00	-75.43	-47.46
18	21.83	3.86	137.63	135.88	69.49	67.74	1.75		1	1		22.32	20.57	40.71	38.96	1.75	-60.74	-37.95
19	21.62	3.68	141.52	137.72	74.37	70.57	3.80		1	1		26.22	22.42	45.87	42.07	3.80	-53.78	-30.79
20	21.38	3.51	146.08	139.88	62.24	56.04	6.20		4	4		30.78	24.58	73.05	66.85	6.20	-47.15	-29.02
21	21.10	3.33	151.40	142.40	64.71	55.71	9.00		4	4		36.10	27.10	66.47	57.47	9.00	-38.63	-30.68
22	20.80	3.17	157.10	145.10	70.57	58.57	12.00		4	4		41.80	29.80	61.66	49.66	12.00	-29.35	-29.49
23	20.45	3.01	163.75	148.25	76.54	61.04	15.50		4	4		48.45	32.95	64.28	48.78	15.50	-19.54	-25.75
24	20.05	2.84	171.35	151.85	82.85	63.35	19.50		4	4		56.05	36.55	69.01	49.51	19.50	-10.16	-20.68
25	19.65	2.70	178.95	155.45	89.44	65.94	23.50		4	4		63.65	40.15	74.02	50.52	23.50	-2.99	-15.02
26	19.30	2.58	185.60	158.60	95.74	68.74	27.00		4	4		70.30	43.30	78.32	51.32	27.00	1.25	-9.19
27	18.98	2.46	191.78	161.53	102.22	71.97	30.25		4	4		76.48	46.23	80.90	50.65	30.25	3.28	-2.92
28	18.67	2.35	197.48	164.23	100.58	67.33	33.25		4	4		82.18	48.93	87.42	54.17	33.25	3.16	2.55
29	18.33	2.22	204.30	167.55	175.59	138.84	36.75		3	3	p	89.00	52.25	173.04	136.29	36.75	1.51	5.12
30	18.00	2.10	210.80	170.80	179.38	139.38	40.00		3	3	p	95.50	55.50	186.65	146.65	40.00	-0.29	4.33
31	17.65	1.97	217.80	174.30	185.91	142.41	43.50		3	3	p	102.50	59.00	193.72	150.22	43.50	-1.38	1.83
32	17.35	1.86	223.80	177.30	192.33	145.83	46.50		3	3		108.50	62.00	197.20	150.70	46.50	-1.55	-0.20
33	17.02	1.74	230.30	180.55	199.40	149.65	49.75		3	3		115.00	65.25	201.60	151.85	49.75	-1.23	-1.33
34	16.67	1.61	237.30	184.05	206.61	153.36	53.25		3	3		122.00	68.75	206.98	153.73	53.25	-0.64	-1.76
***35**	16.33	1.48	244.30	187.55	216.77	160.02	56.75		3	3		129.00	72.25	211.89	155.14	56.75	-0.00	0.00
36	15.93	1.33	252.30	191.55	221.22	160.47	60.75		3	3		137.00	76.25	221.22	160.47	60.75	-0.00	0.00
37	15.52	1.17	260.30	195.55	229.12	164.37	64.75		3	3		145.00	80.25	229.12	164.37	64.75	-0.00	0.00
38	15.13	1.01	268.30	199.55	237.00	168.25	68.75		3	3		153.00	84.25	237.00	168.25	68.75	-0.00	0.00
39	14.73	0.82	276.30	203.55	244.86	172.11	72.75		3	3		161.00	88.25	244.86	172.11	72.75	-0.00	0.00
40	14.32	0.62	284.30	207.55	252.72	175.97	76.75		3	3		169.00	92.25	252.72	175.97	76.75	-0.00	0.00
41	13.93	0.38	292.30	211.55	260.67	179.92	80.75		3	3		177.00	96.25	260.67	179.92	80.75	-0.00	0.00
42	13.52	0.00	300.30	215.55	272.70	187.95	84.75	A	3	3		185.00	100.25	272.70	187.95	84.75	-0.00	0.00

Vt, Ve : vertical total and effective stress
Pt, Pe : horizontal total and effective stress

**** Wall toe level: 16.33***

EXTREME values so far

Displacements [mm]		Moments [kNm/m]		Shears [kN/m]	
Min	Max	Min	Max	Min	Max
-0.18	22.42	-219.08	131.69	-144.88	150.12

Surcharge 1 present in this stage
Surcharge 2 present in this stage

Strut Forces

No.	Node no.	Strut force [kN/m]	Horiz force [kN/m]	Moment [kNm/m]	Max strut force [kN/m]
1	2				10.63
8	13	213.02	213.02	0.00	295.01
10	8				144.44

Results Envelope

Node	Level [m]	Displacements [mm] Min	Max	Moments [kNm/m] Min	Max	Shears [kN/m] Min	Max
1	27.70	-0.18	22.42	0.00	0.00	0.00	0.00
2	27.40	0.00	21.13	-0.72	0.00	-6.11	4.52
3	27.10	0.00	19.85	-1.90	0.92	-3.06	6.85
4	26.80	0.00	18.57	-4.55	1.42	-0.19	11.56
5	26.45	0.00	17.08	-9.54	0.96	0.00	17.99
6	26.10	0.00	15.60	-17.14	0.00	0.00	26.25
7	25.75	0.00	14.16	-27.91	0.00	0.00	36.11
8	25.40	0.00	12.76	-42.42	0.00	-109.85	48.01
9	25.00	0.00	11.22	-64.25	16.82	-97.88	63.46
10	24.60	0.00	9.75	-93.18	53.13	-82.84	82.68
11	24.20	0.00	8.39	-130.40	83.09	-66.99	104.15
12	23.85	0.00	7.46	-170.74	103.77	-51.26	126.69
13	23.50	0.00	6.82	-219.08	118.97	-144.88	150.12
14	23.17	0.00	6.32	-175.89	127.92	-119.97	0.00
15	22.83	0.00	5.87	-138.42	131.69	-94.80	0.00
16	22.52	0.00	5.97	-113.66	129.80	-70.38	14.04
17	22.17	0.00	6.08	-93.28	122.17	-50.48	27.49
18	21.83	0.00	6.13	-78.32	110.56	-38.96	36.41
19	21.62	0.00	6.13	-71.11	102.43	-32.21	41.95
20	21.38	0.00	6.11	-64.09	91.81	-31.10	40.80
21	21.10	0.00	6.06	-54.86	81.35	-33.86	34.27
22	20.80	0.00	5.97	-44.43	71.99	-34.05	29.40
23	20.45	0.00	5.84	-32.77	62.33	-31.90	26.00
24	20.05	0.00	5.64	-20.58	52.57	-28.64	23.04
25	19.65	0.00	5.42	-9.86	43.90	-24.82	20.99
26	19.30	0.00	5.19	-1.86	36.79	-20.71	20.50
27	18.98	0.00	4.97	0.00	30.07	-15.96	22.31
28	18.67	0.00	4.75	0.00	22.89	-12.41	22.88
29	18.33	0.00	4.48	0.00	15.25	-4.68	23.98
30	18.00	0.00	4.23	-0.29	13.10	0.00	21.79
31	17.65	0.00	3.95	-1.38	10.56	0.00	12.46
32	17.35	0.00	3.71	-1.60	8.39	-0.20	7.55
33	17.02	0.00	3.45	-2.03	5.83	-1.33	8.22
34	16.67	0.00	3.17	-1.27	2.83	-2.90	8.33
***35**	***16.33***	***0.00***	***2.90***	***-0.00***	***0.00***	***0.00***	***0.00***
36	15.93	0.00	2.61	-0.00	0.00	0.00	0.00
37	15.52	0.00	2.30	-0.00	0.00	0.00	0.00
38	15.13	0.00	1.98	-0.00	0.00	0.00	0.00
39	14.73	0.00	1.62	-0.00	0.00	0.00	0.00
40	14.32	0.00	1.22	-0.00	0.00	0.00	0.00
41	13.93	0.00	0.74	-0.00	0.00	0.00	0.00
42	13.52	0.00	0.00	-0.00	0.00	0.00	0.00

