# GROUND MOVEMENT ASSESSMENT REPORT

19–21 High Holborn London WC1V 6BS

Client:	The Honourable Society of Gray's Inn
Engineer:	AECOM
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# 1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by AECOM, on behalf of The Honourable Society of Gray's Inn, to complete a ground movement assessment for the proposed extension of the existing single level basement beneath Nos 19–21 High Holborn, London, WC1V 6BS, including an additional storey on the main building which will increase the loadings at the front of the building.

It is understood that the extension to the rear will not provide larger forces on the ground than that of the original structure. The existing four-storey rear extension is a reinforced concrete frame, which is to be replaced with a lightweight steel frame, therefore the worst case ground movements are likely to be the heave which will occur during the excavation stage.

A Desk Study and Ground Investigation Report has previously been carried out by GEA (report ref J15193, dated 15<sup>th</sup> September 2015) and the findings of the report have been used in the derivation of parameters for use in this assessment.

The purpose of this assessment has been to assess any effects of the proposed basement construction upon nearby sensitive structures.

## 1.1 **Proposed Development**

Consideration is being given to the demolition of a four-storey extension at the rear of the existing building and subsequent construction of a new six-storey extension. A single storey will be also be added to the main building and the existing basement beneath the main building will be extended below the new six-storey extension. Latest information provided by the consulting engineers suggests there will be a small increase in depth of the proposed basement extension in relation to the existing basement.

This report is specific to the proposed development and the advice herein should be reviewed if the development proposals are amended.

#### 1.2 Limitations

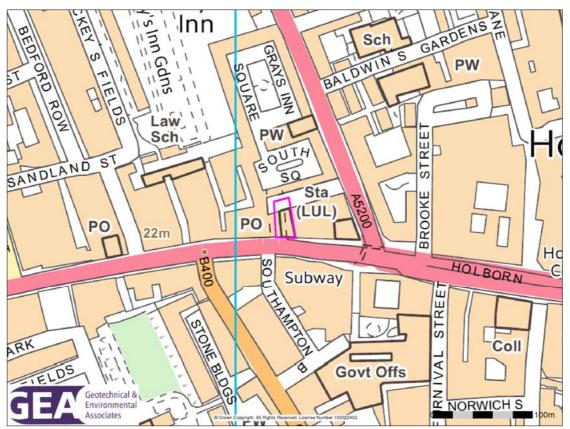
The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

# 2.0 THE SITE

## 2.1 Site Description

The site is located approximately 85 m west of Chancery Lane London Underground station and 520 m east of Holborn London Underground station. The site fronts onto High Holborn to the south and is bounded to the west by No 22 High Holborn, the four-storey Cittie of Yorke public house, to the east by a six storey commercial building and to the north by a private access road leading to Gray's Inn Square to the north. The site may additionally be





located by National Grid Reference 531051, 181641 and is shown on the map overleaf.

The site is irregular in shape and measures roughly 30 m north-south by 20 m east-west. The site is occupied by a seven-storey commercial building, which occupies roughly threequarters of the site in the southeast and at the time of the walkover was occupied at ground level by a stationers. A private access road runs south-north from High Holborn along the west of the site and joins with another private access road orientated east-west from Gray's Inn Road to the east. Above the private access road in the west is five-storey building that is suspended from the public house and commercial building on either side; the ground level of the suspended building is occupied by an archway to allow access to the private road. There is an electricity substation immediately to the northeast of the site at the rear of the commercial building and accessed from the northern private access road. The site is sensibly level with an approximate ground level of 20.0 m OD, with no discernible fall in level and is devoid of vegetation.

During the site walkover it was noted that there is a single level basement that extends beneath the seven-storey commercial building. The adjacent Cittie of Yorke public house was found to have a single level basement and rudimentary measurements taken during the fieldwork suggests the basement does not extend beneath the road in the west.

The Central Line of London Underground runs directly under High Holborn which borders the site to the south. Specifically, the escalator barrel sits underneath the site and the mechanisms contained within are highly sensitive to ground movements, the latter of which has been modelled separately to this report by AECOM (report reference 60472955).



# 3.0 SUMMARY OF GROUND CONDITIONS

The ground investigation generally encountered a significant thickness of made ground over the Hackney Gravel, over the London Clay Formation and was proved to the full depth investigated.

The made ground comprised brown gravelly sand, very sandy clayey silt and silty sandy gravelly clay with frequent crushed brick, concrete, ash, tile, shell and coal and extended to a maximum depth of 4.00 m (15.85 m OD).

Adjacent to the western elevation of the existing building, the Hackney Gravel initially comprised soft to firm brown silty sandy very gravelly clay which extended to a depth of 4.60 m (15.84 m OD). Below this layer, or directly below the made ground elsewhere, the Hackney Gravel comprised medium dense to dense brown and pale brown slightly silty sand and gravel, and extended to a depth of 6.60 m (13.25 m OD).

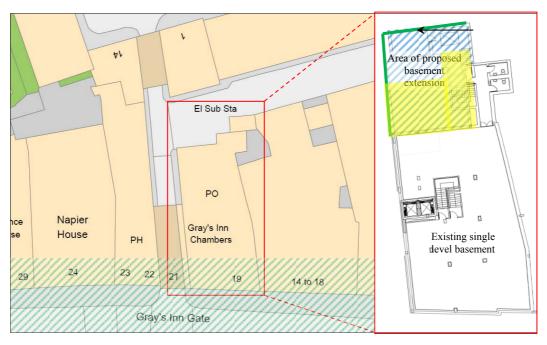
The London Clay initially comprised firm brown clay to a depth of 6.80 m (13.05 m OD), over high strength stiff fissured dark brownish grey silty clay to a depth of 15.50 m (4.35 m OD) over fissured dark brown very silty clay with occasional fine shell fragments, medium selenite crystals and black carbonaceous material to the full depth investigated, of 20.00 m (-0.15 m OD).

Claystones were encountered within the London Clay at depths of 14.30 m (5.55 m OD), 15.50 m (4.35 m OD) and 18.20 m (1.65 m OD).

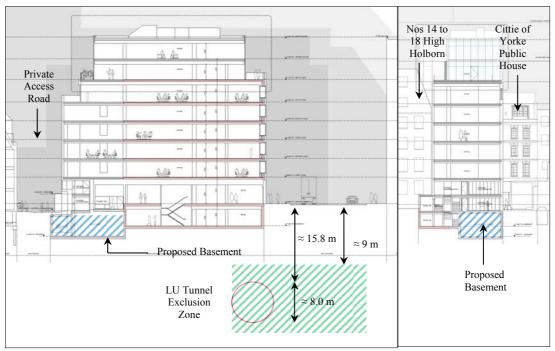
Groundwater was measured at a shallowest depth of 5.00 m (14.85 m OD).

# 4.0 CONSTRUCTION SEQUENCE

The proposed basement layout and areas of demolition are shown in the diagrams below.







Section of Proposed Basement

For the purposes of the ground movement assessment, the ground level will be taken at an arbitrary level of zero, although the LU tunnel depths have been calculated based on a ground level of 21.2 m OD. The position of the LU tunnel is in accordance with AECOM drawing reference ACM-SK-150710-001. The proposed basement will be formed by means of contiguous bored pile walls to a depth of 15.0 m below ground level, with all new loadings assumed to be applied at the same depth. Proposed basement depth is assumed to be a maximum of 4.6 m depth from existing ground level. The area highlighted in yellow in the previous diagram depicts the area of building that has recently been demolished as part of the proposed development. This demolition stage has not been included as part of this analysis. The extension to the rear will not provide larger forces on the ground than that of the original structure. The existing four storey rear extension is a reinforced concrete frame and this is to be replaced with a lightweight steel frame, therefore the worst case ground movements are likely to be the heave which will occur during the excavation stage.

The building above the access road between the Cittie of Yorke Public House and Nos 19 to 21 High Holborn has not been considered in this assessment. The resulting movements of the aforementioned buildings may be used to carry out a structural check of the building above the access road.

In general, the sequence of works for basement construction will comprise the following stages.

- □ Construct piled retaining walls to northern and western perimeters of proposed basement;
- □ Connect new retaining walls into existing basement, excavate new basement and temporarily retain and strengthen the new retaining walls; and
- construct an additional floor to the existing building.

The detail of the support provided to adjacent walls is beyond the scope of this report at this



stage and the structural engineer will be best placed to agree a methodology with the temporary works contractor once appointed.

When the final excavation depths have been reached the permanent works will be formed, which are likely to comprise reinforced concrete walls with a drained cavity lining the inside of the bored pile walls. Reinforced concrete will be used for floor slabs and it is anticipated that heave protection will be installed beneath the basement slab. Following this, the floor slab will be constructed at basement depth and the temporary props will be removed.

## 5.0 GROUND MOVEMENTS

An assessment of ground movements within and surrounding the excavation has been undertaken using the X-Disp and P-Disp computer programs licensed from the OASYS suite of geotechnical modelling software from Arup. These programs are commonly used within the ground engineering industry and are considered to be appropriate tools for this analysis.

The X-Disp program has been used to predict ground movements likely to arise from the construction of the proposed basement. This includes the settlement of the ground (vertical movement) and the lateral movement of soil behind the proposed retaining walls (horizontal movement).

The analysis of potential ground movements within the excavation, as a result of unloading of the underlying soils, has been carried out using the Oasys P-Disp Version 19.3 – Build 12 software package and is based on the assumption that the soils behave elastically, which provides a reasonable approximation to soil behaviour at small strains.

For the purpose of these analyses, the corners have been defined by x and y coordinates, with the x-direction parallel with the orientation east-west, whilst the y-direction is parallel with the orientation of north-south. Vertical movement is in the z-direction. Wall lengths of less than 10 m have been modelled as 1 m long structural elements, while greater than 10 m wall lengths have been modelled as 2 m elements to reflect the greater stiffness of the longer walls. The London Underground structures have been modelled as 1 m long displacement lines along the crown and invert depths and also along the sides of the tunnel.

The full outputs of all the analyses can be provided on request and samples of the output movement contour plots are included within the appendix.

#### 5.1 Ground Movements – Surrounding the Basement

#### 5.1.1 Model Used

For the X-Disp analysis, the soil movement relationships used for the embedded retaining walls are the default values within CIRIA report C580<sup>1</sup>, which were derived from a number of historic case studies.

The analysis has adopted the values for 'installation of a contiguous bored pile wall'. The ground movement curves for 'excavations in front of a wall in sand' have been adopted as being considered most appropriate for the proposed excavation and its support at this site as the walls will be generally supporting granular soils.

<sup>&</sup>lt;sup>1</sup> Gaba, A, Simpson, B, Powrie, W and Beadman, D (2003) *Embedded retaining walls – guidance for economic design*. CIRIA Report C580.

## 5.1.2 Results

The predicted movements are based on the worst case of the individually analysed segments of 'hogging' and 'sagging' and these are summarised in the tables below. It should be noted that the combined effect of segments acting together typically improve the resultant movements and the values below are therefore deemed to be conservative.

#### **Displacement Analysis Points:**



The heights and basement depths of each of the nearby sensitive structures are summarised in the table below. All buildings are assumed to have basements that extend to a depth of 3.3 m below ground level.

Sensitive Structure	Elevation	Height of building above level of basement / foundations (m)
Nos 19-21 High Holborn	A to L	28.3
Nos 14 to 18 Uich Uolborn	N to S	15.3
Nos 14 to 18 High Holborn	M, T, W, X, Y	26.3
Nos 4 to 13 High Holborn	U, V	20.5
Nos 2 to 4 South Square	AB, Z	23.3
No 1 South Square	AA , AC, AD	19.3
No 14 South Square	AE to AJ	19.3
Cittie of Yorke Public House	AK, AO	15.3
Cittle of forke Public House	AN	20.3
No 24 High Holborn	AP to AR, AL, AM	26.3

The results are presented to the degree of accuracy required to allow predicted variations in ground movements around the structure(s) to be illustrated, but may not reflect the anticipated



## accuracy of the predictions.

#### Wall Installation Phase:

Sensitive Structure	Elevation	Vertical Movement (Settlement) (mm)	Horizontal Movement (mm)	
	А	<1	<1	
	В	< 1	< 1	
	С	< 1	< 1	
	D	< 1	< 1	
	E	< 1	< 1	
	F	< 1	< 1	
Nos 19-21 High Holborn	G	< 1	< 1	
	н	< 1	< 1	
	I	< 1	< 1	
	J	< 1	< 1	
	К	< 1	< 1	
	L	< 1	< 1	
Nos 14 to 18 High Holborn	M to T, X to Y	< 1	< 1	
Nos 4 to 13 High Holborn	U, V	< 1	< 1	
Nos 2 to 4 South Square	AB, Z	4		
No 1 South Square	AA, AC, AD	6		
No 14 South Square	AE to AJ	3	2	
Cittie of Yorke Public House	AK, AO, AN	5	3	
No 24 High Holborn	AP to AR, AL, AM	4	2	

#### Wall Installation and Excavation Phases Combined:

Sensitive Structure	Elevation	Vertical Movement (Settlement) (mm)	Horizontal Movement (mm)
	А	<1	<1
	В	< 1	<1
	С	4	<1
Nos 10-21 liisk Holborn	D	14	<1
	E	3	<1
	F	3	<1
Nos 19-21 High Holborn	G	6	<1
	Н	6	<1
	I	15	<1
	J	15	<1
	К	15	<1
	L	4	<1



Sensitive Structure	Elevation	Vertical Movement (Settlement) (mm)	Horizontal Movement (mm)
	Μ	6	< 1
Nos 14 to 18 High Holborn	Ν, Ο	1	< 1
	Р	7	<1
	Q	7	< 1
	R	7	<1
	S, T, W, X, Y	< 1	<1
Nos 4 to 13 High Holborn	U, V	< 1	<1
Nos 2 to 4 South Square	AB, Z	4	2
	AA	11	5
No 1 South Square	AC	3	2
	AD	11	5
No 14 South Square	AE to AJ	4	2
	AK	4	2
Cittie of Yorke Public House	AO	10	5
	AN	< 1	< 1
No 24 High Holborn	AP to AR, AL, AM	4	2

The analysis has indicated that the maximum vertical settlements and horizontal movements that will result from the new retaining wall construction are less than 10 mm. Furthermore, the analysis has indicated that the maximum vertical settlements and horizontal movements that will result from the combined effect of the retaining wall installation and excavation are generally up to around 15 mm.

#### 5.2 Movements within the Excavation (Heave)

#### 5.2.1 Model Used

At this site unloading of the London Clay will take place as a result of the proposed building demolition and subsequent excavation and the reduction in vertical stress in the short term will cause heave to take place. Undrained soil parameters have been used to estimate the potential short term movements, which include the "immediate" or elastic movements as a result of the basement excavation. Drained parameters have been used to provide an estimate of the total long-term movement.

The elastic analysis requires values of soil stiffness at various levels to calculate displacements. Values of stiffness for the soils at this site are readily available from published data and we have used a well-established method to provide our estimates. This relates values of  $E_u$  and E', the drained and undrained stiffness respectively, to values of undrained cohesion, as described by Padfield and Sharrock<sup>2</sup> and Butler<sup>3</sup> and more recently by O'Brien and Sharp<sup>4</sup>. Relationships of  $E_u = 500 C_u$  and E' = 300  $C_u$  for the cohesive soils have been used to obtain values of Young's modulus. More recent published data<sup>5</sup> indicates stiffness values of 750 x Cu for the London Clay and a ratio of E' to Eu of 0.75, and it is considered that the use of the more conservative values provides a sensible approach for this stage in the design. The



<sup>&</sup>lt;sup>2</sup> Padfield CJ and Sharrock MJ (1983) Settlement of structures on clay soils. CIRIA Special Publication 27

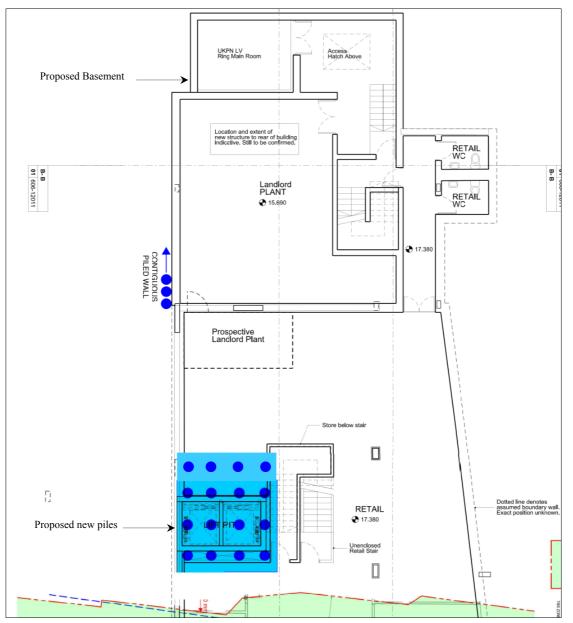
Butler FG (1974) *Heavily overconsolidated clays: a state of the art review.* Proc Conf Settlement of Structures, Cambridge, 531-578, Pentech Press, Lond

<sup>&</sup>lt;sup>4</sup> O'Brien AS and Sharp P (2001) Settlement and heave of overconsolidated clays - a simplified non-linear method. Part Two, Ground Engineering, Nov 2001, 48-53

<sup>&</sup>lt;sup>5</sup> Burland JB, Standing, JR, and Jardine, FM (2001) *Building response to tunnelling, case studies from construction of the Jubilee Line Extension* CIRIA Special Publication 200

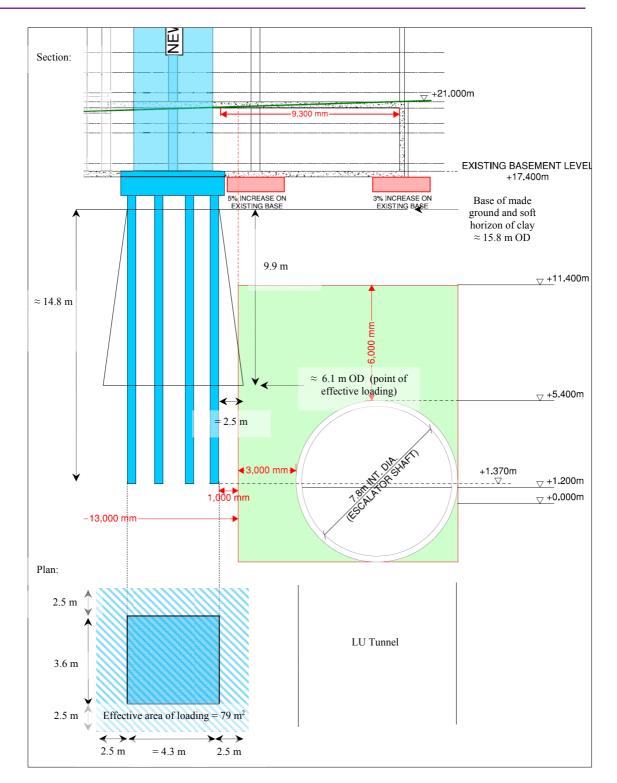
profile of the underlying London Clay has been interpolated from testing carried out during the original ground investigation and supplemented by testing carried out at a nearby site investigation carried out by GEA at Gray's Inn Road, roughly 100 m to the northeast.

The proposed excavation will result in a net unloading of 90 kN/m<sup>2</sup>. All loading from the proposed building will be supported at a level below the proposed basement level by piled foundations. The assessment also includes an assessment of a pile group located adjacent to the LU tunnel and shown in the diagram below. The pile group will support a total load of 9000 kN applied over an area of roughly 15.5 m<sup>2</sup> and bearing at a depth of 20.0 m below ground level.



The pile group has been modelled as friction piles acting as a raft with an applied pressure of  $114 \text{ kN/m}^2$  at a depth of two-thirds of pile embedment within the Hackney Gravel and London Clay, as shown on the diagram overleaf.





A rigid boundary for the analysis has been set within the London Clay at a depth of 35 m below existing ground level, where nearby BGS records indicate that the base of these formations are likely to be present.

## 5.2.2 Results

The P-Disp analysis indicates that, by the time the basement construction is complete and the pile group loading has occurred, around 10 mm to 15 mm of heave is likely to have taken place at the centre of the proposed excavation, reducing to between 5 mm to 10 mm at the

edges.

Following completion of the basement construction, an additional 15 mm to 20 mm is likely to have occurred at the centre of the proposed excavation in the long term.

The results of the P-Disp analysis can be used to indicate the likely impact of the proposed basement construction beyond the site boundaries; about 5 m away from the excavation a total movement up to around 5 mm to 15 mm is predicted, reducing to between 5 mm and 10 mm about 10 m away.

A void or layer of compressible material may need to be incorporated into the design to accommodate these potential long term movements. If a compressible material is used beneath the slab, it will need to be designed to be able to resist the potential uplift forces generated by the ground movements. In this respect potential heave pressures are typically taken to equate to around 30 % of the total unloading pressure.

The effect of the basement construction and adjacent pile group loading on the tunnel has been assessed and the results are presented in Section 7.0.

# 6.0 DAMAGE ASSESSMENT

In addition to the above assessment of the likely movements that will result from the proposed development, the neighbouring buildings are considered to be sensitive structures, requiring Building Damage Assessments, on the basis of the classification given in Table 2.5 of C580<sup>1</sup>.

All structures are shown on the plan in Section 5.1.2.

#### 6.1 **Damage to Neighbouring Structures**

The movements resulting from the wall installation phase and the combined retaining wall installation and basement excavation phases, have been calculated using the X-Disp modelling software to carry out an assessment of the likely damage to adjacent properties and the results are summarised for the combined wall installation and basement excavation in the table below.

The potential heave movements predicted by P-Disp have not been included in this assessment.

Sensitive Structure	Elevation	Category of Damage*
	А	Category 0 - Negligible
	В	Category 0 - Negligible
	C	Category 0 - Negligible
	D	Category 0 - Negligible
Nos 19-21 High Holborn	E	Category 0 - Negligible
	F	Category 0 - Negligible
	G	Category 0 - Negligible
	Н	Category 0 - Negligible
	L	Category 2 - Slight



Sensitive Structure	Elevation	Category of Damage*
	J	Category 2 - Slight
	К	Category 0 - Negligible
	L	Category 0 - Negligible
Nos 14 to 18 High Holborn	M to T, W to Y	Category 0 - Negligible
Nos 4 to 13 High Holborn	U, V	Category 0 - Negligible
Nos 2 to 4 South Square	AB, Z	Category 0 - Negligible
No 1 South Square	AA, AC, AD	Category 0 - Negligible
No 14 South Square	AE to AJ	Category 0 - Negligible
Cittie of Yorke Public House	AK, AO, AN	Category 0 - Negligible
No 24 High Holborn	AP to AR, AL, AM	Category 0 - Negligible

\*From Table 2.5 of C580<sup>1</sup>: Classification of visible damage to walls.

The analysis has predicted that the proposed installation of the bored pile retaining walls and excavation of the proposed basement may generally result in a building damage for sensitive structures of Category 0 (negligible), which fall within acceptable limits according to the Camden Planning Guidance, with sensitive structures I and J resulting in a building damage of Category 2 (slight), which fall outside acceptable limits. Wall elevations I and J are located adjacent to the proposed excavation and it is likely that the walls will be supported and / or reconstructed as part of the redevelopment of the site.