Appendix C

PDISP Analysis

1. Introduction

Pdisp has been used to calculate the settlement due to demolition of existing building, excavation of 2m and construction of new buildings.

2. Input
   - Horizontal rigid boundary at -18.7mOD (Top of Chalk)
   - Parameters, see tables below for short term and long term conditions:

Table 1 Parameters for short term condition

Stratum	Level at top (mOD)	Young's modulus top (kN/m2)	Young's modulus bottom (kN/m2)	Poisson's ratio
River Terrace Deposits	21.5	20000	20000	0.2
London Clay	18.5	40000	80300	0.5
Lambeth Group – Clay	3	80000	80000	0.5
Lambeth Group - Sand	-8	20000	200000	0.2

Table 2 Parameter for long term condition

Stratum	Level at top (mOD)	Young's modulus top (kN/m2)	Young's modulus bottom (kN/m2)	Poisson's ratio
River Terrace Deposits	21.5	20000	20000	0.2
London Clay	18.5	32000	64240	0.2
Lambeth Group – Clay	3	64000	64000	0.2
Lambeth Group - Sand	-8	20000	200000	0.2

   - Load data

     Unloading - Demolition of existing buildings:

     Load is calculated as Realistic load (7.49 kPa per storey) times number of floors, see Figure 1

     Unloading - Excavation of 2m to the new basement floor

     A uniform load of -38kPa has been applied to account for the excavation of 2m

     Loading – construction of new building

     Load is calculated as Average load per storey times number of floors see Figure 2.
   - Displacement Data, see Figure 3.

     Sewer, water main and gas

     Four displacement lines are located 7m away from the edge of the site at the level of 21.5mOD.

     BT tunnels

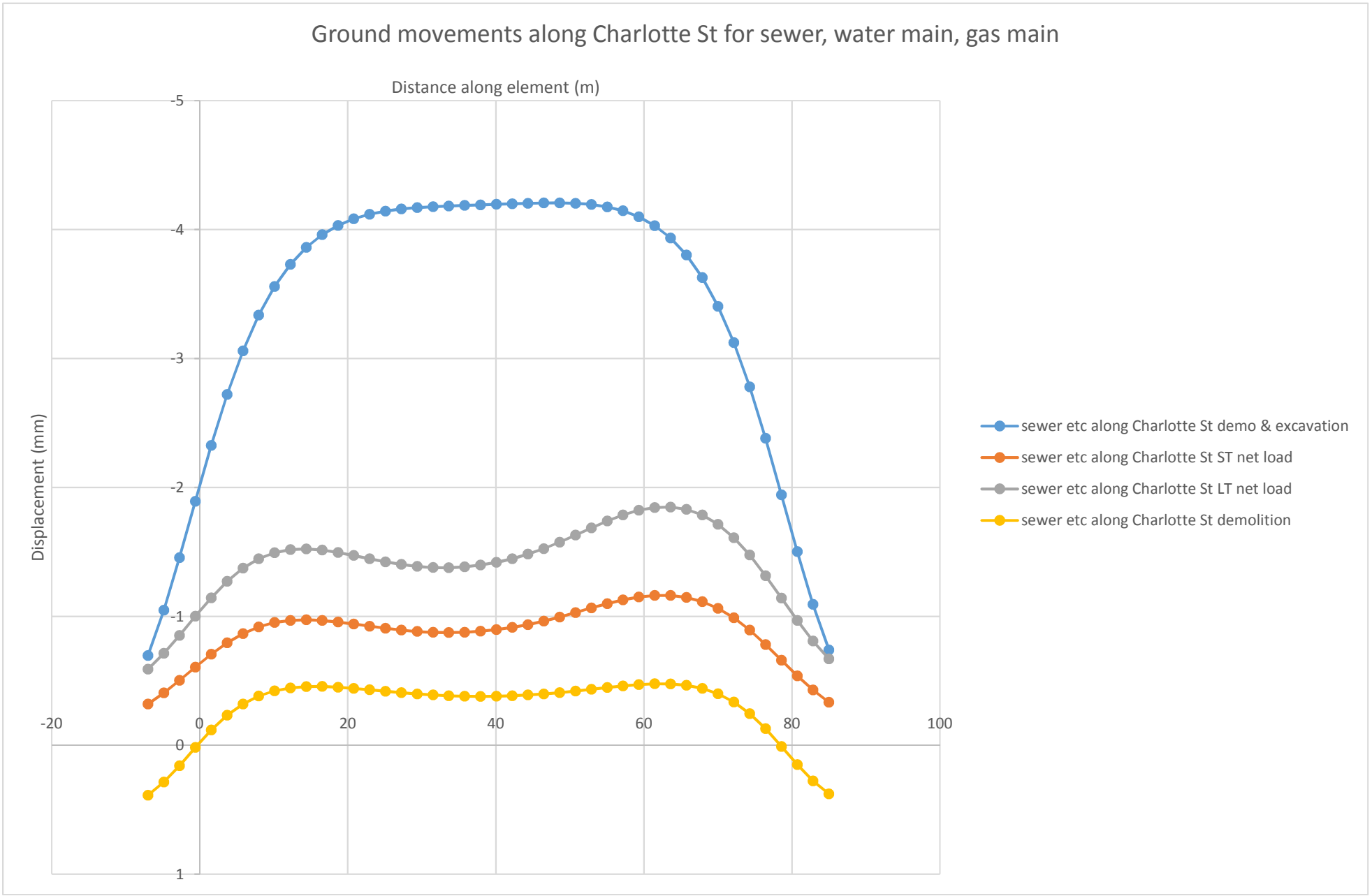
Two displacement lines are locate 7m away from the edge of the site on Howland road at level of -11 and -13.1mOD respectively.