#### 6.2 Monitoring of Ground Movements

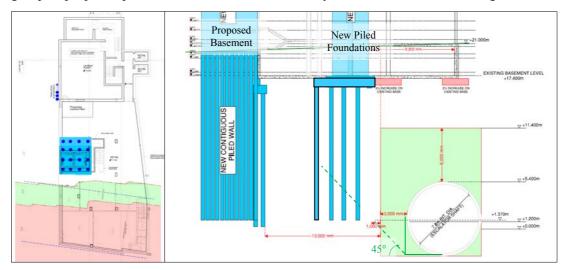
The predictions of ground movement based on the ground movement analysis should be checked by monitoring of the adjacent properties and structures. The structures to be monitored during the construction stages should include the neighbouring structures. Condition surveys of the above existing structures should be carried out before and after the proposed works.

The precise monitoring strategy will be developed at a later stage and it will be subject to discussions and agreements with the owners of the adjacent properties and structures. Contingency measures will be implemented if movements of the adjacent structures exceed predefined trigger levels. Both contingency measures and trigger levels will need to be developed within a future monitoring specification for the works.



# 7.0 TUNNEL MOVEMENTS

The proposed basement extension will be in close proximity to a London Underground tunnel. In addition to this, the consulting engineers have requested that the installation of a group of proposed piles is included in the tunnel analysis and in shown on the diagram below.



The proposed piled foundations are assumed to be constructed to a depth of 15.0 m from ground level.

It is recommended that the piles that are located close to the LU tunnel exclusion zone are permanently sleeved over the upper portion of the pile so that no load can be transferred to the sensitive structures through shedding of shaft friction within the zone of influence of the tunnel. The typical pile detail is shown on the attached sketch; the minimum sleeved length being determined by a 45° line drawn from the intersection of the outside edge and invert level of the structure and extended until it meets the proposed new piles, 4 m away. This is indicated by the green dashed line in the diagram above. The typical pile detail indicates that a permanent sleeve in the order of the full length of the pile is likely to be required; thus it is likely that the piles will need to be increased in length to take the sleeving into consideration.

The analysis has been carried out using the Oasys PDisp software. The LU tunnel has been modelled at four discrete reference points; the crown level, invert level, northern side and southern side. The crown and invert depths have been modelled as 15.8 m and 23.8 m below ground level (21.2 m OD) respectively. Similarly, the northern and southern side walls have been modelled at 19.8 m below ground level.

The approximate location of the four reference points described above have been analysed along the length of the tunnel adjacent to the site based on drawings provided by the consulting engineers. The four points have been modelled as straight lines at roughly 1 m intervals.

The analysis will assess the change in vertical movement of the four reference points in order to demonstrate the differential movement, if any, across the tunnel structure. The analysis provides an assessment of the vertical stress and strain along the crown level of the tunnel. The results of the short and total movements are shown in the table overleaf and a positive displacement is in the downward direction.



Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m²)	Maximum Vertical Strain (%)
Crown	-0.3	-0.50	-3.00 × 10 <sup>-6</sup>
Invert	-0.20	-1.14	-1.54 × 10 <sup>-5</sup>
Northern side wall	-0.43	-1.56	-2.40 × 10 <sup>-5</sup>
Southern side wall	-0.15	-0.47	$-4.34 \times 10^{-6}$

#### **Basement excavation only**

#### Basement excavation and pile group loading

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m²)	Maximum Vertical Strain (%)
Crown	0.9	-0.5	-1.39 × 10 <sup>-5</sup>
Invert	0.8	4.5	6.65 × 10 <sup>-5</sup>
Northern side wall	2.8	14.4	2.51 × 10 <sup>-4</sup>
Southern side wall	0.4	-0.3	-8.79 × 10 <sup>-6</sup>

The results indicate a differential in displacements around the cross section of the tunnel, with a relatively high level of stress at the northern side wall.

The above assessment should be repeated once the proposed foundation sizes, positions and applied loadings have been confirmed. The assessment has assumed the pressure from the pile group is applied uniformly over the area, with no allowance for eccentric loads.

# 8.0 REUSE OF PAD FOUNDATIONS

It is understood that a number of existing pad foundations will be incorporated into the proposed development. The existing pads are assumed to be 3.5 m by 3.5 m square and are founded at a depth of 2.0 m below existing ground level, or 5.3 m below existing ground level. For the purpose of this assessment a single pad will be considered and is assumed to be located directly over the crown of the existing London Underground tunnel, at a depth of 15.8 m below ground level. The pad foundation will have an increase in net loading of up to 150 kN, or  $12.3 \text{ kN/m}^2$ .

On the basis of the above, the assessment has predicted that an approximate stress increase of  $2.5 \text{ kN/m}^2$  will occur at the crown of the tunnel.

# 9.0 CONCLUSIONS

The analysis has concluded that the predicted damage to the neighbouring properties from the construction of the bored pile retaining walls and basement excavations would generally be 'Negligible', with the walls immediately adjacent to the excavation assigned the category 'Slight', for which the damage that would occur would fall outside the acceptable limits although it is likely that the walls will be supported and / or reconstructed as part of the redevelopment of the site. It is recommended that movement monitoring is carried out on all



structures prior to and during the proposed basement construction.

The separate phases of work, including excavation of the proposed basement, will in practice be separated by a number of weeks during which time construction of permanent supports, basement slab and retaining wall curing will take place. This will provide an opportunity for the ground movements during and immediately after bored pile retaining wall construction to be measured and the data acquired can be fed back into the design and compared with the predicted values. Such a comparison will allow the ground model to be reviewed and the predicted wall movements to be reassessed prior to the main excavation taking place so that propping arrangements can be adjusted if required.



# APPENDICES

#### **X-DISP ANALYSIS:**

#### Wall Installation

Contour Plots of Vertical Movements and Horizontal Movements

#### Pile Installation and Basement Excavation combined

Contour Plots of Combined Vertical Movements and Horizontal Movements

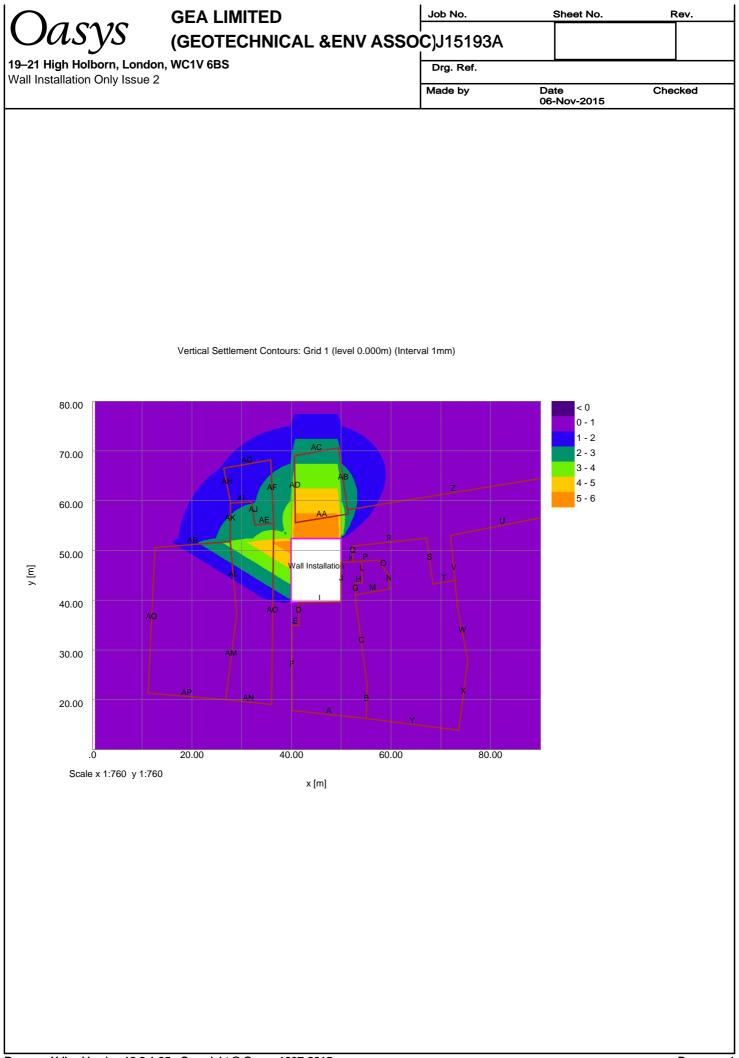
Tabular Output of Results

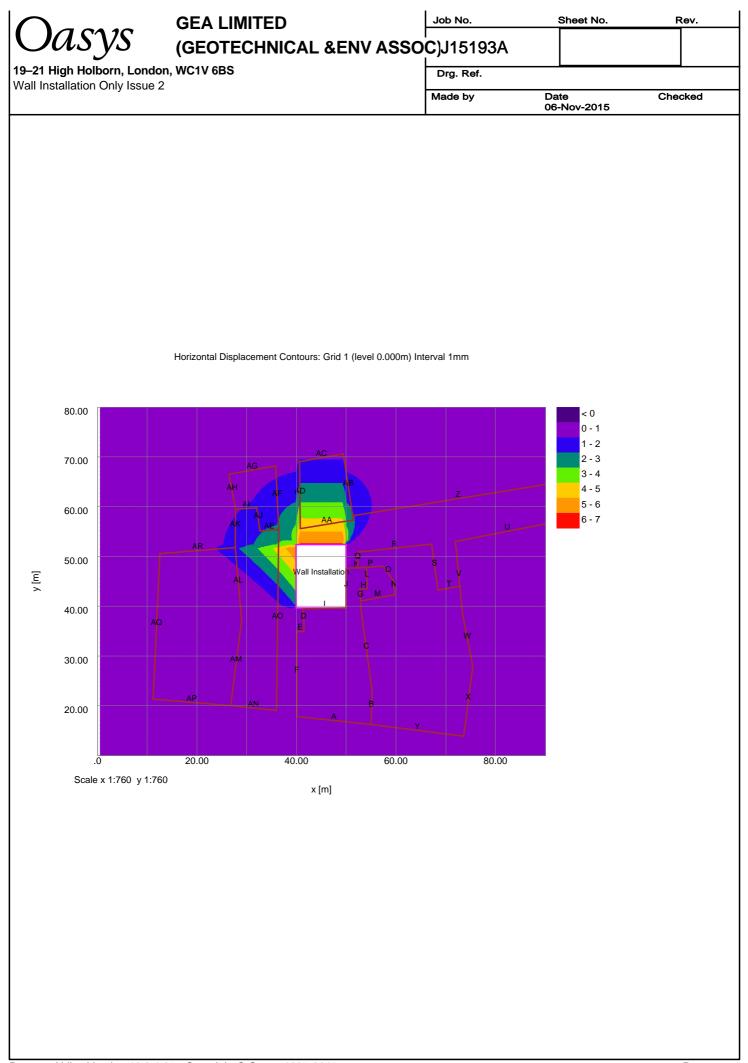
London Underground Displacement Plots

#### P-DISP ANALYSIS

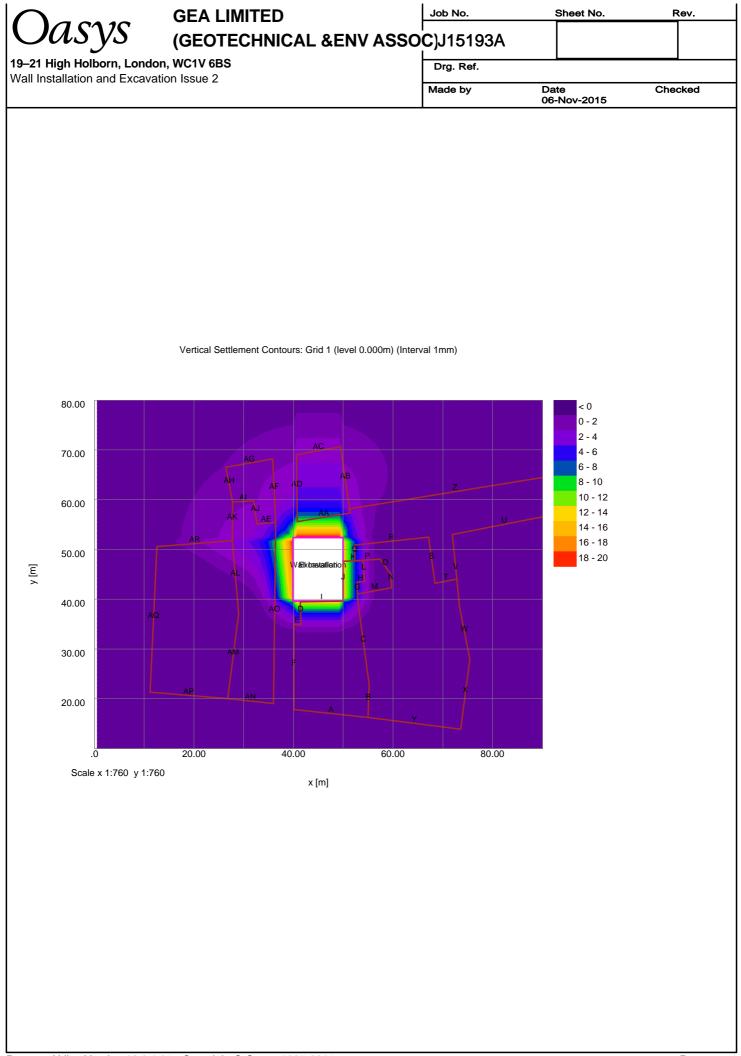
Short Term Movement Contour Plots Short Term London Underground Displacement Plots Total Movement Contour Plots Total London Underground Displacement Plots

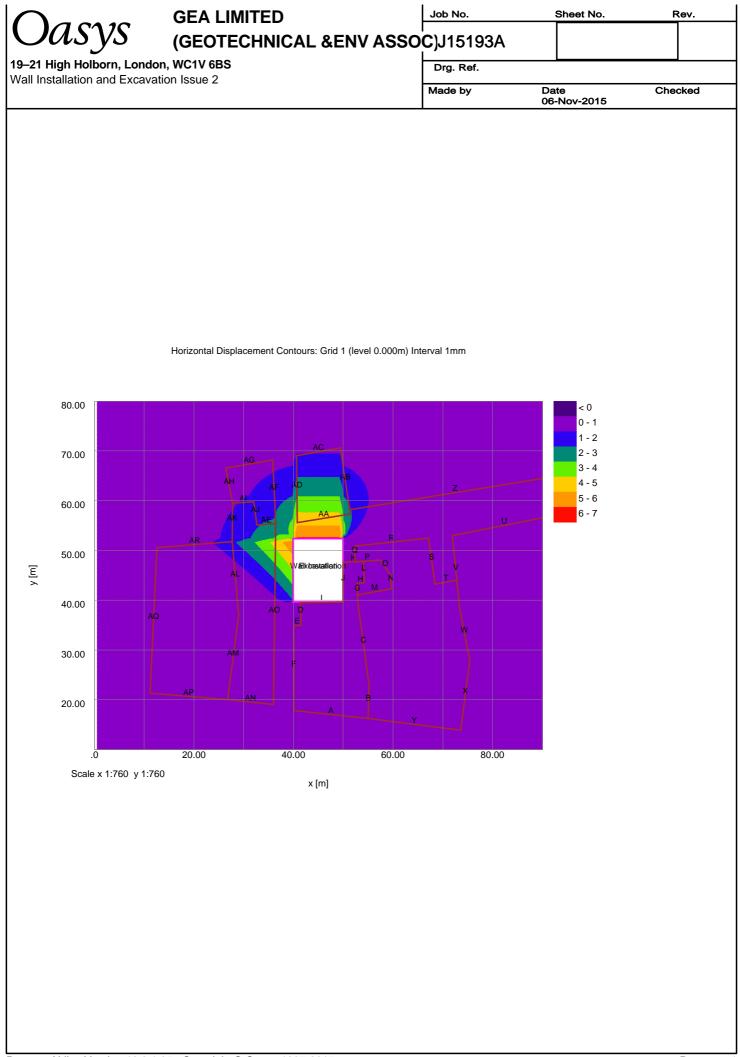






Program Xdisp Version 19.3.1.35 Copyright © Oasys 1997-2015 C:\Users\caroline\Desktop\High Holborn GMA\Issu...\Xdisp1 Wall Installation Only.xdd





$\bigcap$			10		(	GEA LIM	TED			Job No.	Sheet No.		Rev.
J	'U	SJ	/S					AL &EN	V ASSC	<b>C</b> )J15193A			
9–21	High	Holbo	orn, Lo	onde		WC1V 6BS				Drg. Ref.	<u> </u>		
all In	stalla	ation a	nd Ex	cava	atior	n Issue 2				Made by	ate -Nov-2015	Che	ecked
pecific B	uilding	Damage R	esults - H	orizont	al Disp	placements							
tructure		Sub-struct	ure:			Displacements							
	x	У	z	x	У	Horizontal Horizon displacement displace along the perpendi	ment						
0.0 40	[m] .10000	[m] 17.80000	[m] -3.30000	[mm] 0.0	0.0	Line to Li [mm] [mm] 0.0	0.0						
.7464 43 .6196 45	.82500	17.60000 17.40000 17.20000 17.00000	-3.30000	0.0	0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0						
.3660 49 1.239 51 3.112 53	.41250 .27500 .13750	16.80000 16.60000 16.40000	-3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0						
		16.20000 Sub-struct			0.0	0.0	0.0						
Dist.		Sub-struct Coordinate y		×	у	Displacements Horizontal Horizo	ntal						
		-	-		-	displacement displace along the perpend Line to L	ement icular ine						
94329 5	5.0285	[m] 0 16.20000 7 17.14286	-3.3000	0 0.0	0.0	[mm] [mm 0.0 0.0	0.0 0.0						
.8299 5 .7732 5	5.0857 5.1142	4 18.08571 1 19.02857 9 19.97143 5 20.91429	-3.3000	0 0.0	0.0	0.0	0.0 0.0 0.0 0.0						
.6597 5	5.1714	3 21.85714 0 22.80000	-3.3000	0 0.0	0.0	0.0	0.0						
ructure		Sub-struct		#		Displacements							
	×	y	z	x	У d	Horizontal Horizon displacement displace along the perpendi	ment						
0.0 55		[m] 22.80000			[mm] 0.0	Line to Li [mm] [mm] 0.0	ne 0.0						
.7682 54 .6522 54	.68889	24.66667 26.53333 28.40000 30.26667	-3.30000	0.0	0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0						
4204 53 .304 53 .189 53	.92222 .66667 .41111	32.13333 34.00000 35.86667	-3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0						
.073 53	.15556	37.73333 39.60000	-3.30000	0.0	0.0	0.0	0.0 0.0						
ructure		Sub-struct		#		Displacements							
	x	y	z	x	У	Horizontal Horizo displacement displace along the perpend	ement						
0.0 4	[m] 1.4000	[m] 0 39.40000	[m] -3.3000	0 0.0	[mm] 0.0	Line to L [mm] [mm 0.0	ine ] 0.0						
.8004 4 .7007 4	1.4400	38.50000 37.60000 36.70000 35.80000	-3.3000	0 0.0	0.0	0.0	0.0 0.0 0.0 0.0						
5011 4	1.5000	34.90000	-3.3000	0 0.0	0.0	0.0	0.0						
ucture st.		Sub-struct		#		Displacements							
	x	У	Z	x	У	Horizontal Horizo displacement displac along the perpend Line to L	ement icular						
10000 4	0.8000	[m] 0 34.90000 0 34.90000	-3.3000	0 0.0	0.0	[mm] [mm 0.0 0.0	0.0 0.0						
		0 34.90000 Sub-struct			υ.Ο	0.0	0.0						
st.		ordinates y		* x	у	Displacements Horizontal Horizon							

							displacement
							perpendicular
						Line	to Line
[m]	[m]	[m]		[ mm ]		[ mm ]	[ mm ]
		34.90000		0.0	0.0	0.0	0.0
1.9000	40.10000	33.00000	-3.30000	0.0	0.0	0.0	0.0
3.8000	40.10000	31.10000	-3.30000	0.0	0.0	0.0	0.0
5,7000	40.10000	29.20000	-3.30000	0.0	0.0	0.0	0.0
7.6000	40.10000	27.30000	-3.30000	0.0	0.0	0.0	0.0
9.5000	40.10000	25,40000	-3.30000	0.0	0.0	0.0	0.0
11.400	40.10000	23.50000	-3.30000	0.0	0.0	0.0	0.0
		21.60000			0.0	0.0	0.0
		19.70000				0.0	0.0
		17.80000		0.0		0.0	0.0
Structu	ro: a l s	ub-struct	ura: Sub	#			
Scruccu	16.013	ub-scrucc	ure: Sub				
Dist.	~	Cordinate	~			Displacemen	+ 0
Disc.	×		5 7	×		Horizontal	Horizontal
	x	У	z	x	У		displacement
						along the	perpendicular
						Line	to Line
[m]	[m]	[m]	[m]		[mm]	[mm]	[ mm ]
		39.80000			0.0		
0.90035	52.87500	40.70000	-3.30000	0.0	0.0	0.0	0.0
0.90035	52.87500 52.85000	40.70000 41.60000	-3.30000	0.0	0.0	0.0	0.0
0.90035 1.8007 2.7010	52.87500 52.85000 52.82500	40.70000 41.60000 42.50000	-3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
0.90035 1.8007 2.7010	52.87500 52.85000 52.82500	40.70000 41.60000	-3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
0.90035 1.8007 2.7010	52.87500 52.85000 52.82500	40.70000 41.60000 42.50000	-3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
0.90035 1.8007 2.7010	52.87500 52.85000 52.82500	40.70000 41.60000 42.50000	-3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
0.90035 1.8007 2.7010 3.6014	52.87500 52.85000 52.82500 52.80000	40.70000 41.60000 42.50000	-3.30000 -3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
0.90035 1.8007 2.7010 3.6014	52.87500 52.85000 52.82500 52.80000	0 40.70000 0 41.60000 0 42.50000 0 43.40000	-3.30000 -3.30000 -3.30000 -3.30000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
0.90035 1.8007 2.7010 3.6014	52.87500 52.85000 52.82500 52.80000 re: H   S	0 40.70000 0 41.60000 0 42.50000 0 43.40000	-3.30000 -3.30000 -3.30000 -3.30000 ure: Sub	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0 0.0
0.90035 1.8007 2.7010 3.6014 Structu	52.87500 52.85000 52.82500 52.80000 re: H   S	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 Gub-struct Coordinate</pre>	-3.30000 -3.30000 -3.30000 -3.30000 ure: Sub	0.0 0.0 0.0 0.0	0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0
0.90035 1.8007 2.7010 3.6014 Structu	52.87500 52.85000 52.82500 52.80000 re: H   S	0 40.70000 0 41.60000 0 42.50000 0 43.40000 Sub-struct	-3.30000 -3.30000 -3.30000 -3.30000 ure: Sub	0.0 0.0 0.0	0.0	0.0 0.0 0.0 0.0 Displacemen Horizontal	ts Horizontal
0.90035 1.8007 2.7010 3.6014 Structu	52.87500 52.85000 52.82500 52.80000 re: H   S	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 Gub-struct Coordinate</pre>	-3.30000 -3.30000 -3.30000 -3.30000 ure: Sub	0.0 0.0 0.0 0.0	0.0	0.0 0.0 0.0 Displacemen Horizontal displacement	ts Horizontal displacement
0.90035 1.8007 2.7010 3.6014 Structu	52.87500 52.85000 52.82500 52.80000 re: H   S	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 Gub-struct Coordinate</pre>	-3.30000 -3.30000 -3.30000 -3.30000 ure: Sub	0.0 0.0 0.0 0.0	0.0	0.0 0.0 0.0 0.0 0.0 Displacemen Horizontal displacement along the	ts Horizontal displacement perpendicular
0.90035 1.8007 2.7010 3.6014 Structu Dist.	52.87500 52.85000 52.825000 52.80000 re: H   S x	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 Gub-struct Coordinate Y</pre>	-3.30000 -3.30000 -3.30000 -3.30000 -3.30000 ure: Sub s z	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 Displacemen Horizontal displacement along the Line	ts Horizontal displacement perpendicular to Line
0.90035 1.8007 2.7010 3.6014 Structu Dist.	52.87500 52.85000 52.825000 52.80000 re: H   S x [m]	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 0 43.40000 Gub-struct Coordinate</pre>	-3.30000 -3.30000 -3.30000 -3.30000 uure: Sub s z [m]	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 <b>y</b> [mm]	0.0 0.0 0.0 0.0 Displacemen Horizontal displacement along the Line [mm]	ts Horizontal displacement perpendicular to Line [mm]
0.90035 1.8007 2.7010 3.6014 Structu Dist.	52.87500 52.85000 52.825000 52.80000 re: H   S x [m] 52.80000	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 Sub-struct Coordinate</pre>	-3.30000 -3.30000 -3.30000 -3.30000 ure: Sub s z [m] -3.30000	0.0 0.0 0.0 0.0 # <b>x</b> [mm] 0.0	0.0 0.0 0.0 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0.0 0.0 0.0 Displacement Horizontal displacement along the Line [mm] 0.0	ts Horizontal displacement perpendicular to Line [mm] 0.0
0.90035 1.8007 2.7010 3.6014 Structu Dist. [m] 0.0 0.70178	52.87500 52.85000 52.82500 52.80000 re: H   S x [m] 52.80000 53.50000	<pre>40.70000 41.60000 41.60000 42.50000 43.40000 Gub-struct Coordinate y [m] 43.40000 43.45000</pre>	-3.30000 -3.30000 -3.30000 -3.30000 uure: Sub s z [m] -3.30000 -3.30000	0.0 0.0 0.0 0.0 # # [mm] 0.0 0.0	0.0 0.0 0.0 <b>y</b> [mm] 0.0 0.0	0.0 0.0 0.0 0.0 Horizontal displacement along the Line [mm] 0.0 0.0	ts Horizontal displacement perpendicular to Line [mm] 0.0
0.90035 1.8007 2.7010 3.6014 Structu Dist. [m] 0.0 0.70178	52.87500 52.85000 52.82500 52.80000 re: H   S x [m] 52.80000 53.50000	<pre>0 40.70000 0 41.60000 0 42.50000 0 43.40000 Sub-struct Coordinate</pre>	-3.30000 -3.30000 -3.30000 -3.30000 uure: Sub s z [m] -3.30000 -3.30000	0.0 0.0 0.0 0.0 # # [mm] 0.0 0.0	0.0 0.0 0.0 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0.0 0.0 0.0 Displacement Horizontal displacement along the Line [mm] 0.0 0.0	ts Horizontal displacement perpendicular to Line [mm] 0.0

$\bigcap$	<b>GEA LIMITED</b>	ļ	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL	. &ENV ASSO	C)J15193A		
9–21 High Holborn, Londo Vall Installation and Excavat			Drg. Ref.		
			Made by	Date 06-Nov-2015	Checked
Dist. Coordinates x y z x	displacement displacement				
Structure: I   Sub-structure: Sub # Dist. Coordinates	along the perpendicular				
x y z x	displacement displacement along the perpendicular Line to Line				
[m]         [m]         [m]         [mm]         [mm]           0.0         41.40000         39.50000         3.30000         0.0           0.95562         42.35556         39.51111         -3.30000         0.0           1.9112         43.31111         39.52222         -3.30000         0.0           2.8669         44.26667         39.5333         -3.30000         0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
3.8225 45.22222 39.54444 -3.30000 0.0 4.7781 46.17778 39.55556 -3.30000 0.0 5.7337 47.13333 39.56667 -3.30000 0.0 6.6893 48.08889 39.57778 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
7.6450 49.04444 39.58889 -3.30000 0.0 8.6006 50.00000 39.60000 -3.30000 0.0 Structure: J   Sub-structure: Sub #					
vist. Coordinates x y z x y	Displacements Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [mm] [n 0.0 50.00000 39.60000 -3.30000 0.0 (	along the perpendicular Line to Line m] [mm] [mm]				
.0000 50.00000 40.60000 -3.30000 0.0 0 .0000 50.00000 41.60000 -3.30000 0.0 0 .0000 50.00000 42.60000 -3.30000 0.0 0 .0000 50.00000 43.60000 -3.30000 0.0 0	.0         0.0         0.0           .0         0.0         0.0           .0         0.0         0.0           .0         0.0         0.0				
.0000 50.00000 44.60000 -3.30000 0.0 ( 0000 50.00000 45.60000 -3.30000 0.0 ( 0000 50.00000 46.60000 -3.30000 0.0 ( .0000 50.00000 47.60000 -3.30000 0.0 (	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
tructure: K   Sub-structure: Sub #	Displacements				
	y Horizontal Horizontal displacement displacement along the perpendicular Line to Line				
[m] [m] [m] [m] [m] [mm] [ 0.0 50.00000 47.60000 -3.30000 0.0 82098 50.82000 47.64000 -3.30000 0.0 1.6420 51.64000 47.68000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
2.4629 52.46000 47.72000 -3.30000 0.0 3.2839 53.28000 47.76000 -3.30000 0.0 4.1049 54.10000 47.80000 -3.30000 0.0	0.0 0.0 0.0				
tructure: L   Sub-structure: Sub # Dist. Coordinates x y z x	Displacements y Horizontal Horizontal				
[m] [m] [m] [m] [mm] [	displacement displacement along the perpendicular Line to Line mm] [mm] [mm]				
0.0         54.10000         47.80000         -3.30000         0.0           86023         54.12000         66.94000         -3.30000         0.0           1.7205         54.14000         46.08000         -3.30000         0.0           2.5807         54.16000         45.22000         -3.30000         0.0           3.4409         54.18000         45.22000         -3.30000         0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
4.3012 54.20000 43.50000 -3.30000 0.0 tructure: M   Sub-structure: Sub #					
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [m] [mm] [ 0.0 52.90000 41.10000 -3.30000 0.0 .98644 53.87143 41.27143 -3.30000 0.0	0.0 0.0 0.0				
1.9729 54.84286 41.44286 -3.30000 0.0 2.9593 55.81429 41.61429 -3.30000 0.0 3.9458 56.78571 41.78571 -3.30000 0.0 4.9322 57.75714 41.95714 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
5.9186 58.72857 42.12857 -3.30000 0.0 5.9051 59.70000 42.30000 -3.30000 0.0	0.0 0.0 0.0				
tructure: N   Sub-structure: Sub # Dist. Coordinates x y z x	Displacements Y Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [mm] [ 0.0 59.70000 42.30000 -3.30000 0.0	along the perpendicular Line to Line mm] [mm] [mm]				
.90247 59.63333 43.20000 -3.30000 0.0 1.8049 59.56667 44.10000 -3.30000 0.0 2.7074 59.50000 45.00000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0				
tructure: 0   Sub-structure: Sub # Dist. Coordinates	Displacements				
<b>x y z x</b>	y Horizontal Horizontal displacement displacement along the perpendicular Line to Line mm] [mm] [mm]				
0.0 59.50000 45.00000 -3.30000 0.0 93608 58.97500 45.77500 -3.30000 0.0 1.8722 58.45000 46.55000 -3.30000 0.0 2.8082 57.92500 47.32500 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
3.7443 57.40000 48.10000 -3.30000 0.0	0.0 0.0 0.0				
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement along the perpendicular				
[m] [m] [m] [m] [m] [mm] [ 0.0 57.40000 48.10000 -3.30000 0.0 85261 56.55000 48.03333 -3.30000 0.0	Line         to Line           mm]         [mm]           0.0         0.0				
1.7052 55.70000 47.96667 -3.30000 0.0 2.5578 54.85000 47.90000 -3.30000 0.0 3.4104 54.00000 47.83333 -3.30000 0.0 4.2631 53.15000 47.76667 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
5.1157 52.30000 47.70000 -3.30000 0.0 tructure: Q   Sub-structure: Sub #	0.0 0.0 0.0				
Dist. Coordinates	Displacements				

$\bigcap$	<b>GEA LIMITED</b>		Job No.	Sheet No.	Rev.
Oasys		AL &ENV ASSO	С)J15193A		
19–21 High Holborn, Londo	on, WC1V 6BS		Drg. Ref.		
Wall Installation and Excava	tion Issue 2		Made by	Date 06-Nov-2015	Checked
				00 1107 2010	
x y z x	y Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [m] 0.0 52.30000 47.70000 -3.30000 0.0	0.0 0.0 0.0				
0.80000 52.30000 48.50000 -3.30000 0.0 1.6000 52.30000 49.30000 -3.30000 0.0 2.4000 52.30000 50.10000 -3.30000 0.0 3.2000 52.30000 50.90000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0				
Structure: R   Sub-structure: Sub # Dist. Coordinates	Displacements				
x y z x	y Horizontal Horizon displacement displace along the perpendi Line to Li	cular			
[m] [m] [m] [m] [mm 0.0 52.30000 50.90000 -3.30000 1.8608 54.15000 51.10000 -3.30000 3.7216 56.00000 51.30000 -3.30000					
5.5823 57.85000 51.50000 -3.30000 7.4431 59.70000 51.70000 -3.30000 9.3039 61.55000 51.90000 -3.30000 11.165 63.40000 52.10000 -3.30000	0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0	0.0 0.0 0.0 0.0			
13.025 65.25000 52.30000 -3.30000 14.886 67.10000 52.50000 -3.30000 -0.001	0.0 0.0 0.0 8313 -10.709E-6 -0.0018219 186.	0.0 19E-6			
Structure: S   Sub-structure: Sub # Dist. Coordinates x y z x	Displacements y Horizontal Horizon				
[m] [m] [m] [m] [mm] 0.0 67.10000 52.50000 -3.30000 -0.001		cular ne			
1.8781 67.36000 50.64000 -3.30000 3.7562 67.62000 48.78000 -3.30000 5.6343 67.88000 46.92000 -3.30000 7.5123 68.14000 45.06000 -3.30000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0			
9.3904 68.40000 43.20000 -3.30000 Structure: T   Sub-structure:	0.0 0.0 0.0	0.0			
Dist. Coordinates x y z x	Displacements Y Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [m] [mm] 0.0 68.40000 43.20000 -3.30000 0.0 0.91411 69.30000 43.36000 -3.30000 0.0	0.0 0.0 0.0				
1.8282 70.20000 43.52000 -3.30000 0.0 2.7423 71.10000 43.68000 -3.30000 0.0 3.6564 72.00000 43.84000 -3.30000 0.0 4.5706 72.90000 44.00000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
Structure: U   Sub-structure:					
Dist. Coordinates x y z x	Displacements y Horizontal Horizon displacement displace along the perpendi	cular			
[m] [m] [m] [m] [mm] 0.0 92.80000 57.10000 -3.30000 1.9362 90.90000 56.72727 -3.30000 3.8724 89.00000 56.35455 -3.30000	Line         to Li           [mm]         [mm]         [mm]           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0				
5.8086 87.10000 55.98182 -3.30000 7.7449 85.20000 55.98182 -3.30000 9.6811 83.30000 55.23636 -3.30000 11.617 81.40000 54.86364 -3.30000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0			
13.553 79.50000 54.49091 -3.30000 15.490 77.60000 54.11818 -3.30000 17.426 75.70000 53.74545 -3.30000 19.362 73.80000 53.37273 -3.30000	0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0	0.0 0.0 0.0 0.0			
21.298 71.90000 53.00000 -3.30000 -939.7 Structure: V   Sub-structure:	4E-6 -25.746E-6 927.12E-6 -155.	64E-6			
Dist. Coordinates x y z x	Displacements y Horizontal Horizor displacement displace along the perpendi	ment			
[m] [m] [m] [m] [mm 0.0 71.90000 53.00000 -3.30000 -939.7 1.8346 72.08750 51.17500 -3.30000	Line to Li [mm] [mm] [mm]	ne			
3.6692 72.27500 49.35000 -3.30000 5.5038 72.46250 47.52500 -3.30000 7.3384 72.65000 45.70000 -3.30000 9.1730 72.83750 43.87500 -3.30000	0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0	0.0 0.0 0.0 0.0			
11.008 73.02500 42.05000 -3.30000 12.842 73.21250 40.22500 -3.30000 14.677 73.40000 38.40000 -3.30000	0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0	0.0 0.0 0.0			
Structure: W   Sub-structure: Dist. Coordinates x y z x	Displacements y Horizontal Horizontal				
- [m] [m] [m] [m] [mm] [	displacement displacement along the perpendicular Line to Line mm] [mm] [mm]				
0.0 73.40000 38.40000 -3.30000 0.0 1.7815 73.73333 36.65000 -3.30000 0.0 3.5629 74.06667 34.90000 -3.30000 0.0 5.3444 74.40000 33.15000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
7.1259 74.73333 31.40000 -3.30000 0.0 8.9073 75.06667 29.65000 -3.30000 0.0 10.689 75.40000 27.90000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0				
Structure: X   Sub-structure: Dist. Coordinates X Y Z X	Displacements y Horizontal Horizontal				
[m] [m] [m] [m] [m]	displacement displacement along the perpendicular Line to Line				
0.0 75.40000 27.90000 -3.30000 0.0 1.7644 75.17500 26.15000 -3.30000 0.0 3.5288 74.95000 24.40000 -3.30000 0.0 5.2932 74.72500 22.65000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
7.0576 74.50000 20.90000 -3.30000 0.0 8.8220 74.27500 19.15000 -3.30000 0.0 10.586 74.05000 17.40000 -3.30000 0.0 12.351 73.82500 15.65000 -3.30000 0.0 14.115 73.60000 13.90000 -3.30000 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				

$\bigcap$	GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL &E	NV ASSOC)J15193A		
19–21 High Holborn, Londo Wall Installation and Excava		Drg. Ref.		
		Made by	Date 06-Nov-2015	Checked
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement			
Structure: Y   Sub-structure:	along the perpendicular			
Dist. Coordinates x y z x	Displacements y Korizontal Horizontal displacement displacement along the perpendicular Line to Line			
$ \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \begin{bmatrix} \mathbf{m} \end{bmatrix}  \\ \mathbf{m} \end{bmatrix}$	0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0           0.0         0.0         0.0			
Structure: Z   Sub-structure: Dist. Coordinates	Displacements			
x y z x	y Horizontal Horizontal displacement displacement along the perpendicular Line to Line			
$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$			
Structure: AA   Sub-structure: Dist. Coordinates	Displacements			
1.7892 42.56667 55.88333 -3.30000 ( 3.5785 44.33333 56.16667 -3.30000 ( 5.3677 46.10000 56.45000 -3.30000 ( 7.1570 47.86667 56.73333 -3.30000 ( 8.9462 49.63333 57.01667 -3.30000 (	y         Horizontal Horizontal along the prependicular         Horizontal displacement prependicular           Line         the total           0         -4.754         -0.75288         -4.6944           0         -6.4588         -0.73568         -4.5872           0         -4.6548         -0.70208         -4.4816           0         -4.6586         -0.70208         -4.3777           0         -4.3284         -0.66955         -4.1749           2         -0.66955         -4.1749           2         -0.28054         -19.166			
Structure: AB   Sub-structure: Dist. Coordinates	Displacements			
11.528 49.68571 68.70000 -3.30000	y         Horizontal displacement         Horizontal perpendicular           along the Line         perpendicular           [mm]         [mn]         [mn]           123         -2.0343         -1.9253         0.87728           654         -1.9952         -1.9244         0.62000           120         -1.7976         -1.7522         0.43661           1273         -1.5479         -1.5189         0.30857			
Structure: AC   Sub-structure: Dist. Coordinates	Displacements			
x y z x	y Horizontal Horizontal displacement displacement along the perpendicular Line to Line			
0.0 49.40000 70.60000 -3.30000 0.0 0.99381 48.42222 70.42222 -3.30000 0.0 1.9876 47.44444 70.24444 -3.30000 0.0 2.9814 46.46667 70.06667 -3.30000 0.0 3.9752 45.48889 69.88889 -3.30000 0.0	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$			
Structure: AD   Sub-structure: Dist. Coordinates x y z x	Displacements y Horizontal Horizontal			
x         y         z         x           [m]         [m]         [m]         [m]         [m]         [m]           0.0         40.60000         69.00000         -3.30000         0.0         -           1.9145         40.62857         67.08571         -3.30000         0.0         -           3.8290         40.65714         63.25714         -3.30000         0.0         -           7.6580         40.71429         63.226714         -3.30000         0.0         -           7.5580         0.71429         61.34266         -3.30000         0.0         -           1.487         0.71429         61.34246         -3.30000         0.0         -           1.487         0.71429         61.34246         -3.30000         0.0         -           1.3.401         40.80000         55.60000         -3.30000         0.0         -	displacement along the perpendicular           Line         to Line           [mm]         [mm]           1.0809         1.0808           1.4690         1.4688           2.3500         2.3498           2.3500         2.8589           3.4240         3.4226           4.0522         4.0527			
Structure: AE   Sub-structure: Dist. Coordinates	Displacements			
<b>x y z x</b> [m] [m] [m] [m] [mm] 0.0 32.60000 55.10000 -3.30000 1.833 (0.5520 63.5500 55.17500 -3.30001 1.833)	4 -0.65739 1.7201 -0.79523			

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Oasys	(GEOTECHNICAL	&ENV ASSO	С)J15193A		
19–21 High Holborn, Londor	n, WC1V 6BS		Drg. Ref.	<u> </u>	
Wall Installation and Excavati	on Issue 2		Made by	Date 06-Nov-2015	Checked
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement		I	001107 2010	
1.9059 34.50000 55.25000 -3.30000 1.8578 2.8589 35.45000 55.32500 -3.30000 1.8099 3.8118 36.40000 55.40000 -3.30000 1.6595	along the perpendicular -0.98050 1.7749 -1.1237 -1.1897 1.7107 -1.3284				
Structure: AF   Sub-structure: Sub # Dist. Coordinates x y z x	Displacements y Horizontal Horizontal				
[m] [m] [m] [mm]	j horizontar displacement displacement along the perpendicular Line to Line [mm] [mm]				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$				
Structure: AG   Sub-structure: Sub # Dist. Coordinates	Displacements				
x y z x	y Horizontal Horizontal displacement displacement along the perpendicular Line to Line				
[m]         [m]         [m]         [m]         [m]           0.035.80006         3.0000         3.2600         3.0000         3.2600         3.0000         3.2400         9.5525         5.40000         65.8000         3.30000         3.24000         9.5525         5.40000         65.8000         3.0000         3.24000         9.5525         5.40000         65.8000         3.0000         3.26000         3.0000         3.26000         3.0000         3.26000         3.0000         3.26000         3.0000         3.2600         3.0000 <td>-0.59747 -0.12109 0.62906 -0.50003 -0.16680 0.53831 -0.39479 -0.18576 0.43479 -0.29088 -0.17857 0.32790</td> <td></td> <td></td> <td></td> <td></td>	-0.59747 -0.12109 0.62906 -0.50003 -0.16680 0.53831 -0.39479 -0.18576 0.43479 -0.29088 -0.17857 0.32790				
Structure: AH   Sub-structure: Sub #	0.11012 0.12100				
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement along the perpendicular Line to Line				
[m] [m] [m] [m] [m] [m] [m] 0.0 26.40000 66.50000 -3.30000 0.18606 0.89233 26.57500 65.62500 -3.30000 0.23795 2.6770 26.92500 63.87500 -3.30000 0.32795 3.5693 27.10000 63.00000 -3.30000 0.3616 4.4616 27.27500 62.12500 -3.30000 0.5702 5.3540 27.45000 61.25000 -3.30000 0.58844					
6.2463 27.62500 60.37500 -3.30000 0.67628 7.1386 27.80000 59.50000 -3.30000 0.77043 Structure: AI   Sub-structure: Sub #	8 -0.43937 0.56347 0.57698 8 -0.45207 0.59439 0.66681				
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [mm] 0.0 27.80000 59.50000 -3.30000 0.77043	along the perpendicular Line to Line [mm] [mm] [mm]				
0.84214 28.64000 59.56000 -3.30000 0.81291 1.6843 29.48000 59.62000 -3.30000 0.84644 2.5264 30.32000 59.68000 -3.30000 0.86607 3.3686 31.16000 59.74000 -3.30000 0.87862 4.2107 32.00000 59.80000 -3.30000 0.8772	0.51692 0.77402 -0.57352 -0.58650 0.80250 -0.64531 -0.66042 0.81981 -0.72066 -0.73788 0.82381 -0.79860				
Structure: AJ   Sub-structure: Sub # Dist. Coordinates x y z x	Displacements y Horizontal Horizontal				
- [m] [m] [m] [m]	displacement displacement along the perpendicular Line to Line [mm] [mm] [mm]				
0.0 32.00000 59.80000 -3.30000 0.87273 0.94763 32.12000 58.86000 -3.30000 1.0166 1.8953 32.24000 57.92000 -3.30000 1.1806 2.6429 32.36000 56.98000 -3.30000 1.5644 3.7905 32.48000 56.04000 -3.30000 1.5655 4.7381 32.60000 55.10000 -3.30000 1.7774	8 -0.81750 0.92143 0.76219 9 -0.84438 0.96636 0.90180 8 -0.85089 0.99357 1.0635 4 -0.82878 0.99489 1.2485 -0.76797 0.96602 1.4556				
Structure: AK   Sub-structure: Dist. Coordinates X Y Z X	Displacements y Horizontal Horizontal displacement displacement along the perpendicular				
[m] [m] [m] [m] [m] [m] 0.0 27.80000 59.50000 -3.30000 0.77043 0.96258 27.78750 53.53750 -3.30000 0.86594 1.9252 27.77500 57.57500 -3.30000 0.96244 2.8877 27.76520 56.61250 -3.30000 1.1462 4.8129 27.77550 55.65000 -3.30000 1.2927 5.7755 27.72500 53.72500 -3.30000 1.2927 6.7381 27.71250 52.76250 -3.30000 1.3424 7.7006 27.70000 51.80000 -3.30000 1.8640	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$				
Structure: AL   Sub-structure: Sub # Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement along the perpendicular				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Line         to Line           [mm]         [mm]           0.0         0.16420           0.0         0.12570           0.0         0.22570           0.0         0.088671           1.0027				
Structure: AM   Sub-structure: Sub # Dist. Coordinates x y z x y	Displacements Horizontal Horizontal displacement displacement along the perpendicular				
[m] [m] [m] [m] [m] [mm] 0.0 29.00000 37.10000 -3.30000 0.0 0. 1.9157 28.75556 35.20000 -3.30000 0.0 0.	Line to Line [mm] [mm] 0 0.0 0.0				