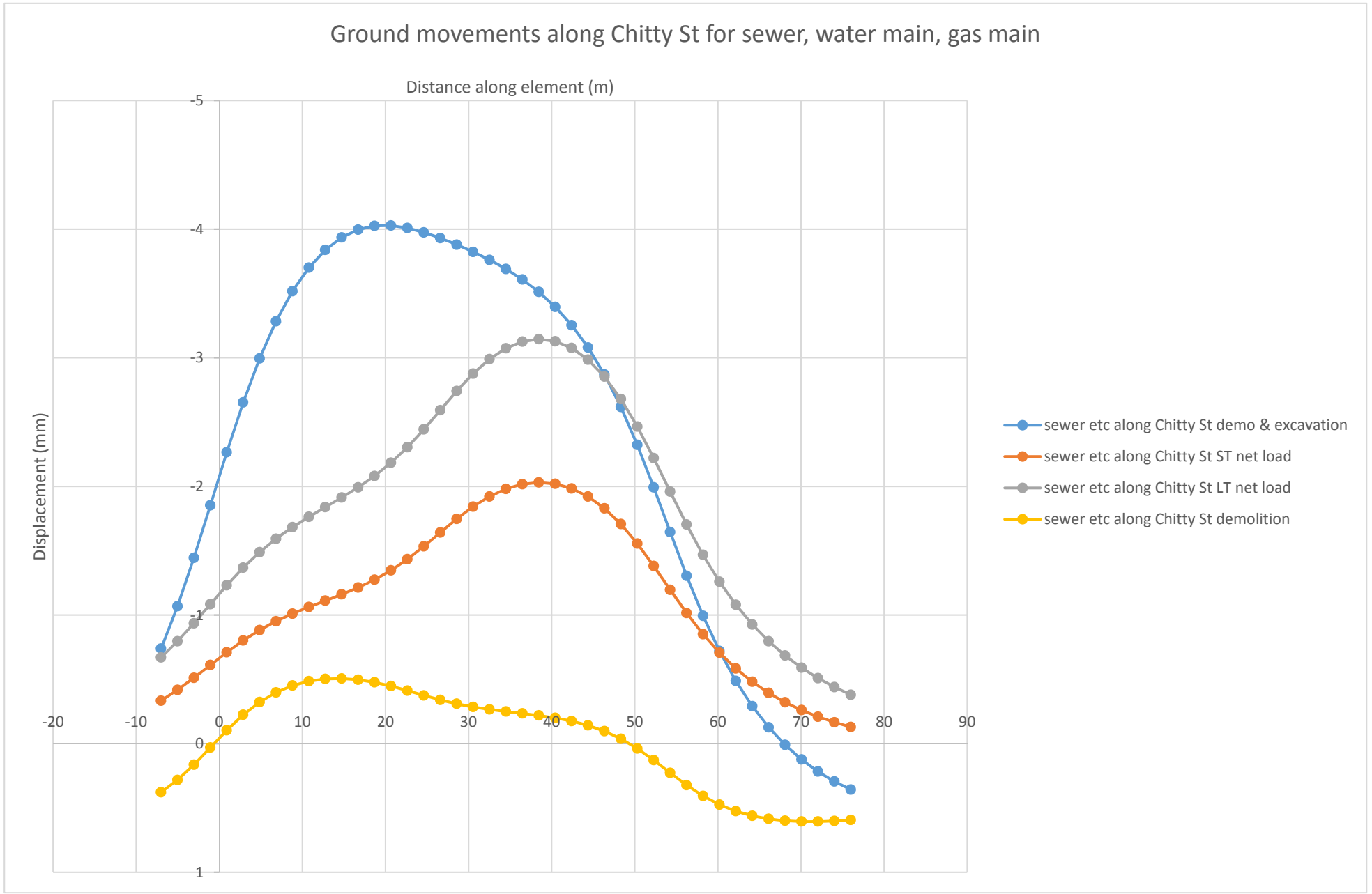
Effect to 67-69 Whitfield Street

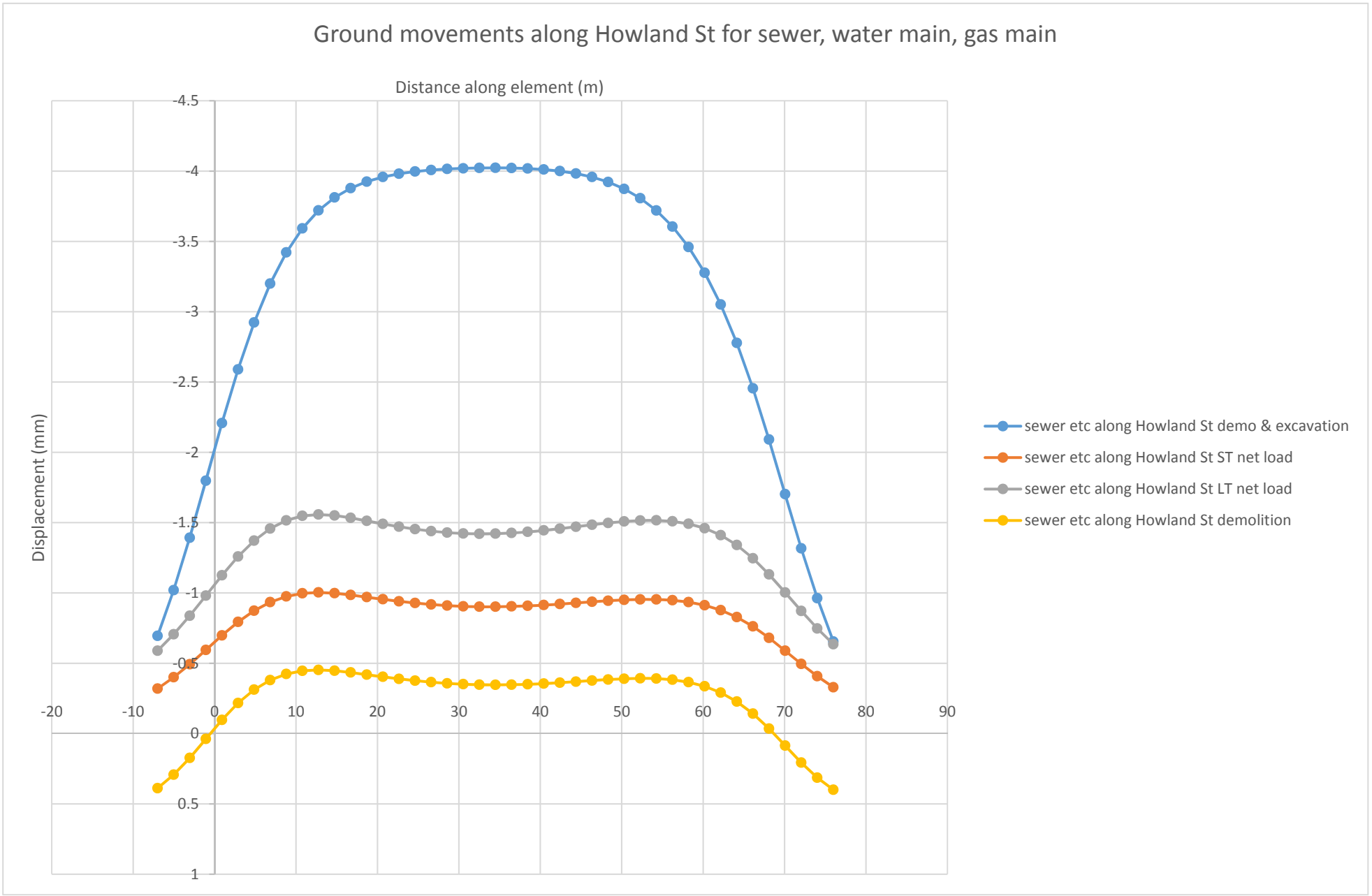
Two displacement lines across 67-69 Whitfield street at level of 21.5mOD

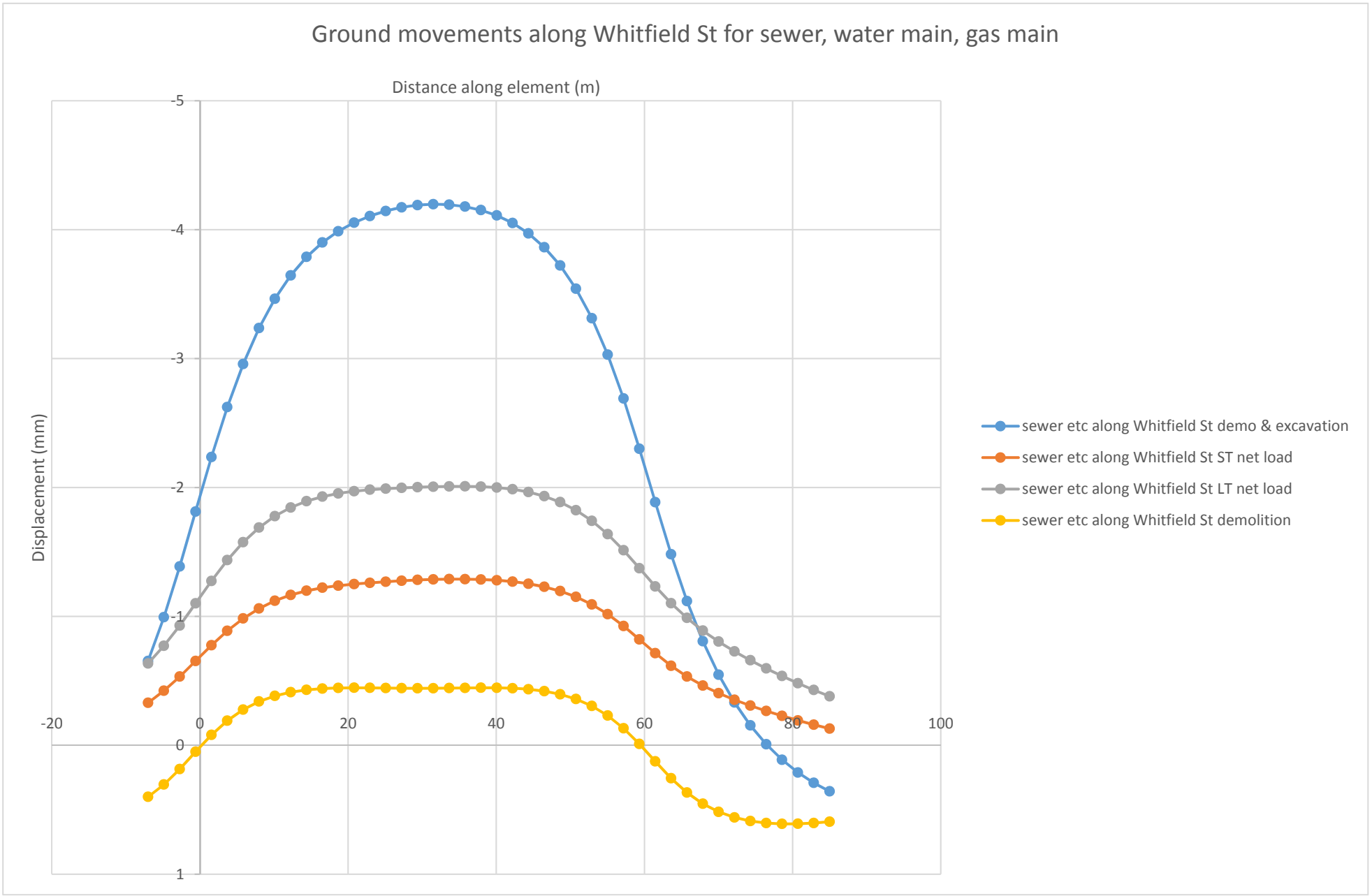
Pavement

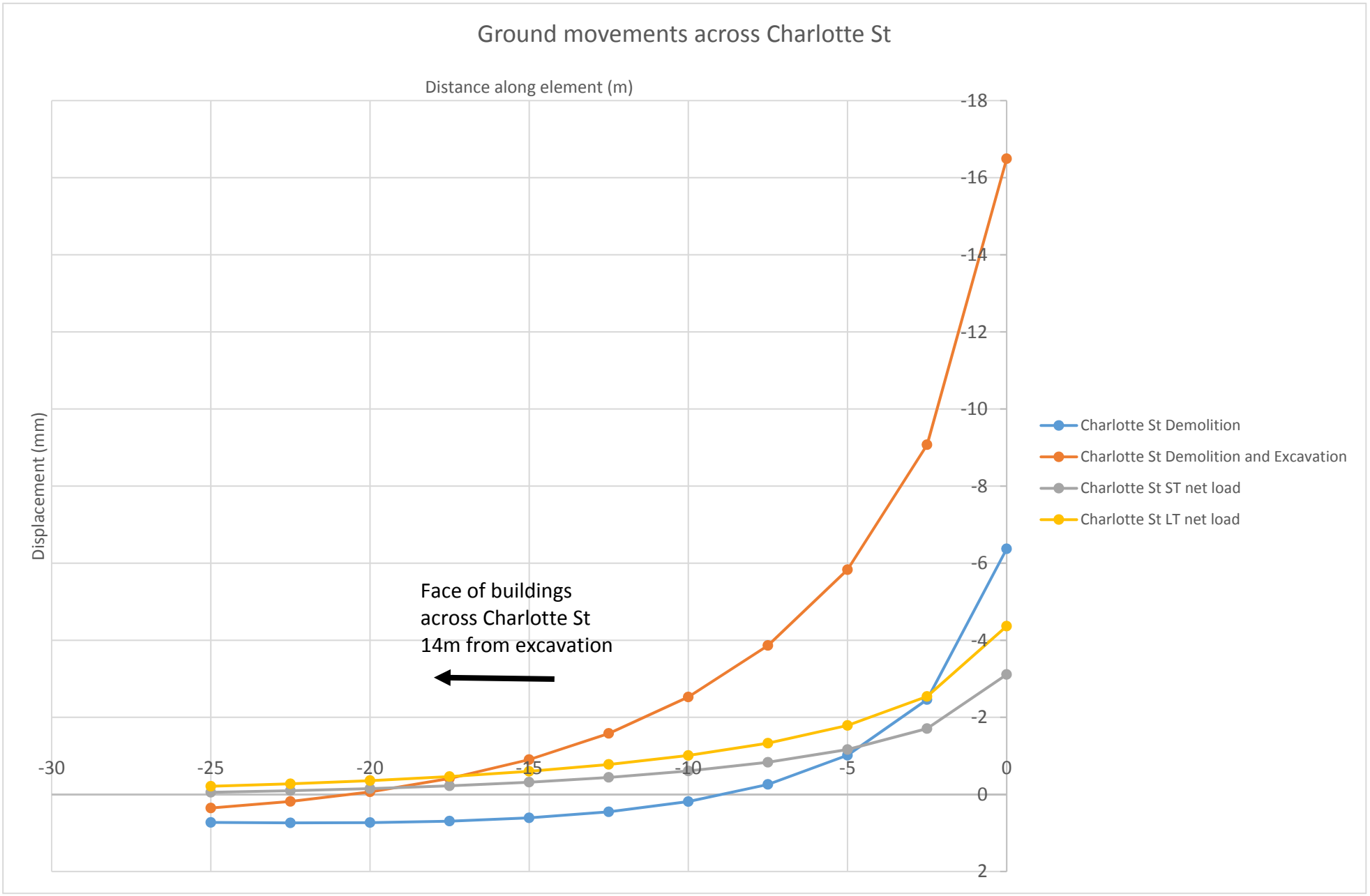
Four lines across the pavement at 21.5mOD