$\bigcap$	GEA LIMITED		Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL	&ENV ASSO	C)J15193A		
19–21 High Holborn, London			Drg. Ref.		
Wall Installation and Excavation	on Issue 2		Made by	Date 06-Nov-2015	Checked
Dist. Coordinates x y z x y	Displacements Horizontal Horizontal displacement displacement				
3.8313 28.51111 33.30000 -3.30000 0.0 0.0 5.7470 28.26667 31.40000 -3.30000 0.0 0.0 7.6626 28.02222 29.50000 -3.30000 0.0 0.0	along the perpendicular 0 0.0 0.0 0 0.0 0.0				
9.5783         27.77778         27.60000         -3.30000         0.0         0.0           11.494         27.53333         25.70000         -3.30000         0.0         0.0           13.410         27.28889         23.80000         -3.30000         0.0         0.0           15.325         27.0444         21.90000         -3.30000         0.0         0.0	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
17.241 26.80000 20.00000 -3.30000 0.0 0.0 Structure: AN   Sub-structure:					
Dist. Coordinates x y z x y	Displacements Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [mm] [mm] 0.0 26.80000 20.00000 -3.30000 0.0 0.0	0.0 0.0				
1.8508         28.64000         19.80000         -3.30000         0.0         0.0           3.7017         30.48000         19.60000         -3.30000         0.0         0.0           5.5525         32.32000         19.40000         -3.30000         0.0         0.0           7.4034         34.16000         19.20000         -3.30000         0.0         0.0	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
9.2542 36.00000 19.00000 -3.30000 0.0 0.0 Structure: AO   Sub-structure:	0 0.0 0.0				
Dist. Coordinates x y z x	Displacements y Horizontal Horizontal displacement displacement along the perpendicular				
[m] [m] [m] [m] [m] [mm] 0.0 36.00000 19.00000 -3.30000 0.0 4.0447 36.04444 23.04444 -3.30000 0.0	Line         to Line           [mm]         [mm]           0.0         0.0         0.0           0.0         0.0         0.0				
8.0894 36.08889 27.08889 -3.30000 0.0 12.134 36.13333 31.13333 -3.30000 0.0 16.179 36.17778 35.17778 -3.30000 0.028836 20.223 36.22222 39.22222 -3.30000 0.38597	0.039647 0.043886 -0.38552				
24,268 36,26667 43,26667 -3,30000 1.7047 28,313 36,31111 47,31111 -3,30000 2.9762 32,358 36,35556 51,35556 -3,30000 4.2855 36,402 36,40000 55,40000 -3,30000 1.6595	0.0 0.018732 -1.7046 0.0 0.032704 -2.9760 0.0 0.047090 -4.2852 -1.4224 -1.4041 -1.6750				
Structure: AP   Sub-structure: Dist. Coordinates	Displacements				
х у г х у	Horizontal Horizontal displacement displacement along the perpendicular Line to Line				
[m] [m] [m] [m] [m] [mm] [mm] 0.0 26.70000 20.00000 -3.30000 0.0 0.0 1.9443 24.76250 20.16250 -3.30000 0.0 0.0 3.8886 22.82500 20.32500 -3.30000 0.0 0.0	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
5.8329 20.88750 20.48750 -3.30000 0.0 0.0 7.7772 18.95000 20.65000 -3.30000 0.0 0.0 9.7215 17.01250 20.81250 -3.30000 0.0 0.0 11.666 15.07500 20.97500 -3.30000 0.0 0.0 13.610 13.13750 21.13750 -3.30000 0.0 0.0	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
15.554 11.20000 21.30000 -3.30000 0.0 0.0 Structure: AQ   Sub-structure: Sub #					
Dist. Coordinates x y z x y	Displacements Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [m] [mm] [mm] 0.0 11.20000 21.30000 -3.30000 0.0 0.0	0.0 0.0				
1.9556 11.2933 23.2533 -3.30000 0.0 0.0 0.0 3.9111 1.38667 25.20667 -3.30000 0.0 0.0 5.8667 11.48000 27.16000 -3.30000 0.0 0.0 7.8222 11.5733 29.11333 -3.30000 0.0 0.0 0.0 9.7778 11.66667 31.06667 -3.30000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
11.733 11.76000 31.0200 - 3.30000 0.0 0.0 13.689 11.8533 34.97333 -3.30000 0.0 0.0 15.644 11.94667 36.92667 -3.30000 0.0 0.0 17.600 12.04000 38.88000 -3.30000 0.0 0.0	0 0.0 0.0 0 0.0 0.0 0 0.0 0.0				
19.556         12.13333         40.83333         -3.30000         0.0         0.0           21.511         12.22667         42.78667         -3.30000         0.0         0.0           23.467         12.32000         44.74000         -3.30000         0.0         0.0           25.422         12.41333         46.69333         -3.30000         0.0         0.0	0         0.0         0.0           0         0.0         0.0           0         0.0         0.0           0         0.0         0.0           0         0.0         0.0				
27.378 12.50667 48.64667 -3.30000 0.0 0.0 29.333 12.60000 50.60000 -3.30000 0.0 0.0 Structure: AR   Sub-structure: Sub #					
Dist. Coordinates	Displacements y Horizontal Horizontal displacement displacement				
[m] [m] [m] [m] [m] [mm] [ 0.0 12.60000 50.60000 -3.30000 0.0	along the perpendicular           Line         to Line           [mm]         [mm]           0.0         0.0         0.0				
1.9059 14.50000 50.75000 -3.30000 0.0 3.8118 16.40000 50.90000 -3.30000 0.0 5.7177 18.30000 51.05000 -3.30000 0.0 7.6236 20.20000 51.20000 -3.30000 0.2338 5.506 20.20000 51.25000 -3.30000 0.2338	0.0 0.0 0.0 0.0 0.0 0.0				
11.435 24.00000 51.50000 -3.30000 1.0069 13.341 25.90000 51.65000 -3.30000 1.4281	$\begin{array}{cccccccccccccccccccccccccccccccccccc$				
Specific Building Damage Results - Vertical Disp	lacements				
x y z z	acements				
[m] [m] [m] [m] [mm] Vertical Offset 1 0.0 40.10000 17.80000 -3.30000 0.0 1.8732 41.96250 17.60000 -3.30000 0.0					
3.7464 43.82500 17.40000 -3.30000 0.0 5.6196 45.68750 17.20000 -3.30000 0.0 7.4928 47.55000 17.00000 -3.30000 0.0 9.3660 49.41250 16.80000 -3.30000 0.0					
11.239 51.27500 16.60000 -3.30000 0.0 13.112 53.13750 16.40000 -3.30000 0.0 14.986 55.00000 16.20000 -3.30000 0.0					
Structure: B   Sub-structure: Sub # Dist. Coordinates Displ x y z z	lacements				
[m] [m] [m] [m] [m] [m] Vertical Offset 1 0.0 55.00000 16.20000 -3.30000 0.0					

$\bigcap$	GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL & ENV ASSO	<b>C)</b> J15193A		
19–21 High Holborn, Londo Wall Installation and Excavat	n, WC1V 6BS	Drg. Ref.	I	
wan msianalion and Excavat	1011 133UE 2	Made by	Date 06-Nov-2015	Checked
Dist.         Coordinates         Dis           x         y         z         z           [m]         [m]         [m]         [mm]	splacements			
.94329 55.02857 17.14286 -3.30000 0.0 1.8866 55.05714 18.08571 -3.30000 0.0 2.8299 55.08571 19.02857 -3.30000 0.0 3.7732 55.11429 19.97143 -3.30000 0.0 4.7164 55.14286 20.91429 -3.30000 0.0 5.6597 55.17143 21.85714 -3.30000 0.0				
tructure: C   Sub-structure: Sub #				
ist.         Coordinates         Di           x         y         z         z           [m]         [m]         [m]         [m]           ertical Offset 1         1         1	splacements			
0.0 55.20000 22.80000 -3.30000 0. .841 54.9444 24.66667 -3.30000 0. .6522 54.4333 28.40000 -3.30000 0. .6522 54.4333 28.40000 -3.30000 0. .4204 53.92222 32.1333 -3.3000 0.0.4641 .104 53.6667 34.0000 -3.30000 0.3641 3.189 53.41111 35.86667 -3.3000 1.032 .015 23.73 53.1556 37.7333 -3.30000 0.2421 6.957 52.90000 39.60000 -3.30000 3.659	0 0 0 0 55 59 29 29			
x         y         z         z           [m]         [m]         [m]         [m]         [mm]	splacements			
Instruction         Instruction	3 3 5			
	splacements			
x         y         z         z           [m]         [m]         [m]         [m]         [m]           setical Offset 1         0.0 41.50000 34.90000 -3.30000 2.4523         .70000 40.80000 34.90000 -3.30000 2.4523           .4000 40.10000 34.90000 -3.30000 2.4523         .24523         .24523	3			
rructure: F   Sub-structure: Sub # ist. Coordinates Di x y z z [m] [m] [m] [m] [mm]	isplacements			
stical Offset 1           0.0         40.1000         34.9000         -3.3000         2.452           9000         40.1000         33.0000         -3.3000         0.722           8000         40.1000         31.0000         -3.3000         0.722           7000         40.1000         21.3000         0.3000         0.6226           7000         40.1000         29.2000         -3.3000         0.           5000         40.1000         25.4000         -3.3000         0.           5000         40.1000         25.4000         -3.3000         0.           1.400         40.1000         21.6000         -3.3000         0.           3.300         40.1000         21.6000         -3.3000         0.           5.200         40.10000         21.6000         -3.3000         0.           5.200         40.10000         17.8000         -3.3000         0.	33 50 00 00 00 00 00 00 00			
tructure: G   Sub-structure: Sub # Dist. Coordinates Di x y z z [m] [m] [m] [m] [m] [mm]	isplacements			
settical Offset 1         0.0         52.90000         39.80000         -3.30000         5.4616           90035         52.87500         40.70000         -3.30000         5.5146           1.8007         52.85000         41.60000         -3.30000         5.5146           2.7010         52.82500         42.50000         -3.30000         5.6214           3.6014         52.80000         43.40000         -3.30000         5.6754	5 3 4			
ructure: H   Sub-structure: Sub # <b>bist. Coordinates Di</b> <b>x y z z</b> [m] [m] [m] [m] [m]	splacements			
rtical Offset 1 0.0 52.80000 43.40000 -3.30000 5.6754 70178 53.50000 43.45000 -3.30000 4.2873 .4036 54.20000 43.50000 -3.30000 3.1384	3			
x         y         z         z           [m]         [m]         [m]         [m]         [mm]	splacements			
	L 3 5 9 2 3 3			
tructure: J   Sub-structure: Sub # ist. Coordinates Diss (m] [m] [m] [m] [mm]	pplacements			
crtical offset         1           0.0         50.0000         39.6000         -3.30000         9.4096           0.000         50.0000         40.6000         -3.3000         14.044           0.000         50.0000         41.6000         -3.3000         14.044           0.000         50.0000         41.6000         -3.3000         14.044           0.000         50.0000         42.6000         -3.3000         14.044           0.000         50.0000         43.6000         -3.3000         14.044           0.000         50.0000         43.6000         -3.3000         14.044           0.000         50.0000         45.6000         -3.3000         14.044           0.000         50.0000         45.6000         -3.3000         14.044           0.000         50.0000         45.6000         -3.3000         14.044           0.000         50.0000         45.6000         -3.3000         14.044				
ructure: K   Sub-structure: Sub #				

$\bigcap$	GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL & ENV ASSO	<b>C)</b> J15193A		
19–21 High Holborn, Londo	on, WC1V 6BS	Drg. Ref.		
Wall Installation and Excava	ation issue 2	Made by	Date 06-Nov-2015	Checked
Dist.         Coordinates         I           x         y         z         z           [m]         [m]         [m]         [mm]	Displacements			
Vertical Offset 1 0.0 50.00000 47.60000 -3.30000 14.00 0.82098 50.82000 47.6000 -3.30000 11.00 1.6420 51.64000 47.68000 -3.30000 8.545 2.4629 52.46000 47.7000 -3.30000 6.444 3.2839 53.28000 47.76000 -3.30000 4.3000 4.1049 54.10000 47.80000 -3.30000 3.288 4.1049 54.10000 47.80000 -3.288 4.1049 54.10000 47.80000 -3.288 4.1049 54.10000 47.80000 -3.288 4.1049 54.10000 47.8000 -3.30000 3.288 4.1049 54.1000 47.8000 -3.30000 3.288 4.1049 54.1000 47.8000 -3.288 4.1049 54.1000 47.8000 -3.288 4.1049 54.1000 47.8000 -3.3000 4.698 4.1049 54.1000 47.8000 -3.3000 -3.288 4.1049 54.1000 47.8000 -3.3000 -3.808 4.1049 54.1000 47.8000 -3.3000 -3.808 4.1049 54.1000 47.8000 -3.3000 -3.808 4.1049 54.1000 47.8000 -3.808 4.1049 54.1000 47.808 4.1049 54.1000 47.8000 -3.808 4.1049 54.1000 47.8000 -3.808 4.1049 54.1000 47.8000 -3.808 4.1049 54.1000 47.8000 -3.808 4.1049 54.1000 47.808 4.1049 54.1000 47.8000 -3.808 4.1049 54.10000 47.8000 -3.800	44 82 92 22 68			
Structure: L   Sub-structure: Sub #	Displacements			
Vertical Offset 1 0.0 54.10000 47.80000 -3.30000 3.284 0.86023 54.12000 46.94000 -3.30000 3.228 1.7205 54.14000 46.08000 -3.30000 3.222 2.5807 54.16000 45.22000 -3.30000 3.126 4.3012 54.20000 43.50000 -3.30000 3.136	186 182 180 79 81			
<b>x y z z</b> [m] [m] [m] [m] [mm				
1.9729         54.84286         41.44286         -3.30000         2.2           2.9593         55.81429         41.61429         -3.30000         1.2           3.9458         56.78571         41.78571         -3.30000         0.61           4.9322         57.75714         41.95714         -3.30000         0.62           5.9186         58.72857         42.12857         -3.30000         0.03	6492 2757 2842 1808 2045			
	Displacements			
x         y         z         z           [m]         [m]         [m]         [m]         [mm]           vertical Offset 1				
0.059,70000 42.30000 -3.30000 0.0 0.90247 59.63333 43.20000 -3.30000 0.0 1.8049 59.56667 44.10000 -3.30000 0.0 2.7074 59.50000 45.00000 -3.30000 0.0				
Structure: 0   Sub-structure: Sub # Dist. Coordinates x y z z [m] [m] [m] [m] [m]				
Vertical Offset 1	0.0 4295 9534 7479			
Structure: P   Sub-structure: Sub # Dist. Coordinates I				
Dist.         Coordinates         I           x         y         z         z           [m]         [m]         [m]         [m]         z           Vertical Offset 1         1         1         1				
0.0         57.40000         48.10000         -3.30000         0.33           0.85261         56.55000         48.0333         -3.30000         0.752           1.7052         55.70000         47.96667         -3.30000         1.33           2.4578         54.85000         47.96067         -3.30000         1.33           3.4104         54.0000         47.9333         -3.30000         3.44           4.2631         53.15000         47.76667         -3.30000         4.4           5.1157         52.30000         47.76007         -3.30000         6.83	289 1829 1671 1435 501			
Structure: Q   Sub-structure: Sub #         Dist.       Coordinates         Image: The structure is a structure in the structure in the structure is a structure in the structure in the structure is a structure in the structure in the structure is a structure in the structure in the structure is a structure in the structure in the structure in the structure is a structure in the str				
Vertical Offset 1 0.0 52.0000 47.70000 -3.30000 6.822 0.80000 52.30000 48.50000 -3.30000 6.822 1.6000 52.30000 49.30000 -3.30000 6.822 2.4000 52.30000 50.10000 -3.30000 6.822 3.2000 52.30000 50.90000 -3.30000 6.825	250 250 250			
<b>x y z z</b> [m] [m] [m] [m] [mm]				
1.8608 54.15000 51.10000 -3.30000 3.2 3.7216 56.0000 51.30000 -3.30000 1.1 5.5823 57.85000 51.50000 -3.30000 0.15 7.4431 59.70000 51.70000 -3.30000 9.3039 61.55000 51.90000 -3.30000 11.155 63.40000 52.10000 -3.30000	0.0 0.0 0.0 0.0			
Structure: S   Sub-structure: Sub #           Dist.         Coordinates         I           [m]         [m]         [m]         [m]         [m]           [m]         [m]         [m]         [m]         [m]           Vertical Offset 1         0.0 67.10000 52.50000 -3.30000 0.0044         0.044	1			
1.8781 67.36000 50.64000 -3.30000 3.7562 67.62000 48.78000 -3.30000 5.6343 67.88000 46.92000 -3.30000 7.5123 68.14000 45.06000 -3.30000 9.3904 68.40000 43.20000 -3.30000	8024 0.0 0.0 0.0 0.0 0.0			
Structure: T   Sub-structure: Dist. Coordinates Di x y z z	Displacements			

$\bigcap$	GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL & ENV ASSO	<b>C)</b> J15193A		
19–21 High Holborn, Lond		Drg. Ref.		
Wall Installation and Excav			Date 06-Nov-2015	Checked
[m] [m] [m] [m] [mm Vertical Offset 1	m]			
0.0 68.40000 43.20000 -3.30000 0. 0.91411 69.30000 43.36000 -3.30000 0. 1.8282 70.20000 43.52000 -3.30000 0. 2.7423 71.10000 43.68000 -3.30000 0. 4.5706 72.90000 43.084000 -3.30000 0.	.0 .0 .0 .0			
Structure: U   Sub-structure: Dist. Coordinates	Displacements			
	2			
1.9362 90.90000 56.72727 -3.30000 3.8724 89.00000 56.735455 -3.30000 5.8086 87.10000 55.98182 -3.30000 7.7449 85.20000 55.60909 -3.30000	0.0 0.0 0.0			
9.6811 83.30000 55.23636 -3.30000 11.617 81.40000 54.86364 -3.30000 13.553 79.50000 54.49091 -3.30000 0.00 15.490 77.60000 54.11818 -3.30000 0.00	092878			
17.426 75.70000 53.74545 -3.30000 0.0 19.362 73.80000 53.37273 -3.30000 0.0 21.298 71.90000 53.00000 -3.30000 0.0	016071			
Structure: V   Sub-structure: Dist. Coordinates				
[m] [m] [m] [m] [m] Vertical Offset 1 0.0 71.9000 53.00000 -3.30000 0.01 1.8346 72.08750 51.17500 -3.30000	nm] 14110 0.0			
1.6540 72.05750 31.1500 -3.30000 5.5038 72.46250 47.52500 -3.30000 7.3384 72.65000 45.70000 -3.30000 9.1730 72.83750 43.87500 -3.30000	0.0 0.0 0.0 0.0			
11.008 73.02500 42.05000 -3.30000 12.842 73.21250 40.22500 -3.30000 14.677 73.40000 38.40000 -3.30000	0.0 0.0 0.0			
	Displacements			
x y z z [m] [m] [m] [m] [mm] Vertical Offset 1				
0.0 73.40000 38.40000 -3.30000 0.0 1.7815 73.73333 36.55000 -3.30000 0.0 3.5629 74.06667 34.90000 -3.30000 0.0 5.3444 74.40000 33.15000 -3.30000 0.0 7.1259 74.73333 1.40000 -3.30000 0.0	0 0 0			
8.9073 75.06667 29.65000 -3.30000 0.0 10.689 75.40000 27.90000 -3.30000 0.0	0			
x y z z	Displacements			
[m] [m] [m] [m] [mm] Vertical Offset 1 0.0 75.40000 27.90000 -3.30000 0.0	0			
1.7644 75.17500 26.15000 -3.30000 0.0 3.5288 74.95000 24.40000 -3.30000 0.0 5.2932 74.72500 22.65000 -3.30000 0.0 7.0576 74.50000 20.90000 -3.30000 0.0 8.8220 74.27500 19.15000 -3.30000 0.0	0 0 0			
10.586 74.0500 17.4000 -3.3000 0.0 12.351 73.82500 15.65000 -3.3000 0.0 14.115 73.60000 13.90000 -3.30000 0.0	0			
	Displacements			
x         y         z         z           [m]         [m]         [m]         [m]         [mm]           Vertical Offset 1         0         0         0         0				
0.0 73.60000 13.90000 -3.30000 0.0 1.8742 71.74000 14.13000 -3.30000 0.0 3.7483 69.88000 14.36000 -3.30000 0.0 5.6225 68.02000 14.59000 -3.30000 0.0 7.4967 66.16000 14.82000 -3.30000 0.0	0 0 0			
9.3708 64.30000 15.05000 -3.30000 0.0 11.245 62.44000 15.28000 -3.30000 0.0 13.119 60.58000 15.51000 -3.30000 0.0 14.993 58.72000 15.74000 -3.30000 0.0	0 0 0			
16.867 56.86000 15.97000 -3.30000 0.0 18.742 55.00000 16.20000 -3.30000 0.0				
Structure: Z   Sub-structure: Dist. Coordinates X Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	Displacements z m]			
[m] [m] [m] [m] [m] Vertical Offset 1 0.0 93.80000 65.10000 -3.30000 1.9616 91.86364 64.78636 -3.30000	0.0 0.0			
3.9232 89.92727 64.47273 -3.30000 5.8848 87.99091 64.15909 -3.30000 7.8464 86.05455 63.84545 -3.30000 9.8080 84.11818 63.53182 -3.30000	0.0 0.0 0.0 0.0			
11.770 82.18182 63.21818 -3.30000 13.731 80.24545 62.90455 -3.30000 15.693 78.30909 62.59091 -3.30000 17.654 76.37273 62.27727 -3.30000 0.04	0.0 0.0 0.0 1938			
19.616 74.43636 61.96364 -3.30000 0.08 21.578 72.50000 61.65000 -3.30000 0.1 23.539 70.56364 61.33636 -3.30000 0.1 25.501 68.62727 61.02273 -3.30000 0.2	89267 14086 19779 26147			
29.424 64.75455 60.39545 -3.30000 0.4 31.386 62.81818 60.08182 -3.30000 0.5 33.347 60.88182 59.76818 -3.30000 0.6	33391 41789 51750 63879			
37.270         57.00909         59.14091         -3.30000         0.9           39.232         55.07273         58.82727         -3.30000         1.           41.194         53.13636         58.51364         -3.30000         2.	79103 98860 4.247 .2519 .4487			
43.155 51.20000 58.20000 -3.30000 -3.				
Dist. Coordinates x y z z	Displacements			