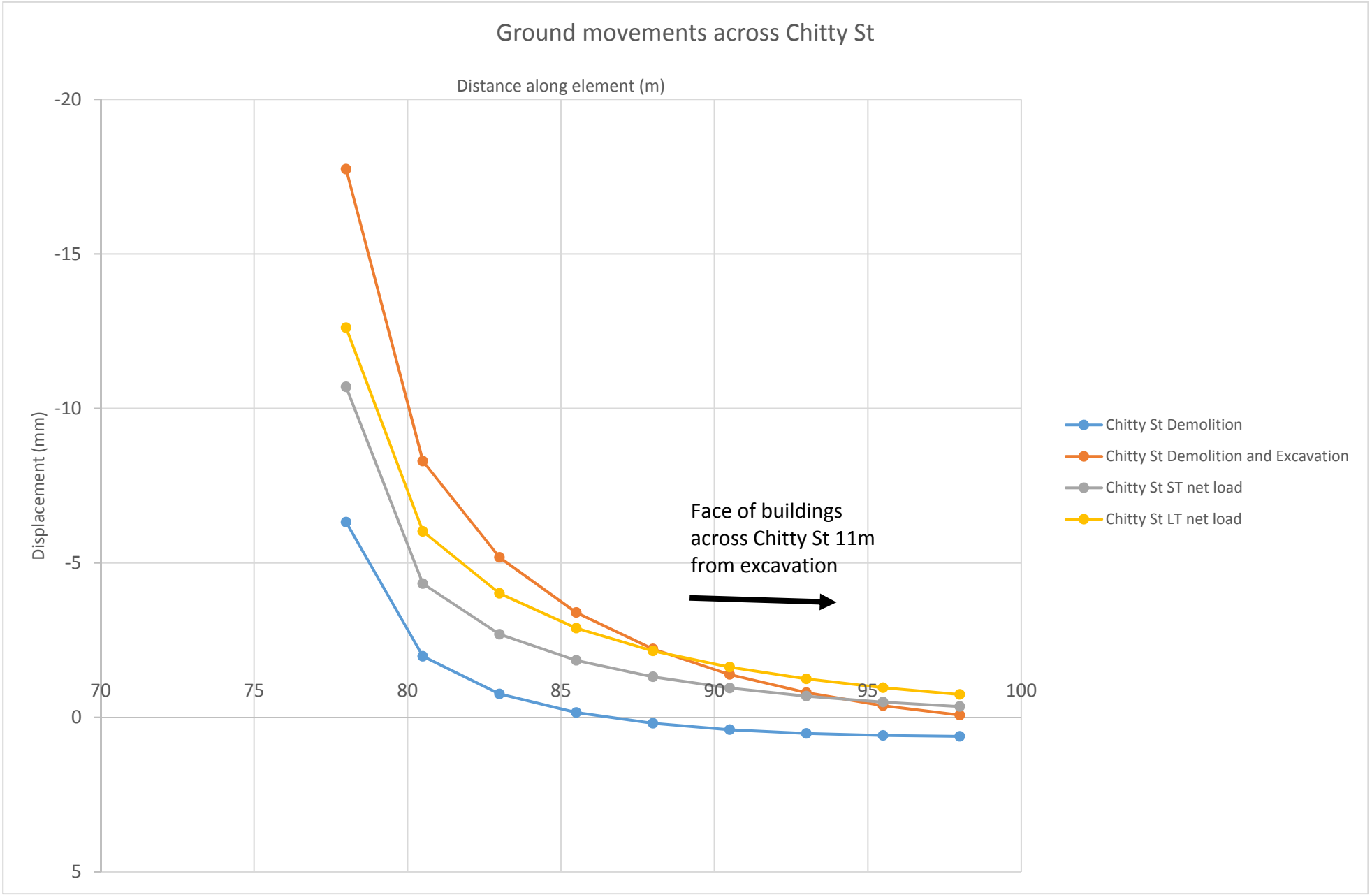

Ground movements along Charlotte St for sewer, water main, gas main
Distance along element (m)
Displacement (mm)
-5
-4
-3
-2
-1
0
1
-20
0
20
40
60
80
100
sewer etc along Charlotte St demo & excavation
sewer etc along Charlotte St ST net load
sewer etc along Charlotte St LT net load
sewer etc along Charlotte St demolition

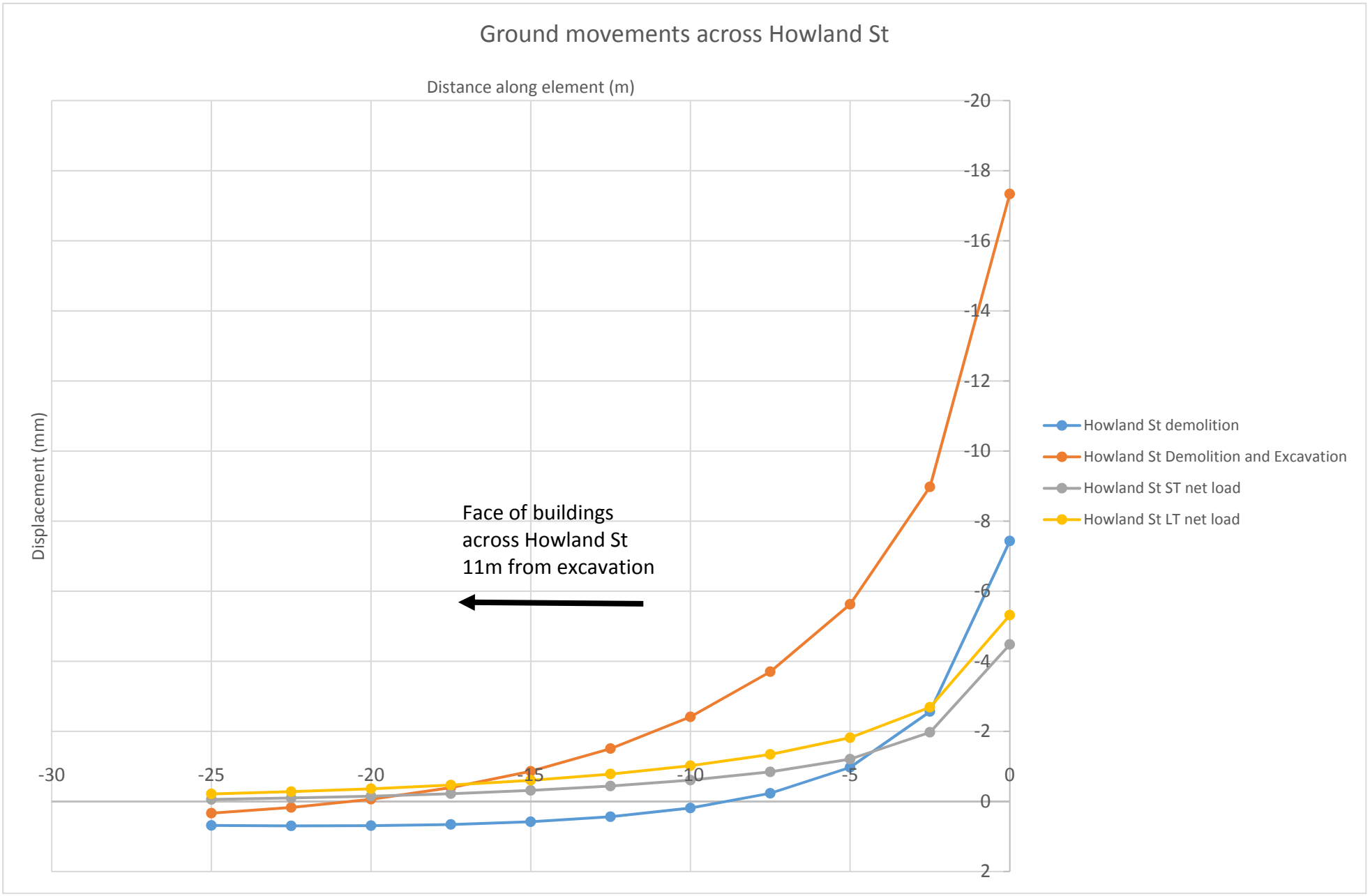

Ground movements along Chitty St for sewer, water main, gas main
Distance along element (m)
Displacement (mm)
-5
-4
-3
-2
-1
0
1
-20
-10
0
10
20
30
40
50
60
70
80
90
sewer etc along Chitty St demo & excavation
sewer etc along Chitty St ST net load
sewer etc along Chitty St LT net load
sewer etc along Chitty St demolition

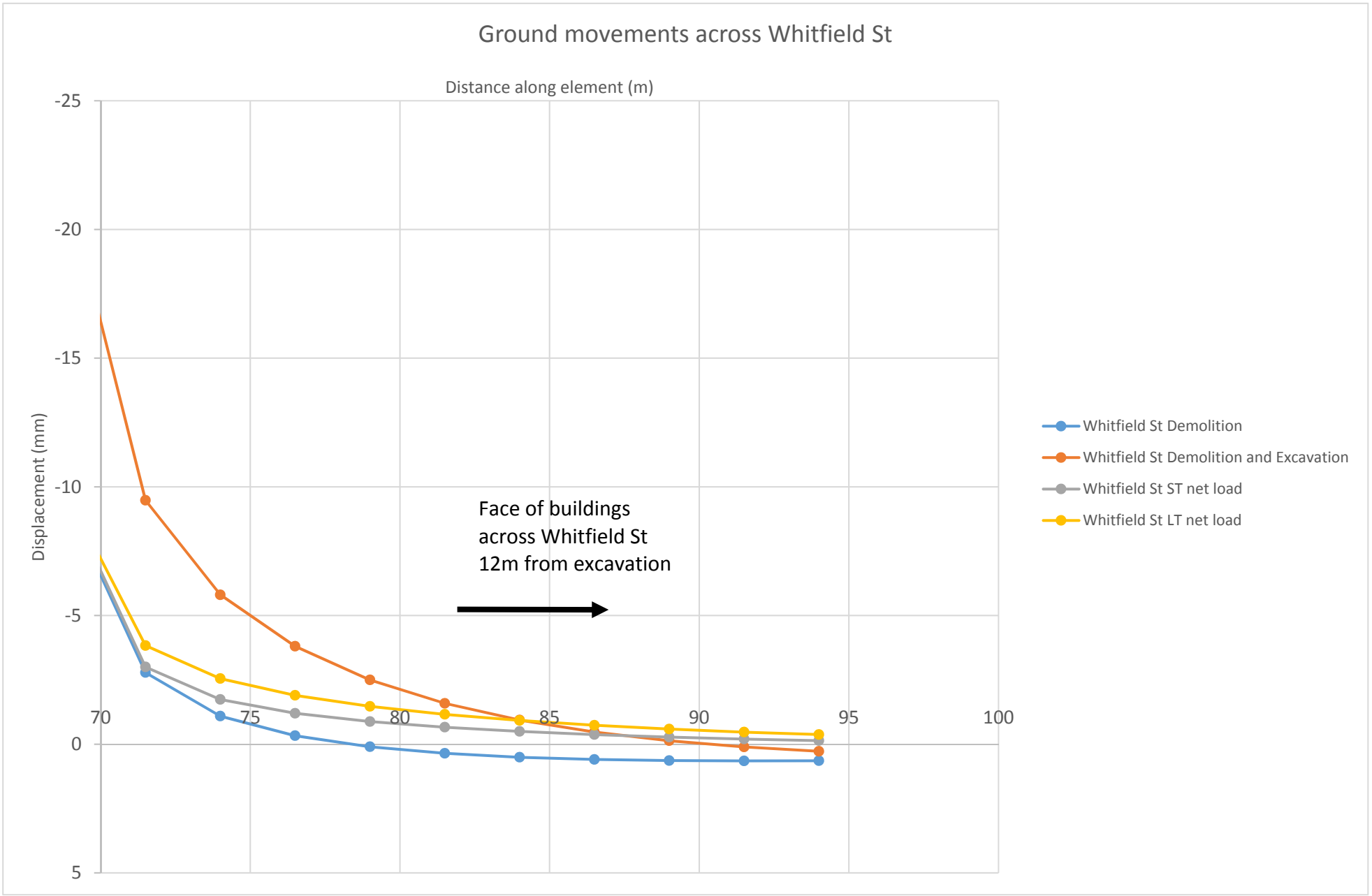

Ground movements along Howland St for sewer, water main, gas main
Distance along element (m)
Displacement (mm)
-4.5
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
-20
-10
0
10
20
30
40
50
60
70
80
90
sewer etc along Howland St demo & excavation
sewer etc along Howland St ST net load
sewer etc along Howland St LT net load
sewer etc along Howland St demolition