$\bigcap$	GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL & ENV ASSO	С)J15193A		
19–21 High Holborn, Londo	n, WC1V 6BS	Drg. Ref.		
Wall Installation and Excavat	tion issue 2		Date 06-Nov-2015	Checked
[m] [m] [m] [m] [mm] Vertical Offset 1				
0.0 40.80000 55.60000 -3.30000 10.212 1.7892 42.5667 55.88333 -3.30000 9.6208 3.5785 44.3333 56.16667 -3.30000 9.692 5.3677 46.10000 56.45000 -3.30000 8.5555 7.1570 47.86667 56.73333 -3.30000 8.0782 8.9462 49.6333 57.01667 -3.30000 7.6360 10.735 51.40000 57.30000 -3.30000 3.8049				
Structure:         AB         Sub-structure:           Dist.         Coordinates         Dist.           X         Y         Z           [m]         [m]         [m]         [m]	splacements			
Vertical Offset 1 0 051.4000 57.3000 -3.3000 3.8049 1.9214 51.11429 59.2000 -3.3000 3.0527 3.8427 50.82857 61.1000 -3.3000 2.6548 5.7641 50.54286 63.0000 -3.3000 2.6548 5.7641 50.54286 63.0000 -3.3000 2.3002 9.6088 49.97143 66.8000 -3.3000 2.3000 11.528 49.6571 66.7000 -3.3000 2.3600 13.450 49.40000 70.60000 -3.30000 2.3600				
Structure: AC   Sub-structure: Dist. Coordinates Di x y z z [m] [m] [m] [m] [m] [mm]	isplacements			
Vertical Offset 1 0.0 49.40000 70.60000 -3.30000 2.3600 0.99381 48.42222 70.42222 -3.30000 2.3956 1.9876 47.44444 70.24444 -3.30000 2.4311 2.9814 46.46667 70.06667 -3.30000 2.4567 3.9752 45.48889 59.88889 -3.30000 2.502 4.9590 44.51111 69.71111 -3.30000 2.573 5.9562 43.53333 69.53333 -3.30000 2.573 5.9565 41.55778 69.17778 -3.30000 2.6444 8.9443 40.60000 69.0000 -3.30000 2.6444	5 7 2 3 3 9 4			
<b>x y z z</b> [m] [m] [m] [m] [mm]	splacements			
Vertical Offset 1 0.0 40.60000 69.00000 -3.30000 2.6800 1.9145 40.62857 67.08571 -3.30000 3.0629 3.8290 40.65714 65.17143 -3.30000 3.4457 5.7435 40.68571 63.25714 -3.30000 3.8286 7.6580 40.71429 61.34286 -3.30000 4.2278 9.5725 40.71429 65.42867 -3.30000 5.0900 11.487 40.77143 57.51429 -3.30000 6.9398 13.401 40.80000 55.60000 -3.30000 10.212				
Structure: λE         Sub-structure:           Dist.         Coordinates         Di           X         Y         Z         Z           [m]         [m]         [m]         [m]           Vertical Offset 1         1         1	isplacements			
0.0 32.60000 55.10000 -3.30000 2.7627 0.95296 33.55000 55.17500 -3.30000 2.9956 1.9059 34.5000 55.25000 -3.30000 3.2994 2.8589 35.45000 55.32500 -3.30000 3.6316 3.8118 36.40000 55.40000 -3.30000 3.9502	5 1 5			
Structure: AF   Sub-structure: Sub #           Dist.         Coordinates         Dist.           X         Y         Z         Z           [m]         [m]         [m]         [mm]	splacements			
Vertical Offset 1 0.036.40000 55.40000 -3.30000 3.9502 1.8306 36.31429 57.22857 -3.30000 3.1476 3.6612 36.22857 59.05714 -3.30000 2.6503 5.4917 36.14286 60.88571 -3.30000 2.4026 7.3223 36.05714 62.71429 -3.30000 2.2518 9.1529 35.97143 64.54286 -3.30000 2.0763 10.983 35.88571 66.37143 -3.30000 1.8644 12.814 35.80000 68.20000 -3.30000 1.6824				
Structure: AG         Sub-structure: Sub #           Dist.         Coordinates         Dist           x         y         z         z           [m]         [m]         [m]         [m]         [mm]	splacements			
Vertical Offset 1 0.0 35.80000 68.20000 -3.30000 1.6824 1.9105 33.92000 67.86000 -3.30000 1.5843 3.8210 32.04000 67.52000 -3.30000 1.379 7.6420 28.28000 66.84000 -3.30000 1.3279 7.6420 28.28000 66.84000 -3.30000 1.2000 9.5525 26.40000 66.50000 -3.30000 1.0578				
<b>x y z z</b> [m] [m] [m] [m] [mm]	isplacements			
Vertical Offset 1 0.0 26.40000 66.50000 -3.30000 1.057 0.89233 26.57800 65.62500 -3.30000 1.1244 1.7847 26.75000 64.75000 -3.30000 1.2122 2.6770 26.92500 63.87500 -3.30000 1.3012 3.6593 27.10000 63.00000 -3.30000 1.3924 4.6616 27.27500 62.12500 -3.30000 1.85792 6.2463 27.45000 61.25000 -3.30000 1.5792 5.2463 27.65200 60.37500 -3.30000 1.7732 7.1386 27.80000 59.50000 -3.30000 1.7732	4 2 5 4 9 2 3			
Structure: AI   Sub-structure: Sub #           Dist.         Coordinates         Di           x         y         z         z           [m]         [m]         [m]         [m]         [mm]	isplacements			
Vertical Offset 1 0.0 27.80000 59.50000 -3.30000 1.773 0.84214 28.64000 59.56000 -3.30000 1.8236 1.6843 29.48000 59.62000 -3.30000 1.8665	5			

$\bigcap$	GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL & ENV ASSO	С)J15193A		
<b>19–21 High Holborn, London</b> Wall Installation and Excavation		Drg. Ref.		4
Wall Installation and Excavation	on issue 2	Made by Da	te Che -Nov-2015	cked
Dist.         Coordinates         Disp           x         y         z         z           [m]         [m]         [m]         [mm]	placements			
2.5264 30.32000 59.68000 -3.30000 1.9022 3.3686 31.16000 59.74000 -3.30000 1.9285				
4.2107 32.00000 59.80000 -3.30000 1.9447 Structure: AJ   Sub-structure: Sub #				
Dist. Coordinates Dis x y z z [m] [m] [m] [m] [mm]	placements			
Vertical Offset 1 0.0 32.00000 59.80000 -3.30000 1.9447 0.94763 32.12000 58.86000 -3.30000 2.0683				
1.8953 32.24000 57.92000 -3.30000 2.1991 2.8429 32.36000 56.98000 -3.30000 2.3516 3.7905 32.48000 56.04000 -3.30000 2.5408 4.7381 32.60000 55.10000 -3.30000 2.7627				
Structure: AK   Sub-structure:				
Dist.         Coordinates         Disp.           x         y         z         z           [m]         [m]         [m]         [mm]	placements			
Vertical Offset 1 0.0 27.80000 59.50000 -3.30000 1.7732 0.96258 27.78750 58.53750 -3.30000 1.8670				
1,9252 27.77500 57.57500 -3.30000 1,9598 2.8877 27.76250 56.61250 -3.30000 2.0504 3.8503 27.75000 55.65000 -3.30000 2.1375 4.8129 27.73750 54.68750 -3.30000 2.2198				
5.7755 27.72500 53.72500 -3.30000 2.2956 6.7381 27.71250 52.76250 -3.30000 2.3632 7.7006 27.70000 51.80000 -3.30000 3.3650				
Structure: AL   Sub-structure: Sub #	lacements			
x         y         z         z           [m]         [m]         [m]         [m]         [m]           Vertical Offset 1         1         1         1				
0.0 27.70000 51.80000 -3.30000 3.3650 1.8447 27.86250 49.96250 -3.30000 2.8003 3.6893 28.02500 48.12500 -3.30000 2.2356				
5.5340 28.18750 46.28750 -3.30000 1.6709 7.3787 28.35000 44.45000 -3.30000 1.1063 9.2234 28.51250 42.61250 -3.30000 0.54156 11.068 28.67500 40.77500 -3.30000 0.0				
12.913 28.83750 38.93750 -3.30000 0.0 14.757 29.00000 37.10000 -3.30000 0.0				
x y z z	acements			
[m] [m] [m] [m] [mm] Vertical Offset 1 0.0 29.00000 37.10000 -3.30000 0.0				
1.9157 28.75556 35.20000 -3.30000 0.0 3.8313 28.51111 33.30000 -3.30000 0.0 5.7470 28.26667 31.40000 -3.30000 0.0 7.6626 28.02222 29.50000 -3.30000 0.0				
9.5783 27.77778 27.60000 -3.30000 0.0 11.494 27.53333 25.70000 -3.30000 0.0 13.410 27.28889 23.80000 -3.30000 0.0 15.325 27.04444 21.90000 -3.30000 0.0				
17.241 26.80000 20.00000 -3.30000 0.0 Structure: AN   Sub-structure:				
Dist. Coordinates Displax y z z	acements			
Vertical Offset 1 0.0 26.80000 20.00000 -3.30000 0.0				
1.8508 28.64000 19.80000 -3.30000 0.0 3.7017 30.48000 19.60000 -3.30000 0.0 5.5525 23.23200 19.40000 -3.30000 0.0 7.4034 34.16000 19.20000 -3.30000 0.0				
9.2542 36.00000 19.00000 -3.30000 0.0 Structure: AO   Sub-structure:				
Dist.         Coordinates         Disp.           x         y         z         z           [m]         [m]         [m]         [m]	lacements			
Vertical Offset 1 0.0 36.00000 19.00000 -3.30000 0.0 4.0447 36.04444 23.04444 -3.30000 0.0				
8.0894 36.08889 27.08889 -3.30000 0.0 12.134 36.13333 31.13333 -3.30000 0.0 16.179 36.17778 35.17778 -3.30000 0.83327 20.223 36.2222 39.22222 -3.30000 3.2299				
24.268 36.26667 43.26667 -3.30000 6.3556 28.313 36.31111 47.31111 -3.30000 7.7569 32.358 36.35556 51.35556 -3.30000 9.1591 36.402 36.40000 55.40000 -3.30000 3.9502				
Structure: AP   Sub-structure:				
Dist.         Coordinates         Display           x         y         z         z           [m]         [m]         [m]         [mm]	acements			
Vertical Offset 1 0.0 26.70000 20.00000 -3.30000 0.0 1.9443 24.76250 20.16250 -3.30000 0.0				
3.8886 22.82500 20.32500 -3.30000 0.0 5.8329 20.88750 20.48750 -3.30000 0.0 7.7772 18.95000 20.65000 -3.30000 0.0 9.7215 17.01250 20.81250 -3.30000 0.0				
11.666 15.07500 20.97500 -3.30000 0.0 13.610 13.13750 21.13750 -3.30000 0.0 15.554 11.20000 21.30000 -3.30000 0.0				
Structure: AQ   Sub-structure: Sub # Dist. Coordinates Displa	acements			
x y z z [m] [m] [m] [m] [mm] Vertical Offset 1				
0.0         01.20000         21.30000         -3.30000         0.0           1.9556         11.29333         23.25333         -3.30000         0.0           3.9111         11.38667         25.20667         -3.30000         0.0           5.8667         11.48000         27.16000         -3.30000         0.0				
5.8667 11.48000 27.16000 -3.30000 0.0 7.8222 11.57333 29.11333 -3.30000 0.0				

$\bigcap$	GEA LIMITED		Job No.	Sheet No.	Rev.
Oasys	(GEOTECHNICAL	&ENV ASSO	С)J15193A		
19–21 High Holborn, London			Drg. Ref.		
Wall Installation and Excavation	on Issue 2		Made by	Date	Checked
Dist. Coordinates Displa	acements			06-Nov-2015	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $					
Structure: AR   Sub-structure: Sub #           Dist.         Coordinates         Disp.           x         y         z         z           [m]         [m]         [m]         [m]	lacements				
Vertical Offset 1         0.0         12.60000         50.60000         -3.30000         0.0           1.9059         14.50000         50.75500         -3.30000         0.38375           3.8118         16.40000         50.90000         -3.30000         0.38255           5.7177         18.30000         51.05000         -3.30000         1.2413           7.6236         20.20000         51.20500         -3.30000         1.6700           9.5296         22.10000         51.50500         -3.30000         2.5828           13.341         25.90000         51.65000         -3.30000         2.5275           13.341         25.90000         51.8000         -3.30000         3.3850					
Specific Building Damage Results - All Segments	s				
from Line for Vertical Movement Calculations [m] [m] [m]	th Curvature Deflection Average Max. Ratio Horisontal Tensil Strain Strain [%] [%] [%] han the Settlement Trough Limit Sensitivit ssive horizontal strains are -ve.	Horizontal Vertical Displacement Displacement Curve Curve	Min. Damage Radius of Category Curvature [m]		
from Line for	ch Curvature Deflection Average Max. Ratio Horizontal Tensil		Min. Damage Radius of Category		
Vertical Movement Calculations [m] [m] 0.0 All settlements are less th Tensile horizontal strains are +ve, compres	Strain Strain [%] [%] [%] nan the Settlement Trough Limit Sensitivit ssive horizontal strains are -ve.	Displacement Displacement Curve Curve	[m]		
Structure: C   Sub-structure: Sub #					
Vertical Offset         Segment         Start         Leng           from Line for         Vertical         Movement         Calculations         [m]         [m]	Strain Strai	le Gradient of Gradient of n Horizontal Vertical Displacement Displacement Curve Curve	[m] 8688.7 0		
Tensile horizontal strains are +ve, compres	ssive horizontal strains are -ve.		(Negligible)		
from Line for Vertical Movement Calculations [m] [m] [m]	ch Curvature Deflection Average Max. Ratio Horizontal Tensile Strain [%] [%] [%] [%] 00 Hogging 0.030341 0.0 0.03029	Displacement Displacement Curve Curve			
Tensile horizontal strains are +ve, compres	ssive horizontal strains are -ve.		(Regrigible)		
from Line for Vertical Movement Calculations [m] [m] [m] 0.0 1 0.0 1.395	Strain         Strain           [%]         [%]           30 None         0.0         0.0	Gradient of Gradient of Ra Horizontal Vertical Cu Displacement Displacement Curve Curve			
Tensile horizontal strains are +ve, compres	ssive horizontal strains are -ve.				
from Line for Vertical Movement Calculations [m] [m] [m]	<b>Strain Strain</b> [%] [%] [%]	Gradient of Gradient of Ra Horizontal Vertical Cu Displacement Displacement Curve Curve	[m]		
0.0 1 0.0 1.900 Tensile horizontal strains are +ve, compres	00 None 0.0 0.0 0.0	0.0 910.22E-6	3043.0 0 (Negligible)		
	ch Curvature Deflection Average Max.	Maximum Maximum	Min. Damage		
from Line for Vertical Movement Calculations [m] [m] [m]	Ratio Horizontal Tensil Strain Strain [%] [%] [%]	Horizontal Vertical Displacement Displacement Curve Curve	[m]		
	00 Hogging 18.245E-6 0.0 18.203E	2-6 0.0 -59.901E-6			
Structure: H   Sub-structure: Sub #					
from Line for Vertical Movement Calculations	ch Curvature Deflection Average Max. Ratio Horizontal Tensil Strain Strain		Curvature		
[m] [m] [m] 0.0 1 0.0 1.403		0.0 0.0019779	[m] 2058.5 (Negligible)		
Tensile horizontal strains are +ve, compres	HEINE NOTIZONTAL STRAINS ARE -VE.				

GEA LIMITED	Job No.	Sheet No.	Rev.
Oasys (Geotechnical & Env ass	OC)J15193A		
19–21 High Holborn, London, WC1V 6BS	Drg. Ref.		
Wall Installation and Excavation Issue 2	Made by	Date 06-Nov-2015	Checked
2 5.7338 2.8662 Sagging 0.10773 0.0 0.10745 0.0 0.0048	of Radius of Category l Curvature [m] E-6 10.5265+6 0 (Negligible)		
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.			
Vertical Offset Segment Start Length Curvature Deflection Average Max. Maximum Maximum from Line for Ratio Horizontal Tensile Gradient of Gradient of Vertical Strain Strain Horizontal Vertical Movement Calculations Curve Curve	Curvature		
[m]         [m]         [m]         [%]         [%]         [%]           0.0         1         0.03         3.0000 Sagging         0.10299         0.0         0.10269         0.0         -0.004634           2         3.0000         4.9990 None         0.0         0.0         0.0         0.0           Tensile horizontal strains are +ve, compressive horizontal strains are -ve.         -ve.         -ve.         -ve.	[m] 6 172.62 2 (Slight) 0 - 0 (Negligible)		
	Curvature		
Movement         Displacement         Displacement         Displacement           Calculations         Curve         Curve         Curve         Curve           [m]         [m]         [%]         [%]         [%]         0.0         0.00	[m]		
Structure: L   Sub-structure: Sub # Vertical Offset Segment Start Length Curvature Deflection Average Max. Maximum Maximum from Line for Ratio Horizontal Tensile Gradient of Gradient of Vertical Strain Strain Horizontal Vertical	Curvature		
Movement         Displacement	nt [m] -6 4.1113E+6 0 (Negligible)		
Structure: M   Sub-structure: Sub # Vertical Offset Segment Start Length Curvature Deflection Average Max. Maximum Maximum from Line for Ratio Horizontal Tensile Gradient of Gradient of Vertical Strain Strain Horizontal Vertical	Min. Damage Radius of Category Curvature		
Movement         Displacement Displace	[m]		
Structure: N   Sub-structure: Sub #         Vertical Offset       Segment       Start Length Curvature Deflection       Average       Max.       Maximum       Maximum         from Line for       Ratio       Horizontal       Tensile       Gradient of       Gradient of         Wertical       Strain       Strain       Strain       Horizontal       Displacement         Calculations       [m]       [%]       [%]       Curve       Curve         [m]       [%]       [%]       [%]       [%]       Curve       Curve         [m]       [%	Curvature		
Novement Displacement Displacement Calculations Curve Curve	Curvature		
[m]         [m]         [m]         [%]         [%]         [%]           0.0         1         2.8082         0.93475         None         0.0         0.0         0.0         -175.45E           Tensile horizontal strains are +ve, compressive horizontal strains are -ve.	[m] -6 14302. 0 (Negligible)		
Movement Displacement Displacement	Curvature		
Calculations         Curve         Curve         Curve           [m]         [m]         [m]         [%]	[m] 1 1923.2 0 (Negligible)		
Structure: Q   Sub-structure: Sub # Vertical Offset Segment Start Length Curvature Deflection Average Max. Maximum Maximum from Line for Ratio Horizontal Tensile Gradient of Gradient Vertical Strain Horizontal Vertica	of Radius of Category		
Movement Calculations         Displacement Displacem Curve         Displacement D	[m] 0.0 2.9515E+18 0 0.0 1.4854E+18 0 (Negligible) 0.0 2.9719E+18 0		
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.	(Negligible)		
	Curvature		
Movement         Displacement	[m]		
Structure: S   Sub-structure: Sub # Vertical Offset Segment Start Length Curvature Deflection Average Max. Maximum Maximum from Line for Ratio Horizontal Tensile Gradient of Gradient of Vertical Strain Strain Horizontal Vertical	Min. Damage f Radius of Category Curvature		

$\bigcap$	GEA L	IMITED			Job N	о.	Sheet No.	Rev.
Oasy	S <sub>(GEOT</sub>	ECHNICAL	&ENV	ASSO	C)J1:	5193A		
19–21 High Holbori	n, London, WC1V 6B	S			Drg.	Ref.		
Wall Installation and	Excavation Issue 2				Made		ate	Checked
						0	6-Nov-2015	
Movement			Displacement					
Tensile horizontal strains a	ents are less than the Settlemer are +ve, compressive horizontal		Curve Y.	Curve	[m]			
Structure: T   Sub-structure Vertical Offset Segment from Line for Vertical Movement	Start Length Curvature Defl	lection Average Max. atio Horizontal Tensile Strain Strain	Maximum e Gradient of Horizontal Displacement	Vertical	Radius of C	Damage Category		
Calculations [m] 0.0 All settleme	[m] [m] ents are less than the Settlemer are +ve, compressive horizontal	[%] [%] [%] nt Trough Limit Sensitivity	Curve	Curve	[m]			
Structure: U   Sub-structure		strains are -ve.						
Vertical Offset Segment from Line for Vertical Movement	Start Length Curvature Defl Ra	lection Average Max. atio Horizontal Tensile Strain Strain	Maximum e Gradient of Horizontal Displacement	Vertical		Damage Category		
Calculations [m] 0.0 All settleme Tensile horizontal strains a	[m] [m] ents are less than the Settlemer are +ve, compressive horizontal	[%] [%] [%] ht Trough Limit Sensitivity strains are -ve.	Curve	Curve	[m]			
Structure: V   Sub-structure	2: Start Length Curvature Defl	lection Average Max.	Maximum	Maximum	Min.	Damage		
from Line for Vertical Movement Calculations		atio Horizontal Tensile Strain Strain		Gradient of Vertical Displacement Curve		Category		
[m] 0.0 All settleme Tensile horizontal strains a	[m] [m]   ents are less than the Settlemer are +ve, compressive horizontal	<pre>[%] [%] [%] ht Trough Limit Sensitivity strains are -ve.</pre>	γ.		[m]			
Structure: W   Sub-structure Vertical Offset Segment	2: Start Length Curvature Defl	lection Average Max.	Maximum	Maximum		Damage		
from Line for Vertical Movement Calculations		atio Horizontal Tensile Strain Strain	e Gradient of Horizontal Displacement Curve	Vertical	Curvature	Category		
	[m] [m]   ents are less than the Settlemer are +ve, compressive horizontal		Υ.		[m]			
Structure: X   Sub-structure Vertical Offset Segment	2: Start Length Curvature Defl	lection Average Max.	Maximum	Maximum	Min.	Damage		
from Line for Vertical Movement Calculations		atio Horizontal Tensile Strain Strain			Radius of C Curvature	Category		
	[m] [m]   ents are less than the Settlemer are +ve, compressive horizontal		Υ.		[m]			
Structure: Y   Sub-structure Vertical Offset Segment	Start Length Curvature Defl		Maximum	Maximum	Min.	Damage		
from Line for Vertical Movement Calculations	Re	atio Horizontal Tensile Strain Strain		Gradient of Vertical Displacement Curve		Category		
	[m] [m] [ ents are less than the Settlemer are +ve, compressive horizontal		γ.		[m]			
Structure: Z   Sub-structure	start Length Curvature Def	Election Average Max.	Maximum	Maximum	Min.	Damage		
from Line for Vertical Movement Calculations		Ratio Horizontal Tensil Strain Strain	n Horizontal		Radius of Curvature	Category		
[m] 0.0	[m] [m] 1 21.578 21.576 Hogging 0. are +ve, compressive horizontal	[%] [%] [%] .0072182 0.0035033 0.00855				0 (Negligible)		
Structure: AA   Sub-structur		beruinb are ve.						
Vertical Offset Segment from Line for Vertical Movement	Start Length Curvature Def I	Election Average Max. Ratio Horizontal Tensil Strain Strain	n Horizontal Displacement	Vertical Displacement	Curvature	Damage Category		
Calculations [m] 0.0	1 0.0 5.4438 Hogging 74	[%] [%] [%] 42.36E-6 945.92E-6 0.00130				0 (Negligible)		
Tensile horizontal strains a	2 5.4438 5.2902 Sagging ( are +ve, compressive horizontal	0.041809 -0.0036759 0.0396 strains are -ve.	608 126.60E-6	0.0021415	753.80	0 (Negligible)		
Structure: AB   Sub-structur	Start Length Curvature De			Maximum	Min.	Damage		
from Line for Vertical Movement Calculations		Ratio Horizontal Tensil Strain Strai	le Gradient of in Horizontal	Gradient of Vertical Displacement Curve	Curvature			
[m] 0.0		[%] [%] [%] [%] 0.0071026 0.0067969 0.0108 0.012943 0.0099415 0.0183	858 -130.84E-6	-423.63E-6		0 (Negligible)		
Tanaila kautanta ini i	3 12.489 0.96040 Sagging	0.0 0.018750 0.0187				0 (Negligible) 0 (Negligible)		
Tensile horizontal strains a Structure: AC   Sub-structur	are +ve, compressive horizontal	strains are -ve.						
Vertical Offset Segment from Line for Vertical	Start Length Curvature Def	Election Average Max. Ratio Horizontal Tensil Strain Strain	n Horizontal	Vertical	Curvature	Damage Category		
Movement Calculations [m] 0.0		[%] [%] [%] 0.0 607.25E-6 607.22E	Displacement Curve	: Displacement Curve	[m] 453.02E+9	9 0		
0.0	2 6.9567 0.0 None	0.0 617.80E-6 617.80F	E-6 -6.2055E-6	5 -35.777E-6	9.2853E+18	(Negligible) 0 (Negligible)		
	3 6.9567 1.9863 Sagging	0.0 622.39E-6 622.38	E-6 -6.2422E-6	-35.777E-6	170.57E+9	(Negligible)		