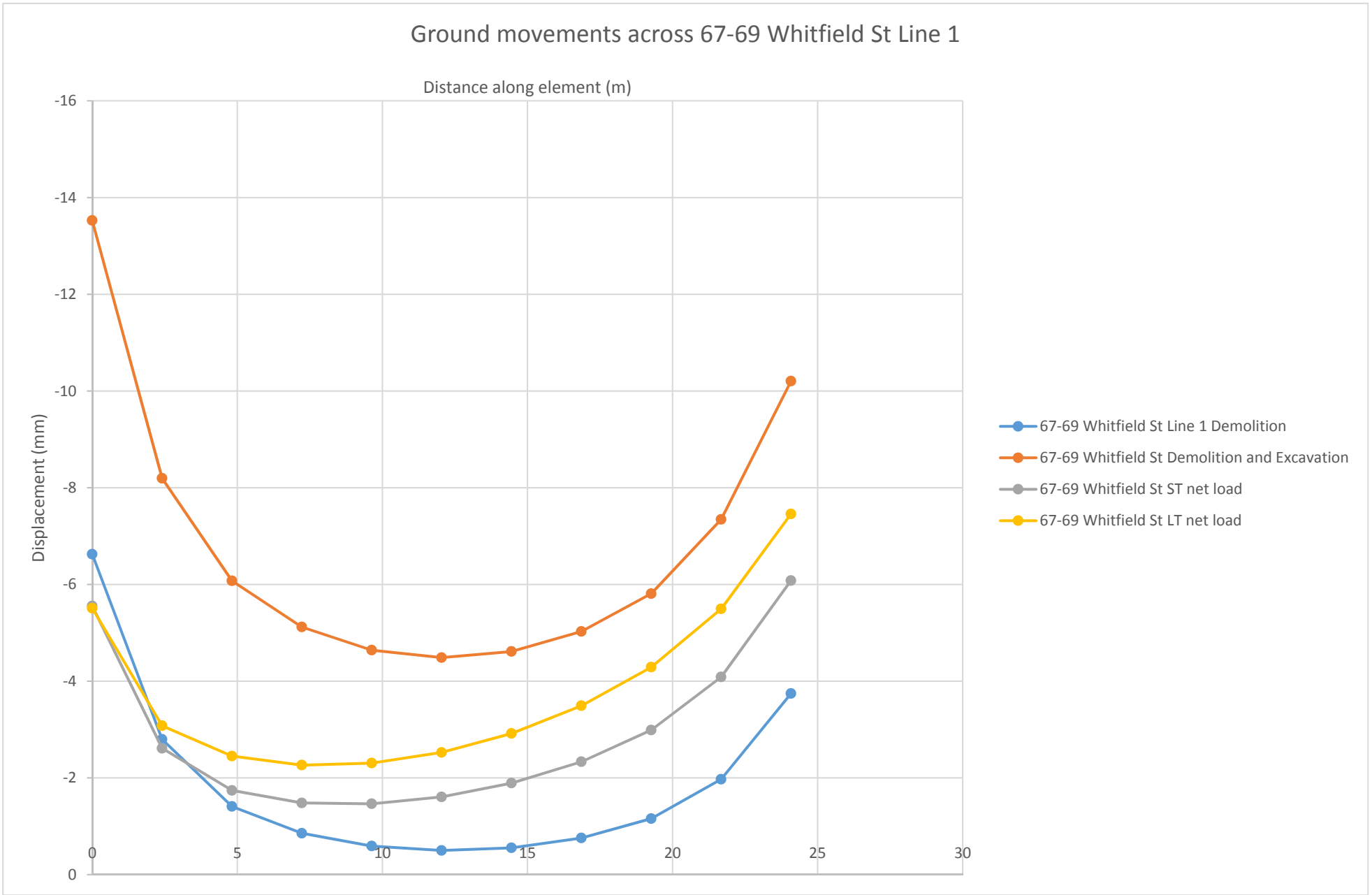

Ground movements along Whitfield St for sewer, water main, gas main
Distance along element (m)
Displacement (mm)
-5
-4
-3
-2
-1
0
1
-20
0
20
40
60
80
100
sewer etc along Whitfield St demo & excavation
sewer etc along Whitfield St ST net load
sewer etc along Whitfield St LT net load
sewer etc along Whitfield St demolition

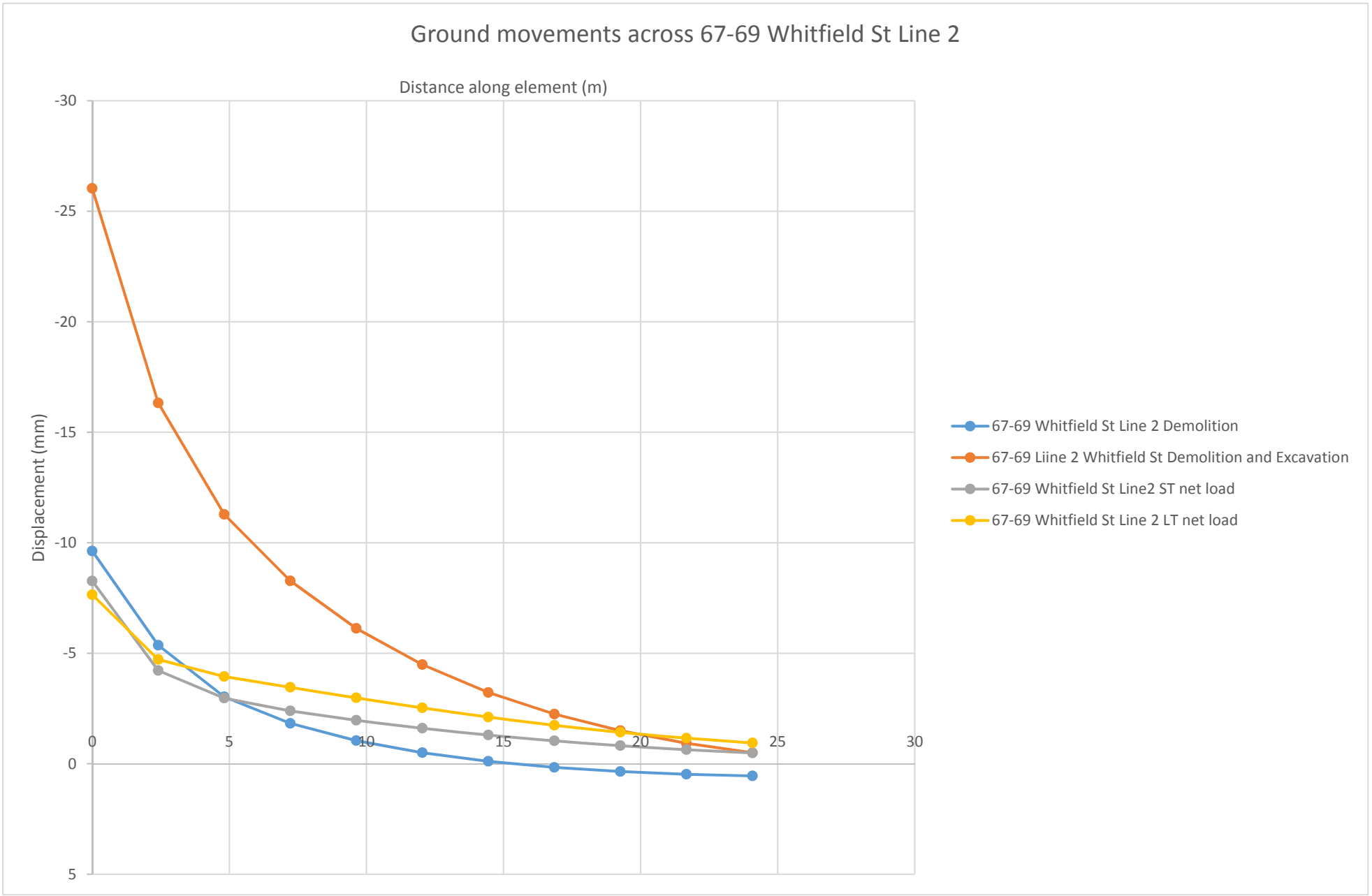

Ground movements across Charlotte St
Distance along element (m)
Displacement (mm)
-30
-25
-20
-15
-10
-5
0
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
2
Face of buildings
across Charlotte St
14m from excavation
Charlotte St Demolition
Charlotte St Demolition and Excavation
Charlotte St ST net load
Charlotte St LT net load

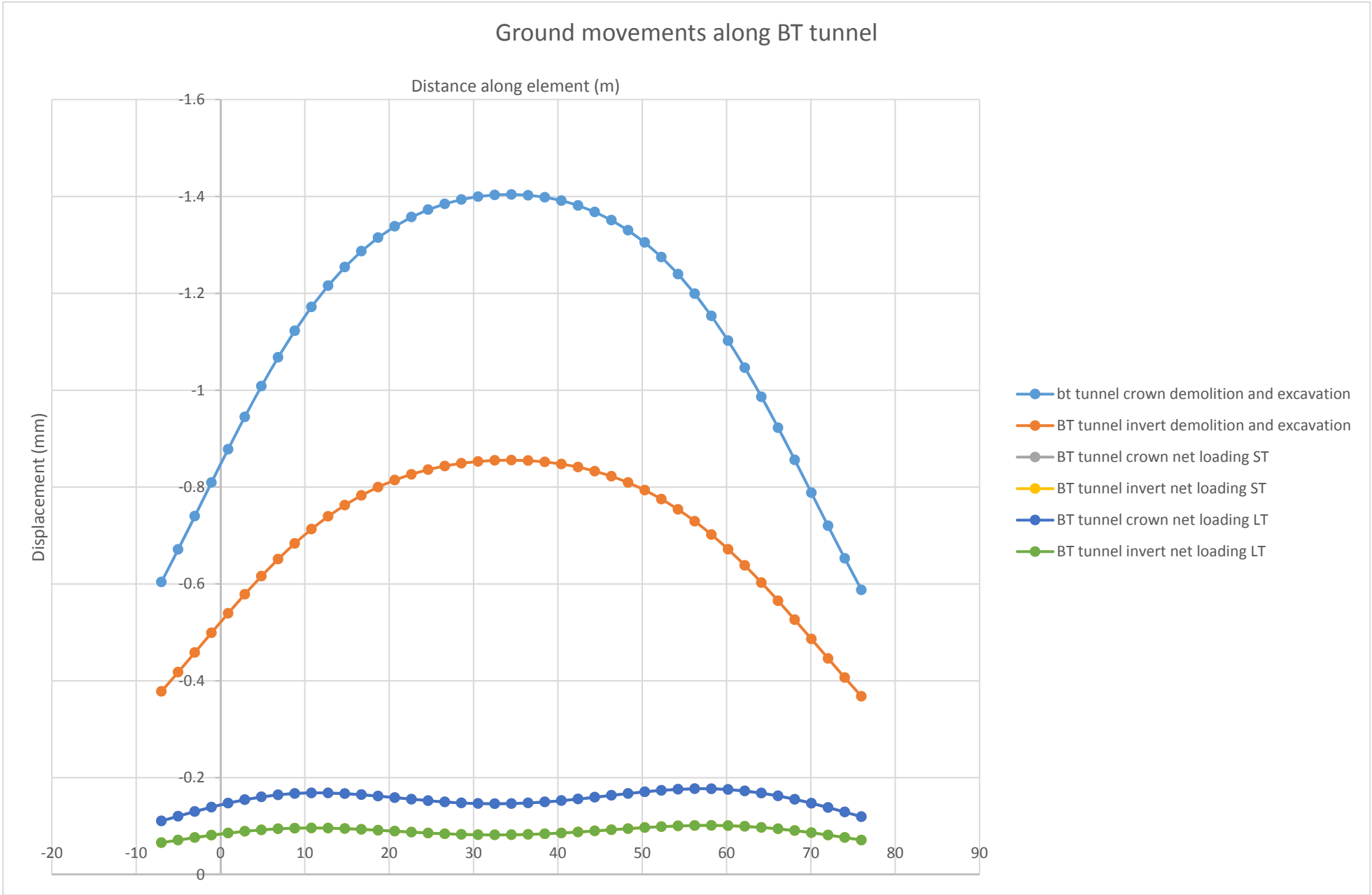

Ground movements across Chitty St
Distance along element (m)
Displacement (mm)
-20
-15
-10
-5
0
5
70
75
80
85
90
95
100
Face of buildings across Chitty St 11m from excavation
Chitty St Demolition
Chitty St Demolition and Excavation
Chitty St ST net load
Chitty St LT net load


Ground movements across Howland St
Distance along element (m)
Displacement (mm)
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
2
-30
-25
-20
-15
-10
-5
0
Face of buildings
across Howland St
11m from excavation
Howland St demolition
Howland St Demolition and Excavation
Howland St ST net load
Howland St LT net load


Ground movements across Whitfield St
Distance along element (m)
Displacement (mm)
-25
-20
-15
-10
-5
0
5
70
75
80
85
90
95
100
Face of buildings
across Whitfield St
12m from excavation
Whitfield St Demolition
Whitfield St Demolition and Excavation
Whitfield St ST net load
Whitfield St LT net load


Ground movements across 67-69 Whitfield St Line 1
Distance along element (m)
Displacement (mm)
-16
-14
-12
-10
-8
-6
-4
-2
0
0
5
10
15
20
25
30
67-69 Whitfield St Line 1 Demolition
67-69 Whitfield St Demolition and Excavation
67-69 Whitfield St ST net load
67-69 Whitfield St LT net load


Ground movements across 67-69 Whitfield St Line 2
Distance along element (m)
Displacement (mm)
-30
-25
-20
-15
-10
-5
0
5
0
5
10
15
20
25
30
67-69 Whitfield St Line 2 Demolition
67-69 Liine 2 Whitfield St Demolition and Excavation
67-69 Whitfield St Line2 ST net load
67-69 Whitfield St Line 2 LT net load


Ground movements along BT tunnel
Distance along element (m)
Displacement (mm)
-1.6
-1.4
-1.2
-1
-0.8
-0.6
-0.4
-0.2
0
-20
-10
0
10
20
30
40
50
60
70
80
90
bt tunnel crown demolition and excavation
BT tunnel invert demolition and excavation
BT tunnel crown net loading ST
BT tunnel invert net loading ST
BT tunnel crown net loading LT
BT tunnel invert net loading LT