Vertical Offset from Line for Vertical Movement Tensile horizontal Structure: AD   Suft Vertical from Line for Vertical Movement Calculations [] 0.0	Segment strains are	London, WC1V Excavation Issue	2 e Deflection	INIC	AL 8	ENV.	ASSO	C)J1				
Vall Installation	Segment strains are b-structure:	Excavation Issue	2 e Deflection					Drg.	Ref.			
from Line for Vertical Movement Tensile horizontal Structure: AD   Sub Zertical Offset from Line for Vertical Movement Calculations [m] 0.0	strains are b-structure:											
from Line for Vertical Movement Tensile horizontal Structure: AD   Sub Zertical Offset from Line for Vertical Movement Calculations [m] 0.0	strains are b-structure:							Made	by	Date 06-Nov-2015	Checked	t:
Vertical Offset from Line for Vertical Movement Calculations [m] 0.0		e +ve, compressive horizo		orizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement	Maximum Gradient of Vertical Displacement	Curvature	Damage Category			
from Line for Vertical Movement Calculations [m] 0.0	Segment											
[m] 0.0	pegment	Start Length Curvature			Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical		Damage Category			
Tensile horizontal		[m] [m] 1 0.0 1.9177 Sagging 2 1.9177 11.482 Hogging		[%] 0.020270 ( 0.028599 (		-219.51E-6 -366.11E-6	-199.94E-6 -0.0017084	2395.3	0 (Negligible) 0 (Negligible)			
	strains are	+ve, compressive horizon	ntal strains an	re -ve.								
Structure: AE   Sub												
Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start Length Curvature		Average forizontal Strain [%]	Max. Tensile Strain	Horizontal	Maximum Gradient of Vertical Displacement Curve	Curvature	Damage Category			
0.0		1 0.0 2.7408 Hogging	0.0019878 -	54.600E-6 (	0.0019636			5 12574.	0 (Negligible)			
Tensile horizontal		2 2.7408 1.0702 Sagging +ve, compressive horizon	194.08E-6 ·		u.UU32933	176.65E-6	-354.19E-6	5 27241.	(Negligible)			
Structure: AF   Sub												
Vertical Offset from Line for Vertical Movement	Segment	Start Length Curvature		Average orizontal Strain	Max. Tensile Strain		Vertical Displacement	Curvature	Damage Category			
Calculations [m] 0.0		[m] [m] 1 0.0 8.0446 Hogging	[%] 0.0059991 (	[%] 0.0034120 (	[%] 0.0076410	Curve -112.77E-6	Curve 438.48E-6	[m] 5 9810.9	0			
		2 8.0446 4.7684 Sagging	218.88E-6	0.011337					(Negligible) 0 (Negligible)			
Fensile horizontal	strains are	e +ve, compressive horizon	ntal strains an	re -ve.								
Structure: AG   Sub												
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start Length Curvature	Ratio Hor	rizontal : Strain :	Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical	Curvature	Damage Category			
[m] 0.0		[m] [m] 1 0.0 9.5510 Sagging	[%] 365.82E-6 -0	[%] .0010077 29	[%] 92.65E-6	36.003E-6	74.450E-6		0 (Negligible)			
Tensile horizontal	strains are	+ve, compressive horizon	ntal strains an	re -ve.								
Structure: AH   Sub	b-structure:	Sub #										
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start Length Curvature	Ratio Hor	rizontal Strain S	Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical		Damage Category			
[m] 0.0		[m] [m] 1 0.0 7.1380 Hogging	[%] 344.09E-6 0	[%] .0051456 0	[%] .0052427	-60.688E-6	-109.69E-6	[m] 30605.	0 (Negligible)			
Tensile horizontal	strains are	+ve, compressive horizon	ntal strains an	re -ve.					(ACG1191010)			
Structure: AI   Sub	b-structure:	Sub #										
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start Length Curvature	Ratio Hor	rizontal : Strain :	Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical	Curvature	Damage Category			
[m] 0.0 Tensile horizontal		<pre>[m] [m] 1 0.0 4.2100 Sagging e +ve, compressive horizon</pre>	[%] 620.37E-6 0 ntal strains an		[%] .0020113	-44.827E-6	-59.782E-6	[m] 67602.	0 (Negligible)			
Structure: AJ   Sub	b-structure:											
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start Length Curvature	Ratio Hon	rizontal Strain S	Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical	Curvature	Damage Category			
[m] 0.0		[m] [m] 1 0.0 4.7370 Hogging	0.0017646 -93		[%] .0014717	87.445E-6	-234.12E-6	[m] 26679.	0 (Negligible)			
Tensile horizontal	strains are	+ve, compressive horizon	ntal strains an	re -ve.								
Structure: AK   Sub Vertical Offset from Line for Vertical	b-structure: Segment	Start Length Curvature	e Deflection J Ratio Ho	orizontal	Max. Tensile Strain	Maximum Gradient of Horizontal	Maximum Gradient of Vertical	Min. Radius of Curvature	Damage Category			
Movement Calculations [m]		[m] [m]	[%]	[%]	[%]	Displacement Curve	Displacement Curve	: [m]				
0.0		1 0.0 4.8396 Sagging 2 4.8396 2.8604 Hogging	194.30E-6 -( 0.021378 -(	0.0047502 9	956.33E-6			5 143170.	(Negligible)			
Tensile horizontal		2 4.8396 2.8604 Hogging +ve, compressive horizon			5.510594	103.335-0	0.0010408	. //1.01	(Negligible)			
Structure: AL   Sub	b-structure.	Sub #										
Vertical Offset from Line for Vertical Movement	Segment	Start Length Curvature	Ratio Hor	rizontal ?	Strain	Maximum Gradient of Horizontal Displacement	Vertical Displacement		Damage Category			
Calculations [m] 0.0		[m] [m] 1 0.0 9.2234 Hogging	[%] 0.0 -0	[%] .0017803 39	[%] 56.02E-6	Curve 20.871E-6	Curve 306.12E-6	[m] 23155.	0			
Fensile horizontal		+ve, compressive horizon							(Negligible)			
Structure: AM   Sub	b-structure:	Sub #										
Vertical Offset from Line for Vertical	Segment	Start Length Curvature	Ratio Hor	rizontal ?	Strain	Maximum Gradient of Horizontal Displacement	Vertical Displacement	Min. Radius of ( Curvature	Damage Category			
Movement Calculations		[m] [m]	[%]	[%]	[%]	Curve	Curve	[m]				

GE GE	EA LIMITED	Job No.	Sheet No.	Rev.
OUSYS <sub>(GI</sub>	EOTECHNICAL &ENV AS	<b>SOC)</b> J15193A		
<b>19–21 High Holborn, London, WC</b> Wall Installation and Excavation Iss		Drg. Ref.		
		Made by	Date 06-Nov-2015	Checked
Vertical Offset Segment Start Length Curva from Line for Vertical Movement		nt of Radius of Category ical Curvature		
	ture Deflection Average Max. Maximum Maxi			
from Line for Vertical Movement Calculations [m] [m] [m]	Ratio Horizontal Tensile Gradient of Gradie Strain Strain Horizontal Vert Displacement Displa Curve Cur [%] [%] [%]	ical Curvature cement		
	Settlement Trough Limit Sensitivity.			
	Ratio Horizontal Tensile Gradient of Gradi Strain Strain Horizontal Ver Displacement Displ	tical Curvature		
[m] [m] [m] 0.0 1 16.179 5.3510 Hogg 2 21.530 14.871 Sagg	[%] [%] [%] ing 0.0033030 22.212E-6 0.0032862 -8.5477E-6 -77 ing 0.034461 -0.0096791 0.031803 358.91E-6 0.	[m] 2.80E-6 13955. 0 (Negligible) 0012883 1978.5 0 (Negligible)		
Tensile horizontal strains are +ve, compressive ho Structure: AP   Sub-structure:	rizontal strains are -ve.			
from Line for Vertical Movement	Displacement Displa	nt of Radius of Category ical Curvature cement		
Tensile horizontal strains are +ve, compressive hor	[%] [%] [%] Curve Cur Settlement Trough Limit Sensitivity. rizontal strains are -ve.	[m]		
Structure: AQ   Sub-structure: Sub # Vertical Offset Segment Start Length Curva from Line for Vertical Movement	ture Deflection Average Max. Maximum Maxi Ratio Horizontal Tensile Gradient of Gradie Strain Strain Horizontal Vert Displacement Displace	nt of Radius of Category ical Curvature		
Calculations         [m]         [m]	[%] [%] Curve Cur [%] [%] Settlement Trough Limit Sensitivity.			
	ature Deflection Average Max. Maximum Maxi			
from Line for Vertical Movement Calculations [m] [m] [m]	Displacement Displa Curve Cur [%] [%] [%]	ical Curvature cement ve [m]		
0.0 1 1.9059 3.8060 Sagg 2 5.7119 9.5341 Sagg Tensile horizontal strains are +ve, compressive ho	ing 0.0 0.0 0.0 0.0 -224 ing 0.0 0.019729 0.019729 -240.06E-6 -224	.96E-6 107630. 0 (Negligible) .96E-6 106.23E+6 0 (Negligible)		
Specific Building Damage Results - Critical Values for All	Segments within Each Sub-Structure			
Structure: A   Sub-structure:				
Vertical Deflection Average Maximum Maximum Offset from Ratio Horizontal Slope Settlem Line for Strain Vertical Movement Calculations	m Max. Maximum Maximum Min. Min. ent Tensile Gradient of Gradient of Radius of Radius of Strain Horizontal Vertical Curvature Curvatur Displacement Displacement (Hogging) (Sagging Curve Curve	e		
[m] [%] [%] [mm] Structure: B   Sub-structure: Sub #	[%] [m] [m]			
Vertical Deflection Average Maximum Maximum Offset from Ratio Horizontal Slope Settlem, Line for Strain Vertical Movement	m Max. Maximum Maximum Min. Min. ent Tensile Gradient of Gradient of Radius of Radius of Strain Horizontal Vertical Curvature Curvatur Displacement Displacement (Hogging) (Sagging Curve Curve	e		
Calculations [m] [%] [%] [mm]				
	imum Max. Maximum Maximum Min. M lement Tensile Gradient of Gradient of Radius of Rad Strain Horizontal Vertical Curvature Cur Displacement Displacement Hoggiang (38	vature		
Movement Calculations [m] [%] [%] [%]	Curve Curve	[m] - O (Negligible)		
Structure: D   Sub-structure: Sub # Vertical Deflection Average Maximum Maxi Offset from Ratio Horizontal Slope Settl	mum Max. Maximum Maximum Min. Min ement Tensile Gradient of Gradient of Radius of Radiu	. Damage Category		
Origet from         Matio         Horizontal         Slope         Setting           Line for         Strain         Strain         Strain         Strain           Vertical         Movement         Strain         Strain         Strain         Strain           [m]         [%]         [%]         [m]         Strain         Strain	Strain Horizontal Vertical Curvature Curva Displacement Displacement (Hogging) (Sagg Curve Curve	ture ing)		
0.0 0.030341 0.0 0.0034509 1 Structure: E   Sub-structure: Sub #	"," 3.279 0.030292 0.0 0.0034509 1537.6	- O (Negligible)		
Vertical Deflection Average Maximum Maximum Offset from Ratio Horizontal Slope Settlem Line for Strain Vertical	m Max. Maximum Maximum Min. Min. ent Tensile Gradient of Gradient of Radius of Radius of Strain Horizontal Vertical Curvature Curvatur Displacement Displacement (Hogging) (Sagging Curve Curve	e		
Movement           Calculations           [m]         [%]           [m]         [%]           0.0         0.0         0.0	[%] [m] [m]	- 0 (Negligible)		
Structure: F   Sub-structure: Sub # Vertical Deflection Average Maximum Maxim Offset from Ratio Horizontal Slope Settle Line for Strain Vertical Movement	mum Max. Maximum Maximum Min. Min. ement Tensile Gradient of Gradient of Radius of Radius Strain Horizontal Vertical Curvature Curvat Displacement Displacement (Hogging) (Saggi Curve Curve	of ure		

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$\mathcal{O}$	AS ]	<i>ys</i>		(GEO	TEC	HNIC	AL &E	ENV	ASSO	C)J15193A	<b>\</b>			
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Calculations [m] 0.0	[%]	[%]	910.22E-6	[mm] 2.4523	[%] 0.0	0.0	910.22E-6	[m]	[m] - 0	(Negligible)				
Structure: G														
Offset from Line for Vertical Movement		Average Horizontal Strain			Max. Tensile Strain		Maximum Gradient o Vertical t Displaceme Curve	Curvatu	re Curvatur	e				
Calculations [m] 0.0	[%] 18.245E-6	[%] 0.0	-59.901E-	[mm] 6 5.6753	[%] 3 18.203E-	-6 0.	0 -59.901E	[m] -6 2.4436E	[m] +6	- 0 (Negligible)				
Structure: H	Sub-stru	cture: Sub	#											
Vertical Offset from Line for Vertical Movement Calculations				Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve		Curvature	e Curvature					
[m] 0.0	[%] 0.0084369	[%] 0.0	0.0019779	[mm] 5.6754	[%] 0.0084356	5 0.0	0.001977	[m] 9 2058.!	[m] 5 –	0 (Negligible)				
Structure: I														
Vertical Offset from Line for Vertical Movement Calculations					Strain	Maximum Gradient of G Horizontal Displacement I Curve	Vertical	Curvature (	Curvature	Damage Category				
[m] 0.0	[%] 0.10773	[%] 0.0	0.0048046	[mm] 14.001	[%] 0.10745	0.0	0.0048046	[m] 10.526E+6	[m] 157.60 2	(Slight)				
Structure: J														
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Maximum Slope	Maximum Settlement		Maximum Gradient of Horizontal Displacement Curve	Vertical	Curvature	Curvature	Damage Category				
[m] 0.0	[%] 0.10299	[%] 0.0	-0.004634	[mm] 6 14.044	[%] 1 0.10269	0.0	-0.0046346	[m] -	[m] 172.62	2 (Slight)				
Structure: K	Sub-stru	cture: Sub	#											
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Maximum Slope	Maximum Settlement		Maximum Gradient of Horizontal Displacement Curve	Vertical	Curvature	Curvature	Damage Category				
[m] 0.0 Structure: L	[%] 0.028796		0.0036084	[mm] 14.044	[%] 0.028758	0.0	0.0036084	[m] 1503.3	[m] -	0 (Negligible)				
Offset from Line for Vertical Movement				Maximum Settlement	Max. Tensile Strain	Horizontal	Maximum Gradient of Vertical Displacemen Curve	Curvature	e Curvature					
Calculations [m] 0.0	[%] 12.498E-6	[%] 0.0	35.360E-6	[mm] 3.2886	[%] 12.481E-6	5 0.0	35.360E-	[m] 6 4.1113E+0	[m] 5 –	0 (Negligible)				
Structure: M	Sub-stru	cture: Sub	#											
Vertical Offset from Line for Vertical Movement Calculations				Maximum Settlement	Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical	Curvature	Curvature	Damage Category				
[m] 0.0	[%] 0.022066	[%] 0.0	0.0018373	[mm] 5.4616	[%] 0.022016	0.0	0.0018373	[m] 2147.7	[m] -	0 (Negligible)				
Structure: N														
Vertical Offset from Line for Vertical Movement Calculations	Ratio			Maximum M Settlement Te St	ensile Gra crain Ho Dis	adient of Gra prizontal N splacement Dis	dient of Ra Vertical Cu	dius of Rad rvature Cu	lius of rvature	amage Category				
[m]	[%]	[%]		[ mm ]	[%]			[m]	[m]					
Structure: 0 Vertical Offset from Line for Vertical	Deflection Ratio	Average	Maximum	Maximum Settlement	Tensile Strain	Maximum Gradient of Horizontal Displacement	Vertical	Curvature	Curvature	Damage Category				
Movement Calculations [m] 0.0	[%] 0.0	[%] 0.0	-175.45E-	[mm] 6 0.33879	[%]	Curve	-175.45E-6			0 (Negligible)				
Structure: P	Sub-stru			Maximum	Max.	Maximum	Maximum	Min.	Min.	Damage Category				
Offset from Line for Vertical Movement Calculations	Ratio	Horizontal Strain		Settlement	Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Gradient of Vertical	Radius of Curvature t (Hogging	f Radius of Curvature ) (Sagging)					
[m] 0.0	[%] 0.025646	[%] 0.0	-0.002199	[mm] 1 6.8236	[%] 5 0.025464	a 0.0	-0.002199	[m] 1 1923.:	[m] 2 -	0 (Negligible)				
Structure: Q				Mayimum	(av -	lavim	lavim-	Min	Min	Damage Caborer				
Offset from Line for Vertical Movement Calculations	Ratio	Horizontal Strain	Maximum Slope S	St	ensile Gra crain Ho Dis	dient of Gra orizontal N splacement Dis	dient of Ra Vertical Cu	dius of Ra rvature Ci ogging) (1	adius of urvature Sagging)	Damage Category				
[m] 0.0	[%] 0.0	[%] 0.0	0.0	[mm] 6.8250	[%] 0.0	0.0	0.0 2.	[m] 9515E+18	[m] - 0	(Negligible)				
Structure: R	Sub-stru	cture: Sub	#											

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Vertical ffset from Line for Vertical	Deflection Ratio	Average Horizontal Strain		Maximum Settlement	Tensile Gra Strain Ho	dient of Gra	/ertical	Curvature		Damage Ca	tegory				
Vertical ffset from Line for Vertical	Deflection Ratio	Average Horizontal Strain	Maximum Slope		Strain	Maximum Gradient of Horizontal Displacement	Vertical Displaceme	L Curvatu	re Curvatur	f	Category				
Movement alculations [m] 0.0	[%] 0.025113	[%] 0.0	0.001941	[mm] .2 6.82	[%] 50 0.024901	Curve 0.0	Curve	[m] #12 2123	[m] .3	- 0 (Neglig	ible)				
tructure: S	Sub-stru	cture: Sub	#												
Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Tensile Gra Strain Ho Dis	dient of Gra rizontal N placement Dig	/ertical	Curvature (	Curvature	Damage Cat	egory				
				[ ]	F.01			[[[]]	[]						
Structure: T Vertical Dffset from Line for Vertical Movement Calculations		Average	Maximum Slope	Maximum Settlement	Tensile Gra Strain Ho Dis	dient of Gra rizontal N placement Dig	/ertical	Curvature (	Curvature	Damage Cat	egory				
[m]	[%]	[%]		[ mm ]	[%]			[m]	[m]						
Structure: U Vertical Offset from Line for Vertical	Sub-stru Deflection Ratio	Average	Maximum Slope	Maximum Settlement	Tensile Gra Strain Ho	dient of Gra	/ertical	Curvature (	Curvature	Damage Cat	egory				
Movement Calculations [m]	[%]	[%]		[ mm ]	[%]	Curve	Curve	[m]	[m]						
Structure: V															
Vertical Dffset from Line for Vertical Movement	Deflection Ratio			Maximum Settlement	Tensile Gra Strain Ho Dis	dient of Gra	/ertical	Curvature (	Curvature	Damage Cat	egory				
[m]	[%]	[%]		[ mm ]	[%]			[m]	[m]						
Structure: W															
Vertical Dffset from Line for Vertical Movement Calculations [m]	Deflection Ratio	Average Horizontal Strain			Tensile Gra Strain Ho Dis	dient of Gra rizontal N placement Dis	<b>/ertical</b>	Curvature (	Curvature	Damage Cat	egory				
Structure: X	Sub-stru	cture:													
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Tensile Gra Strain Ho Dis	dient of Gra	<b>/ertical</b>	Curvature (	Curvature	Damage Cat	egory				
[m]	[%]	[%]		[ mm ]	[%]			[m]	[m]						
Structure: Y															
Offset from Line for Vertical Movement Calculations	Ratio	Strain	Maximum Slope	Settlement	Tensile Gra Strain Ho Dis	dient of Gra	/ertical	Curvature ( (Hogging)	Curvature (Sagging)	Damage Cat	egory				
[m]	[%]	[%]		[ mm ]	[%]			[m]	[m]						
Structure: Z Vertical Offset from Line for Vertical Movement	Deflection		Maximum Slope		n Max. ent Tensile Strain	Maximum Gradient of Horizontal Displacemen Curve	L Vertic	c of Radius cal Curvat ement (Hogg:	s of Radius ture Curvat	of ure	e Category				
[m] 0.0	[%] 0.0072182	[%] 0.0035033	-610.11E	[mm] -6 3.4	[%] 479 0.008559	0 -90.952E-	-6 -610.3	[m 11E-6 103	] [m] 260.	- 0 (Negl	igible)				
Structure: A	A   Sub-str	ucture:													
Dffset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain		n Maximum Settleme	nt Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Vertical	L Curvatu	re Curvatur	f	Category				
[m] 0.0	[%] 0.041809	[%] -0.0036759	0.002141	[mm] .5 10.2	[%] 12 0.039608	126.60E-6	0.00214	[m] 415 8081:	[m] L. 753.8	0 0 (Neglig	ible)				
Structure: Al	B   Sub-str		Maximum	n Maximu	n Max.	Maximum	Maximur	a Min.	Min.	Demo	Category				
Offset from Line for Vertical Movement Calculations	Ratio	Horizontal Strain		Settlem	ent Tensile Strain	Gradient of Horizontal Displacement Curve	Gradient Vertica	of Radius al Curvatu ment (Hoggin	of Radius ure Curvatu ng) (Saggin	of re	Category				
[m] 0.0	[%] 0.012943		-423.638	[mm] 1-6 3.8	[%] 049 0.018750	-200.46E-6	-423.63	[m] 3E-6 9614	[m] 4.1 1065	1. 0 (Negli	gible)				
Structure: A Vertical Dffset from Line for Vertical Movement	C   Sub-str Deflection Ratio		Maximum Slope		n Max. ent Tensile Strain	Maximum Gradient of Horizontal Displacemer Curve	L Vertic	of Radius cal Curvat ement (Hogg:	s of Radius ture Curvat	of ure	e Category				
[m] 0.0	[%] 0.0	[%] 622.39E-6	-35.777E	[mm] -6 2.6	[%] 800 622.38E-	6 -6.2422E-		[m	[m] - 170.57	E+9 0 (Negl	igible)				

GEA LIMITED	Job No. Sheet No. Rev.
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<b>19–21 High Holborn, London, WC1V 6BS</b> Wall Installation and Excavation Issue 2	Drg. Ref.
	Made by Date Checked 06-Nov-2015
Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Radius of Strain Line for Strain Strain Strain Horizontal Vertical Curvature Curvature Vertical Deflection Vertical Strain Displacement Displacement (Hogging) (Sagging) Structure: AD   Sub-structure:	a
Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Strain Strain Overlical Curvature Vertical Displacement Displacement (Hogging) (Sagging) Movement Calculations	Damage Category
[m] [%] [%] [mm] [%] [mm] [%] [mm] [%] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m	0 (Negligible)
Vertical Deflection Average         Maximum         Maximum         Max.         Maximum         Maximum         Min.         Min.           Offset from Ratio         Horizontal         Slope         Settlement         Tensile         Gradient of         Gradient of         Radius of         Rad	a
0.0 0.0019878 -0.016457 -354.19E-6 3.9499 0.0032933 176.65E-6 -354.19E-6 12574. 27241. Structure: AF   Sub-structure: Sub #	. 0 (Negligible)
Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Strain Korizontal Vertical Curvature Curvature Vertical Displacement Hogging) (Sagging) Movement Curve Curve	Damage Category
[m] [%] [%] [mm] [%] [mm] [%] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m	0 (Negligible)
Structure: AG   Sub-structure: Sub # Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Strain Strain Horizontal Vertical Curvature Curvature Vertical Displacement Displacement (Hogging) (Sagging) Novement Curve Curve	Damage Category
	0 (Negligible)
Structure: AH     Sub-structure: Sub #       Vertical Deflection Average Maximum Maximum Maximum Max.     Maximum Maximum Maximum Maximum Maximum Min. Min.       Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Vertical     Tensile Gradient of Gradient of Radius	a
Calculations         [m]         [%]         [mm]         [%]         [m]         <	- 0 (Negligible)
Structure: Al   Sub-structure: Sub #       Vertical Deflection Average Maximum Maximum Max.     Maximum Maximum Maximum Maximum Min.       Offset from Ratio Horizontal Slope     Settlement Tensile Gradient of Gradient of Radius of Radius of Radius of Radius of Radius of Radius of Partical Strain       Vertical     Strain       Vertical     Displacement Displacement (Hogging) (Sagging)       Movement     Curve	2
Calculations         [m]         [%]         [mm]         [%]         [m]         <	. 0 (Negligible)
Structure: AJ   Sub-structure: Sub # Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min.	Damage Category
Offset from         Ratio         Horizontal         Slope         Settlement         Tensile         Gradient         of         Radius         of         Radius         of         Radius         of         Radius         of         Radius         of         Radius         of         Gradient         of         Gradient         of         Gradient         Gradient<	
	- 0 (Negligible)
Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Strain Horizontal Vertical Curvature Curvature Vertical Deflacement Displacement (Hogging) (Sagging) Movement Curve Curve Curve	Damage Category
[m] [%] [%] [mm] [%] [%]	0 (Negligible)
Structure: AL   Sub-structure: Sub # Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Strain Horizontal Vertical Curvature Curvature Vertical Displacement Displacement (Hogging) (Sagging) Movement Curve Curve Curve	
[m] [%] [%] [mm] [%] [m] [m]	0 (Negligible)
Structure: AM   Sub-structure: Sub # Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Da Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Fadius of	amage Category
Line for Strain Strain Horizontal Vertical Curvature Curvature Vertical Displacement Displacement (Hogging) (Sagging) Movement Curve Curve	
[m] [%] [%] [mm] [%] [m] [m]	
Offset from     Ratio     Horizontal Slope     Settlement Tensile     Gradient of Gradient of Radius of Radius of International Vertical       Line for     Strain     Strain     Horizontal Vertical     Urvature Curvature Curvature       Vertical     Displacement     Displacement     Hogging)     (Sagging)       Movement     Curve     Curve     Curve	amage Category
[m] [%] [%] [mm] [%] [m] [m] Structure: A0   Sub-structure:	
Vertical Deflection Average Maximum Maximum Max. Maximum Maximum Min. Min. Offset from Ratio Horizontal Slope Settlement Tensile Gradient of Gradient of Radius of Radius of Line for Strain Horizontal Vertical Curvature Curvature Vertical Displacement (Hogging) (Sagging)	Damage Category

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Movement Calculations [m] 0.0	[%] [%] 0.034461 -0.009	6791 0.00128		%] )31803		Curve 0.0012883	[m] 13955.	[m] 1978.5 0 (	(Negligible)	)				
Vertical I	Deflection Average	ige Maximum			faximum Maxi			1. Dam	age Category	у				
Offset from Line for Vertical Movement Calculations [m]		ontal Slope ain	Settlement Tensi: Strain	ile Grad in Hon Disp (	adient of Gradie	ent of Radiu tical Curva acement (Hoge rve	lus of Radius Nature Curvat	ns of nture ging)						
Structure: AQ	2   Sub-structure:	Sub #												
Vertical I Offset from Line for Vertical Movement Calculations	Deflection Average Ratio Horizo: Stra [%] [%]	ontal Slope Min	m Maximum Max. Settlement Tensi Strain [mm] [%]	ile Grad in Hor Disp (		ent of Radii tical Curva acement (Hoge rve	ius of Radius Vature Curvat	ns of nture ging)	age Category	r				
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Vertical I Offset from Line for Vertical	Deflection Avera	ige Maximu ontal Slope	e Settlement Te	Max. ensile Strain	Gradient of Gr Horizontal Displacement Di	Vertical ( isplacement	Radius of Ra Curvature Cu	Radius of Curvature	Damage Cate	∍gory				
Movement Calculations [m] 0.0	[%] [%] 0.0 0.01	 19729 -224.96	[mm] 6E-6 3.3847 0.	[%] .019729	Curve -240.06E-6	Curve	[m] _	[m] 107630. 0	(Negligible	e)				
		-	ments within Each S											
Structure Name			cture Segment	[m]	[m]	re Maximum Slope	Maximum Settlement [mm]		Min. Radius of Curvature (Hogging) [m]		Damage Cate	agory		
В	All settlement: All settlement: All settlement: All settlement: All settlement: All settlement:	s are less t s are less t	than the Settlemen than the Settlemen	nt Troug nt Troug nt Troug nt Troug nt Troug nt Troug	ugh Limit Sensiti ugh Limit Sensiti ugh Limit Sensiti ugh Limit Sensiti ugh Limit Sensiti ugh Limit Sensiti	ivity. ivity. ivity. ivity. ivity. ivity.								
с	All settlements All settlements Maximum Slope Maximum	s are less t s are less t	than the Settlemen than the Settlemen than the Settlemen 1 1 1 1	nt Troug nt Troug 11.304	ugh Limit Sensiti	ivity. ivity. 767.18E-6		0.0075815 0.0075815			) (Negligible) ) (Negligible)			
	Settlement Max. Tensile Strain	Sub #	1 1	1.304	16.956 Hogging	767.18E-6		0.0075815		- 0	) (Negligible)			
	Min. Radius of Curvature (Hogging)		1 1	1.304	16.956 Hogging	767.18E-6	3.6587	0.0075815	8688.7		) (Negligible)			
	Min. Radius of Curvature (Sagging)		-	-		-	-	-	-					
D	Maximum Slope Maximum Settlement	Sub # Sub #	1	0.0		0.0034509	13.279		1537.6	- 0	) (Negligible) ) (Negligible)			
	Max. Tensile Strain Min. Radius of	Sub # Sub #	1		4.5000 Hogging 4.5000 Hogging	0.0034509		0.030292 0.030292			) (Negligible) ) (Negligible)			
	Curvature (Hogging) Min. Radius of		-	_		-								
E	Curvature (Sagging) Maximum Slope		_	_				_	_					
E	Maximum Settlement	Sub #	- 1		1.3990 Sagging					- 0	) (Negligible)			
	Max. Tensile Strain Min. Radius of	Sub #	1	0.0	1.3990 Sagging 	0.0	2.4523		-	- 0	) (Negligible) -			
	Curvature (Hogging) Min. Radius of	1	-	-		-			-		-			
F	Curvature (Sagging) Maximum Slope	Sub #	1	0.0	1.9000 Sagging	910.22E-6	5 2.4523	8 0.0	-	3043.0 (	) (Negligible)			
£	Maximum Settlement Max. Tensile	Sub # Sub #	1	0.0	1.9000 Sagging 1.9000 Sagging 1.9000 Sagging		2.4523	8 0.0	-	3043.0 0	) (Negligible) ) (Negligible)			
	Strain Min. Radius of		-	-	1.9000 Sagging 	710								
	Curvature (Hogging) Min. Radius of		-	-		-			-		-			
G	Curvature (Sagging) Maximum Slope	Sub #	1		3.6000 Hogging		5.6753	18.203E-6	2.4436E+6	- (	) (Negligible)			
9	Maximum Maximum Settlement Max. Tensile	Sub # Sub #	1	0.0			5.6753	8 18.203E-6	2.4436E+6 2.4436E+6	- 0	) (Negligible) ) (Negligible)			
	Strain Min. Radius of		1		3.6000 Hogging 3.6000 Hogging				2.4436E+6 2.4436E+6		) (Negligible) ) (Negligible)			
	Curvature (Hogging) Min. Radius of		-	-		-			-					
н	Curvature (Sagging) Maximum Slope	Sub #	1	0.0	1.4030 Hogging	0.0019779	5.6754	0.0084356	2058.5	- 0	) (Negligible)			
	Maximum Maximum Settlement Max. Tensile	Sub # Sub #	1	0.0	1.4030 Hogging 1.4030 Hogging		5.6754	0.0084356 0.0084356	2058.5	- 0	) (Negligible) ) (Negligible)			
	Strain Min. Radius of		1		1.4030 Hogging 1.4030 Hogging			0.0084356			) (Negligible) ) (Negligible)			
	Curvature (Hogging) Min. Radius of		-	-		-								
-	Curvature (Sagging)		2 5	0										
I	Maximum Slope Maximum Settlement	Sub # Sub #	2 5	5.7338		0.0048046	14.001	0.10745	-	157.60 2	2 (Slight) 2 (Slight)			
	Max. Tensile Strain Min. Radius of	Sub #	2 5		8.6000 Sagging	0.0048046 45.057E-6			- 10.526E+6		2 (Slight)			
	Curvature (Hogging)				5.7338 Hogging						) (Negligible)			
	Min. Radius of Curvature (Sagging)	Sub #	2 5		8.6000 Sagging						2 (Slight)			
J	Maximum Slope Maximum Settlement	Sub # Sub #	1 2 3	0.0	3.0000 Sagging 7.9990 Sagging	0.0046346 0.0					2 (Slight) ) (Negligible)			

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ructure Nam		cal Critical Sta ucture Segment	rt End Curvatu	re Maximum Slope	Maximum Settlement	Max. Tensile	Min. Radius of 1		mage Category	
			à a praian annin			Strain	Curvature (	Curvature (Sagging)		
	Max. Tensile Sub # Strain Min. Radius of	-	0.0 3.0000 Sagging	0.0046346	14.044	0.10269	-	172.62 2 (Sligh	11)	
	Curvature (Hogging) Min. Radius of Sub #	1	0.0 3.0000 Sagging	0.0046346	14.044	0.10269	-	172.62 2 (Sligh	nt)	
	Curvature (Sagging) Maximum Slope Sub #	1	0.0 4.1040 Hogging	0.0036084	14.044	0.028758	1503.3	- 0 (Negli	igible)	
	Maximum Sub # Settlement Max. Tensile Sub #	1	0.0 4.1040 Hogging 0.0 4.1040 Hogging	0.0036084	14.044	0.028758	1503.3 1503.3	- 0 (Negli - 0 (Negli	igible)	
	Strain Min. Radius of Sub #		0.0 4.1040 Hogging 0.0 4.1040 Hogging			0.028758	1503.3	- 0 (Negli		
	Curvature (Hogging) Min. Radius of	-		-	-	-	-			
	Curvature (Sagging) Maximum Slope Sub #	1	0.0 4.3000 Hogging		3.2886	12.481E-6	4.1113E+6	- 0 (Negli	igible)	
	Maximum Sub # Settlement Max. Tensile Sub #		0.0 4.3000 Hogging 0.0 4.3000 Hogging				4.1113E+6 4.1113E+6	- 0 (Negli - 0 (Negli		
	Strain Min. Radius of Sub # Curvature		0.0 4.3000 Hogging				4.1113E+6	- 0 (Negli		
	(Hogging) Min. Radius of	-		-	-	-	-			
	Curvature (Sagging) Maximum Slope Sub #	1	0.0 4.9322 Hogging	0.0018373	5.4616	0.022016	2147.7	- 0 (Negli	igible)	
	Maximum Sub # Settlement Max. Tensile Sub #		0.0 4.9322 Hogging 0.0 4.9322 Hogging	0.0018373	5.4616	0.022016	2147.7 2147.7	- 0 (Negli - 0 (Negli	igible)	
	Max. Tensile Sub # Strain Min. Radius of Sub # Curvature		0.0 4.9322 Hogging 0.0 4.9322 Hogging			0.022016	2147.7	- 0 (Negli		
	(Hogging) Min. Radius of	-		-	-	-	-			
	Curvature (Sagging) All settlements are less	than the Settlement	Trough Limit Sensit	ivity.						
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	All settlements are less Maximum Slope Sub # Maximum Sub #	than the Settlement ' 1 2.8	Trough Limit Sensit 082 3.7430 Sagging 082 3.7430 Sagging	ivity. 175.45E-6	0.33879 0.33879	0.0	-	14302. 0 (Negli 14302. 0 (Negli		
	Settlement Max. Tensile Sub #		082 3.7430 Sagging		0.33879	0.0	-	14302. 0 (Negli		
	Strain Min. Radius of Curvature	-		-	-	-	-			
	(Hogging) Min. Radius of Curvature	-		-	-	-	-			
	(Sagging) Maximum Slope Sub # Maximum Sub #		0.0 5.1150 Hogging 0.0 5.1150 Hogging		6.8236 6.8236	0.025464	1923.2 1923.2	- 0 (Negli - 0 (Negli	igible)	
	Settlement Max. Tensile Sub #		0.0 5.1150 Hogging			0.025464	1923.2	- 0 (Negli		
	Strain Min. Radius of Sub # Curvature	1	0.0 5.1150 Hogging	0.0021991	6.8236	0.025464	1923.2	- 0 (Negli	igible)	
	(Hogging) Min. Radius of Curvature	-		-	-	-	-			
	(Sagging) Maximum Slope Sub # Maximum Sub #	2 0.40	000 2.8015 Sagging 015 3.1990 Sagging	0.0	6.8250	0.0		1.4854E+18 0 (Negli 2.9719E+18 0 (Negli		
	Settlement Max. Tensile Sub #	1	0.0 0.40000 Hogging		6.8250	0.0	2.9515E+18	- 0 (Negli		
	Strain Min. Radius of Sub # Curvature	1	0.0 0.40000 Hogging	0.0	6.8250	0.0	2.9515E+18	- 0 (Negli	igible)	
	(Hogging) Min. Radius of Curvature	-		-	-	-	-			
	(Sagging) Maximum Slope Sub # Maximum Sub #		0.0 5.5823 Hogging 0.0 5.5823 Hogging		6.8250 6.8250	0.024901	2123.3 2123.3	- 0 (Negli - 0 (Negli		
	Settlement Max. Tensile Sub #		0.0 5.5823 Hogging			0.024901	2123.3	- 0 (Negli		
	Strain Min. Radius of Sub # Curvature	1	0.0 5.5823 Hogging	0.0019412	6.8250	0.024901	2123.3	- 0 (Negli	igible)	
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	Maximum Slope Maximum Settlement	1 21.	578 43.154 Hogging 578 43.154 Hogging	610.11E-6	3.4479	0.0085590 0.0085590	10260. 10260.	- 0 (Negli - 0 (Negli	igible)	
	Max. Tensile Strain Min. Radius of		578 43.154 Hogging 578 43.154 Hogging			0.0085590	10260. 10260.	- 0 (Negli - 0 (Negli		
	Curvature (Hogging)	1 21.		010.11E-0	5.44/9		10200.	- J (Negli		
	Min. Radius of Curvature (Sagging)	-		-	-	-	-			
A	Maximum Slope	2 5 4	438 10.734 Sagging	0 0001415	0 5252	0.039608	-	753.80 0 (Negli	(g) blo)	

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ructure Name		xcavation Is	sue 2					Made b	V	Da	te	Check	ked
ructure Name									•		-Nov-2015		
	Parameter	Critical ( Sub-Structure S		End Curvature		Settlement			Curvature	Damage Cat	egory		
	Max. Tensile		2 5.4438	10.734 Sagging	0.0021415	8.5352	0.039608	(Hogging)		(Negligible)			
	Strain Min. Radius of Curvature		1 0.0	5.4438 Hogging	330.22E-6	10.212 0	.0013098	80811.	- 0	(Negligible)			
	(Hogging) Min. Radius of Curvature		2 5.4438	10.734 Sagging	0.0021415	8.5352	0.039608	-	753.80 0	(Negligible)			
	(Sagging) Maximum Slope		1 0.0	8.3781 Hogging		3.8049				(Negligible)			
	Maximum Settlement Max. Tensile			8.3781 Hogging 13.449 Sagging	423.63E-6		0.010858 0.018750			(Negligible)			
	Strain Min. Radius of			8.3781 Hogging		3.8049				(Negligible)			
	Curvature (Hogging) Min. Radius of		2 8.3781	12.489 Sagging	423.63E-6	3.1166	0.018135	_	10651. 0	(Negligible)			
	Curvature (Sagging)												
	Maximum Slope Maximum Settlement			6.9567 Sagging 8.9430 Sagging		2.6089 6 2.6800 6			453.02E+9 0 170.57E+9 0				
	Max. Tensile Strain		3 6.9567	8.9430 Sagging	35.777E-6	2.6800 6	22.38E-6	-	170.57E+9 0	(Negligible)			
	Min. Radius of Curvature (Hogging)				-	-	-	-					
	Min. Radius of Curvature (Sagging)		3 6.9567	8.9430 Sagging	35.777E-6	2.6800 6	22.38E-6	-	170.57E+9 0	(Negligible)			
	Maximum Slope Maximum			13.400 Hogging 13.400 Hogging	0.0017084 0.0017084	10.209 10.209				(Negligible) (Negligible)			
	Settlement Max. Tensile Strain			13.400 Hogging	0.0017084	10.209	0.040377	2395.3		(Negligible)			
	Min. Radius of Curvature		2 1.9177	13.400 Hogging	0.0017084	10.209	0.040377	2395.3	- 0	(Negligible)			
	(Hogging) Min. Radius of Curvature		1 0.0	1.9177 Sagging	199.94E-6	3.0635	0.020270	-	535.36E+6 0	(Negligible)			
	(Sagging) Maximum Slope			2.7408 Hogging						(Negligible)			
	Maximum Settlement Max. Tensile			3.8110 Sagging 3.8110 Sagging	354.19E-6 354.19E-6	3.9499 0 3.9499 0				(Negligible)			
	Strain Min. Radius of			2.7408 Hogging						(Negligible)			
	Curvature (Hogging) Min. Radius of		2 2.7408	3.8110 Sagging	354.19E-6	3.9499 0	.0032933	-	<b>27241.</b> 0	(Negligible)			
	Curvature (Sagging)	Sub #		8.0446 Hogging		3.9502 0				(Negligible)			
	Maximum Slope Maximum Settlement	Sub #		8.0446 Hogging	438.48E-6	3.9502 0				(Negligible)			
	Max. Tensile Strain Min. Radius of	Sub #		12.813 Sagging 8.0446 Hogging	110.57E-6		0.011419			(Negligible)			
	Curvature (Hogging)												
	Min. Radius of Curvature (Sagging)	Sub #	2 8.0446	12.813 Sagging	110.57E-6	2.1826	0.011419	-	<b>198050.</b> 0	(Negligible)			
	Maximum Slope Maximum	Sub # Sub #	1 0.0 1 0.0	9.5510 Sagging 9.5510 Sagging	74.450E-6 74.450E-6	1.6824 2 1.6824 2				(Negligible) (Negligible)			
	Settlement Max. Tensile Strain	Sub #	1 0.0	9.5510 Sagging	74.450E-6	1.6824 2	92.65E-6	-	181540. 0	(Negligible)			
	Min. Radius of Curvature				-	-	-	-					
	(Hogging) Min. Radius of Curvature	Sub #	1 0.0	9.5510 Sagging	74.450E-6	1.6824 2	92.65E-6	-	181540. 0	(Negligible)			
	(Sagging) Maximum Slope Maximum	Sub # Sub #	1 0.0 1 0.0	7.1380 Hogging 7.1380 Hogging	109.69E-6 109.69E-6	1.7731 0 1.7731 0				(Negligible) (Negligible)			
	Settlement Max. Tensile	Sub #		7.1380 Hogging	109.69E-6		.0052427			(Negligible)			
	Strain Min. Radius of Curvature	Sub #	1 0.0	7.1380 Hogging	109.69E-6	1.7731 0	.0052427	30605.	- 0	(Negligible)			
	(Hogging) Min. Radius of				-	-	-	-					
	Curvature (Sagging) Maximum Slope	Sub #	1 0.0	4.2100 Sagging	59.782E-6	1.9447 0	.0020113	_	67602.0	(Negligible)			
	Maximum Settlement	Sub #	1 0.0	4.2100 Sagging	59.782E-6	1.9447 0	.0020113	-	67602. 0	(Negligible)			
	Max. Tensile Strain Min. Radius of	Sub #	1 0.0	4.2100 Sagging	59.782E-6	1.9447 C	.0020113	-	67602.0	(Negligible)			
	Curvature (Hogging) Min. Radius of	Culo #	1 0.0	4.2100 Sagging	E0 700E 6	1.9447 0	0020112	_	67602 0	(Negligible)			
	Curvature (Sagging)												
	Maximum Slope Maximum Settlement	Sub # Sub #	1 0.0 1 0.0	4.7370 Hogging 4.7370 Hogging	234.12E-6 234.12E-6		.0014717			(Negligible) (Negligible)			
	Max. Tensile Strain	Sub #		4.7370 Hogging	234.12E-6		.0014717			(Negligible)			
	Min. Radius of Curvature (Hogging)	Sub #	1 0.0	4.7370 Hogging	234.12E-6	2.7624 0	.0014717	26679.	- 0	(Negligible)			
	Min. Radius of Curvature				-	-	-	-					
	(Sagging) Maximum Slope Maximum		2 4.8396 2 4.8396	7.7000 Hogging 7.7000 Hogging	0.0010408 0.0010408		0.018594			(Negligible) (Negligible)			
	Settlement Max. Tensile			7.7000 Hogging	0.0010408		0.018594			(Negligible)			
	Strain Min. Radius of Curvature		2 4.8396	7.7000 Hogging	0.0010408	3.3643	0.018594	791.81	- 0	(Negligible)			
	(Hogging) Min. Radius of Curvature		1 0.0	4.8396 Sagging	97.491E-6	2.2219 9	56.33E-6	-	143170. O	(Negligible)			
	(Sagging) Maximum Slope	Sub #		9.2234 Hogging		3.3650 3	56.02E-6	23155.	- 0	(Negligible)			
	Maximum Settlement Max. Tensile	Sub #		9.2234 Hogging 9.2234 Hogging	306.12E-6 306.12E-6		56.02E-6			(Negligible) (Negligible)			
	Strain Min. Radius of			9.2234 Hogging 9.2234 Hogging		3.3650 3				(Negligible)			
	Curvature (Hogging) Min. Radius of				_	_							
	Curvature (Sagging)					-	-	-					
	All settlements All settlements	are less than the are less than the are less than the	Settlement Trou	ugh Limit Sensiti	vity.								

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	Structure Nam	e Parameter Criti Sub-Str	cal Critica ucture Segment	l Start	End Curv	ature Maximum Slope	Maximum Settlement	Tensile	Radius of	Radius of			
		All settlements are less	than the Settl	emení Ťrou	gh <sup>'</sup> Limit Sen	sitivity.			(Hogging)	(Sagging)			
	AO	Maximum											
		Max. Tensile					9.1545	0.031803	-				
		Min. Radius of Curvature		1 16.179	21.530 Hogg	ing 772.80E-6	4.2394	0.0032862	13955.	- 0	(Negligible)		
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	AR	Maximum Slope Sub #		1 1.9059	5.7119 Sagg	ing 224.96E-6			-	107630.0	(Negligible)		
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Barbard March Markel And Barbard Markel And Markel Mar		Min. Radius of				-	-	-	-				
		(Hogging) Min. Radius of Sub #		1 1.9059	5.7119 Sagg	ing 224.96E-6	1.2399	0.0	-	107630.	(Negligible)		
	Specific Buildi	ing Damage Results - All Comb	ined Segments										
	Structure: A	Sub-structure;											
	Vertical	Combined Start Length Curva				Damage Category							
	Line for	Segment	Ratio										
	Movement												
			[%]	[%]	[%]								
If is to a second     Is is a contract is a second     Is is a contract is a second       If is is a contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a contract is a second     Is is a contract is a second     Is is a contract is a second       Vertical contract is a contract is a second     Is is a contract is a contracont is contract is a contract is a contract is a contract is a co	Structure: B	Sub-structure: Sub #											
	Vertical	Combined Start Length Curva				Damage Category							
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Officies From Seguence New State New St	Structure: C	Sub-structure: Sub #											
Vertical is and in a		Combined Start Length Curva Segment		Average Horizonta		Damage Category							
Chalantaria in a control in a c	Vertical			Strain	Strain								
No structures have segments combined. Structures is j dub-structures: Sub d Vertical functions fart fampth Curvature Definition Average Nat. Structures is a segment combined. Structures i	Calculations [m]	[m] [m]	[%]	[%]	[%]								
State of series time for time for	No structures	have segments combined.											
offee from Regeneric is in													
Vertical box     Image Category       Vertical box     Combined fatzi Length Curvature Deflection box     Newrege box     Response       Structure: F     Sub-teructure: Sub #     Newrege box     Newrege box       Vertical box     Image Category     Newrege box     Newrege box       Category     Combined fatzi Length Curvature Deflection box     Newrege box     Newrege box       Category     Category     Newrege box     Newrege box       Category     Newrege box     Newrege box     Newrege box       Structure: I     Sub-teructure: Sub #     Newrege box     Newrege box       Newrege     Newrege     Newrege     Newrege	Offset from			Horizonta	l Tensile	Damage Category							
(a)       (b)       (b)       (b)         (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (c)       (c)         (c)       (c)       (c)       (	Vertical			Strain	Strain								
Structure: B   Sub-structure: Sub S Vertical Combined Start Length Curvature Deflection Average Max. Banage Category Structure: P   Sub-structure: Sub S Structure: P   Sub-structure: Sub S Vertical Combined Start Length Curvature Deflection Average Max. Banage Category Offest from Segment combined. Structure: G   Sub-structure: Sub S Vertical Combined Start Length Curvature Deflection Average Max. Banage Category (a) (b) structures have segments combined. Structure: B   Sub-structure: Sub S Vertical Combined Start Length Curvature Deflection Average Max. Banage Category (b) structures have segments combined. Structure: B   Sub-structure: Sub S Vertical Combined Start Length Curvature Deflection Average Max. Banage Category (c) (c) (c) (c) (c) (c) (c) (c) (c) (c)		[m] [m]	[%]	[%]	[%]								
Vertical Combined StartCombined StartLengthCurvature PationPation Norrage StrainNamage StrainCategoryStrain Norrage StrainStrain StrainStrain StrainStrain StrainStrain StrainStrain StrainStrain StrainStructures Import No structures have segments CombinedImport Import Strain(%)(%)(%)Structures Import StructuresStructures ImportStructures StructuresNamage StrainCategoryStructures Import Structures Import Import StructuresImport Import Structures(%)(%)Structure StructureStructures Import Import StructuresImport Structures(%)(%)(%)Structure StructureStructures Import Import Import StructuresImport Structure(%)(%)Structure StructureStructure <td></td> <td></td>													
Offset from     Segment     Ratio     Revisorial Tensile       Line for     Strain     Strain     Strain       Calculations     [n]     [n]     (n)     (n)       Calculations     [n]     [n]     (n)     (n)       Structure:     F     Sub-structure:     Sub   Vertical Combined Start Length Curvature Deflection Average Strain Strain Strain Structure: Calculations (n) </td <td></td> <td></td> <td>ture Deflection</td> <td>Average</td> <td>Max.</td> <td>Damage Category</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			ture Deflection	Average	Max.	Damage Category							
No   Structure: I    I    I   I    I </td <td>Offset from Line for</td> <td></td> <td></td> <td>Horizonta</td> <td>l Tensile</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Offset from Line for			Horizonta	l Tensile								
im     im     im     im     im       im     im     im	Movement												
Structure: F   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. No structure: G   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: G   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: G   Sub-structure: Sub # Vertical Sub-structure: Sub # Vertical Sub-structure: Sub # No structures have segments combined. Structure: F   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: F   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: F   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: F   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: F   Sub-structure: Sub # Vertical Combined Start Length Ourvature Deflection Average Max. Structure: F   Sub-structure: Sub # Structure: F   Sub-structure: Sub # No structures have segments combined. Structure: F   Sub-structure: Sub # No structures have segments combined.	[m]		[%]	[%]	[%]								
Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Offset from Segment Ratio Strain Strain Im G (m)													
Line for Strain Strain   Movement Image Category   Calculations Strain   Vertical Combined Stat   Length Curvature Deflection Average   Movement Strain   Strain Strain   Vertical Combined Stat   Movement Strain   Structure: H Sub-structure: Sub#   Vertical Combined Stat   Movement No   Structure: H Sub-structure: Sub#   Vertical Combined Stat   Movement No   Structure: H Sub-structure: Sub#   Vertical Morizontal   Structure: H Sub-structure: Sub#   Vertical Morizontal   Structure: H Sub-structure: Sub#   Vertical Morizontal   Inine for Strain   Structure: H Sub-structure: Sub#   No structure: Sub# Strain   Structure: H Sub-structure: Sub#   Norizontal Strain   Structure: H Strain   Structure: H Strain   Structure: H Strain   Structure: H Strain   Strain Strain   Structure: H Strain	Vertical	Combined Start Length Curva				Damage Category							
No structures have segments combined. Structure: G   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: A length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Movement B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Structure: B   Sub-structure: Sub # No structure: B   Sub-structure: Sub # No structure: B   Sub-structure: Sub # No structure: B   Sub-structure: Sub # Structure: B   Sub-	Line for	segment	Ratio										
No structures have segments combined. Structure: G   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Diffset from Segment Strain Strain Strain Vertical Structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Structure: H   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Diffset from Segment Ratio Horisontal Tensile Line for Segment Strain Strain Strain Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Diffset from Segment Ratio Horisontal Tensile Line for Segment Strain Strain Strain Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Diffset from Segment Ratio Horisontal Tensile Line for Maximum Strain Strain Strain Strain Novement Calculations [m] [m] [m] [%] [%] [%]	Movement Calculations												
Vertical     Combined Start Length Curvature Deflection     Average     Max.     Damage Category       Offset from     Segment     Strain     Strain       Vertical     Strain     Strain       Vertical     Image Category       Vertical     Image Category       Movement     Image Category       Image Category     Image Category       Imag	[m] No structures	[m] [m] have segments combined.	[%]	[%]	[%]								
Offset from Segment     Ratio     Horizontal Tensile       Line for     Strain     Strain       Vertical     Strain     Strain       Novement     Image (m)     [%]     [%]       Structure: H     Sub-structure: Sub #     Image Category       Vertical     Strain     Strain       Structure: H     State     Length Curvature Deflection       Average     Ratio     Horizontal Tensile       Structure: H     Strain     Strain       Vertical     Strain     Strain       Vertical     Ratio     Horizontal Tensile       Structure: H     Image Category     Strain       Structure: H     Structure: Deflection     Average       Movement     Strain     Strain       Calculations     Image Category       Movement     Strain       Image Category     Strain       No structures have segments combined.     Image Category	Structure: G	Sub-structure: Sub #											
Line for Strain Strain Vertical Movement Calculations Structure: H   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Offset from Segment Ratio Horizontal Tensile Line for Strain Strain Vertical Calculations [m] [m] [m] [%] [%] [%] No structures have segments combined.	Offset from	Combined Start Length Curva Segment	ture Deflection Ratio	Average Horizonta		Damage Category							
Calculations [m] [m] [m] [k] [k] [k] No structures have segments combined. Structure: H   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Offset from Segment Ratio Horizontal Tensile Line for Segment Strain Strain We visual We visual Galvulations [m] [m] [k] [k] [k] No structures have segments combined.	Line for Vertical												
No structures have segments combined. Structure: H   Sub-structure: Sub # Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Diffset from Segment Ratio Horizontal Tensile Line for Strain Strain Vertical Movement Calculations [m] [m] [m] [%] [%] [%] No structures have segments combined.	Calculations	[m] [1	[6.1	1 ھ]	[ 8-1								
Vertical     Combined Start Length Curvature Deflection     Average     Max.     Damage Category       Offset from     Segment     Ratio     Horizontal Tensile       Line for     Strain     Strain       Vertical     Vertical     Event       Rovement     Calculations     [m]     [m]       [m]     [m]     [%]     [%]       No structures have segments combined.			[8]	[4]	1.61								
Offset from Segment         Ratio         Horizontal Tensile           Line for         Strain         Strain           Vertical         Strain         Strain           Worsment         Calculations         Image: Strain from the segments combined.           [m]         [m]         [%]         [%]	Structure: H	Sub-structure: Sub #											
Line for         Strain         strain           Vertical         Movement           Calculations         [m]         [m]         [%]           [m]         [m]         [%]         [%]           No structures have segments combined.         [%]         [%]	Offset from	Combined Start Length Curva Segment	ture Deflection Ratio	Horizonta	l Tensile	Damage Category							
Calculations [m] [m] [m] [%] [%] No structures have segments combined.	Line for Vertical												
No structures have segments combined.	Calculations	[m] [m]	[%]	[%]	[%]								
Structure: I   Sub-structure: Sub #	No structures	have segments combined.	r.ø 1	r • 1	. • 1								
	Structure: I	Sub-structure: Sub #											

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19–21 High Holborn, London				·	Drg. Ref.		
Wall Installation and Excavation	on Issue 2			·	Made by	Date	Checked
						06-Nov-2015	
Offset from Segment		ntal Tensile					
Line for Vertical Movement	Stra	in Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: J   Sub-structure: Sub # Vertical Combined Start Length Curvatur	re Deflection Avera	ge Max.	Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo						
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: K   Sub-structure: Sub #							
Vertical Combined Start Length Curvatur Offset from Segment Line for Vertical Movement	Ratio Horizo	ge Max. ntal Tensile in Strain	Damage Category				
[m] [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: L   Sub-structure: Sub # Vertical Combined Start Length Curvatur	e Deflection .	ge Max.	Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo Stra	ntal Tensile	Damage Category				
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: M   Sub-structure: Sub # Vertical Combined Start Length Curvatur	re Deflection Avera	je Max.	Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo	ntal Tensile in Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: N   Sub-structure: Sub # Vertical Combined Start Length Curvatur	re Deflection Avera	ge Max.	Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo Stra	ntal Tensile in Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: 0   Sub-structure: Sub # Vertical Combined Start Length Curvatur Offset from Segment	re Deflection Avera Ratio Horizo	ge Max.	Damage Category				
Line for Vertical Movement Calculations	Stra	in Strain					
[m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: P   Sub-structure: Sub # Vertical Combined Start Length Curvatur	re Deflection Avera	ge Max.	Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo Stra	ntal Tensile in Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: Q   Sub-structure: Sub #			_				
Vertical Combined Start Length Curvatur Offset from Segment Line for Vertical Movement	Ratio Horizo	ge Max. ntal Tensile in Strain	Damage Category				
[m] [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: R   Sub-structure: Sub # Vertical Combined Start Length Curvatur	re Deflection Avera	ge Max.	Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo	ntal Tensile in Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: S   Sub-structure: Sub # Vertical Combined Start Length Curvatur			Damage Category				
Offset from Segment Line for Vertical Movement	Ratio Horizo						
Calculations [m] [m] [m] No structures have segments combined.	[%] [%]	[%]					
Structure: T   Sub-structure: Vertical Combined Start Length Curvatur Offset from Segment Line for	Ratio Horizo		Damage Category				
Vertical Movement							

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Calculations		[m]											
	have segments	combined.	[%]	[%]	[%]								
		e: Length Curvature		Average Horizontal	Max.	Damage (	Category						
Line for Vertical Movement			MICIO	Strain									
[m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
1	Sub-structure												
Offset from a Line for Vertical Movement		Length Curvature		Average Horizontal Strain	Max. Tensile Strain	Damage (	Category						
[m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
	Sub-structure	e: Length Curvature	Deflection	Average	Max.	Damage (	Category						
Offset from a Line for Vertical Movement	Segment			Horizontal Strain	Tensile								
Calculations [m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
	Sub-structure		Deflection		Mari	Damage (	<b>Tabagan</b>						
Offset from a Line for Vertical Movement		Length Curvature		Average Horizontal Strain	Tensile	Damage (	Category						
Calculations [m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
Vertical	Sub-structure	e: Length Curvature	Deflection	Average	Max.	Damage (	Category						
Offset from a Line for Vertical Movement Calculations	Segment		Ratio	Horizontal Strain									
[m] No structures	[m] have segments	combined.	[%]	[%]	[%]								
		e: Length Curvature				Damage (	Category						
Line for Vertical Movement	-			Strain									
Calculations [m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
	Sub-structu	re: Length Curvature	Deflection		Max.	Demogra	Category						
Offset from a Line for Vertical Movement		Length Curvature		Horizontal Strain	Tensile	Damage	Category						
[m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
	Sub-structu												
Offset from a Line for Vertical Movement	Segment	Length Curvature		Average Horizontal Strain		Damage (	Category						
[m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
	Sub-structu			_		_							
Offset from a Line for Vertical Movement	Combined Start Segment	Length Curvature	Ratio	Average Horizontal Strain		Damage (	Category						
Calculations [m] No structures	[m] have segments	[m] combined.	[%]	[%]	[%]								
	Ombined Start	re: Length Curvature	Deflection	Aucesso	Mar	Damage	Category						
Offset from a Line for Vertical Movement		Length Curvature		Average Horizontal Strain	Tensile	vamage (	Category						
Calculations [m] No structures	[m] have segments		[%]	[%]	[%]								
	:   Sub-structu: Combined Start Segment	re: Length Curvature	Deflection Ratio	Average Horizontal Strain		Damage (	Category						
Vertical Movement Calculations [m]	[m] have segments	[m] combined.	[%]	[%]	[%]								

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Vertical Combined Start Length Curvat Offset from Segment Line for	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Vertical Structure: AF   Sub-structure: Sub #						
Vertical Combined Start Length Curvat Offset from Segment Line for Vertical Movement	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AG   Sub-structure: Sub # Vertical Combined Start Length Curvat	ture Deflection Average Max.	Damage Category				
Offset from Segment Line for Vertical Movement Calculations	Ratio Horizontal Tensil Strain Strain	e				
[m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AH   Sub-structure: Sub # Vertical Combined Start Length Curvat Offset from Segment Line for Vertical	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Movement Calculations [m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AI   Sub-structure: Sub #						
Vertical Combined Start Length Curvat Offset from Segment Line for Vertical Movement	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AJ   Sub-structure: Sub # Vertical Combined Start Length Curvat		Damage Category				
Offset from Segment Line for Vertical Movement Calculations	Ratio Horizontal Tensil Strain Strain					
[m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AK   Sub-structure: Vertical Combined Start Length Curvat Offset from Segment Line for Vertical Movement	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AL   Sub-structure: Sub # Vertical Combined Start Length Curvat	cure Deflection Average Max.	Damage Category				
Offset from Segment Line for Vertical Movement Calculations	Ratio Horizontal Tensil Strain Strain					
<pre>[m] [m] [m] No structures have segments combined. Structure: AM   Sub-structure: Sub #</pre>	[%] [%] [%]					
Vertical Combined Start Length Curvat Offset from Segment Line for Vertical Movement	ture Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Calculations [m] [m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AN   Sub-structure: Vertical Combined Start Length Curvat Offset from Segment Line for	ure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Vertical Movement Calculations [m] [m] [m] No structures have segments combined.	[\$] [\$] [\$]					
Structure: AO   Sub-structure: Vertical Combined Start Length Curvat	ure Deflection Average Max.	Damage Category				
Offset from Segment Line for Vertical Movement Calculations	Ratio Horizontal Tensil Strain Strain	e				
[m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AP   Sub-structure: Vertical Combined Start Length Curvat Offset from Segment Line for Vertical Movement	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					
Calculations [m] [m] [m] No structures have segments combined.	[%] [%] [%]					
Structure: AQ   Sub-structure: Sub # Vertical Combined Start Length Curvat Offset from Segment Line for	cure Deflection Average Max. Ratio Horizontal Tensil Strain Strain					

Oasys	GEA LIMITED	Job No.	Sheet No.	Rev.
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 Movement

 Calculations

 [m]
 [m]

 [m]
 [m]

 [m]
 [m]

 [m]
 [m]

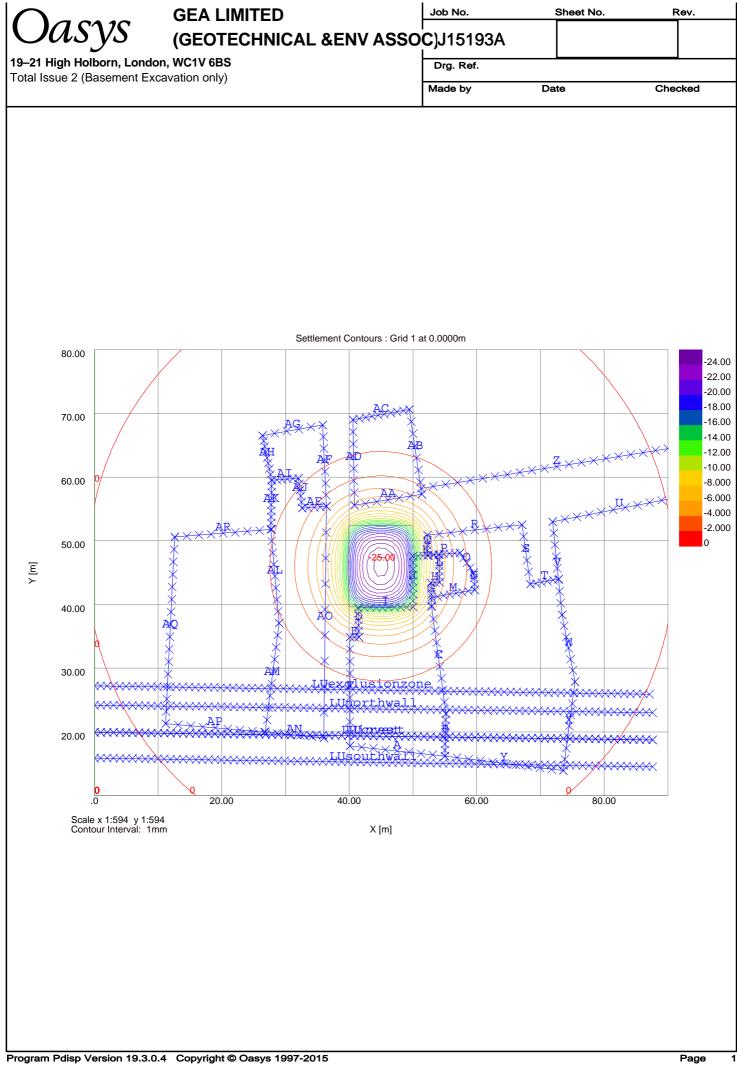
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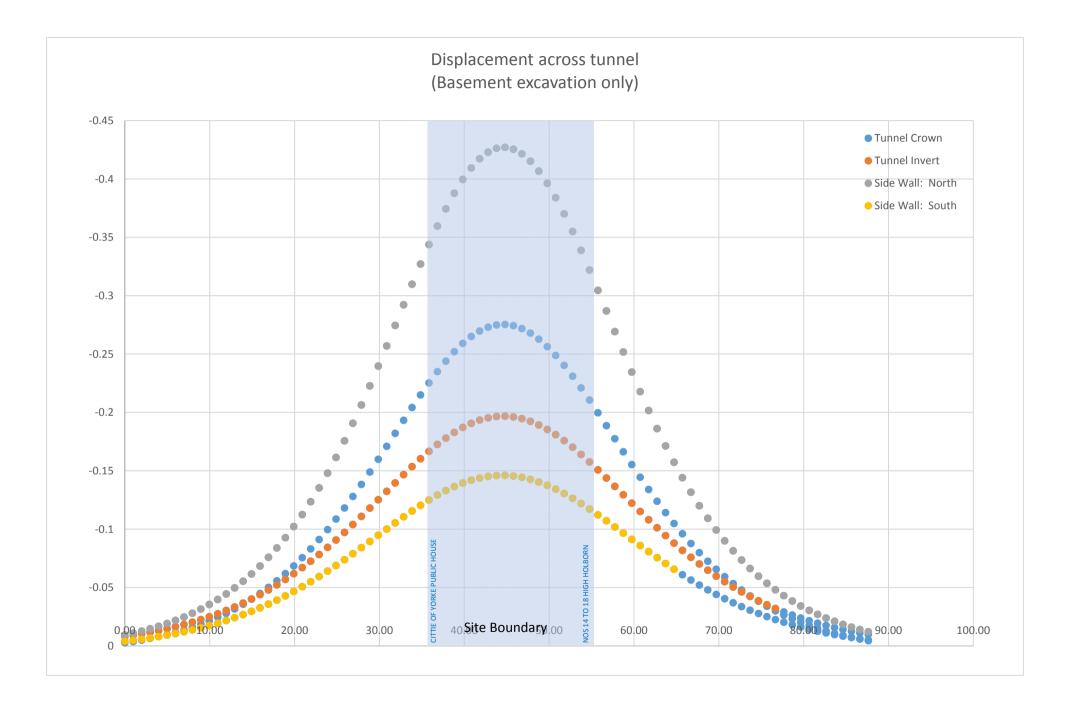
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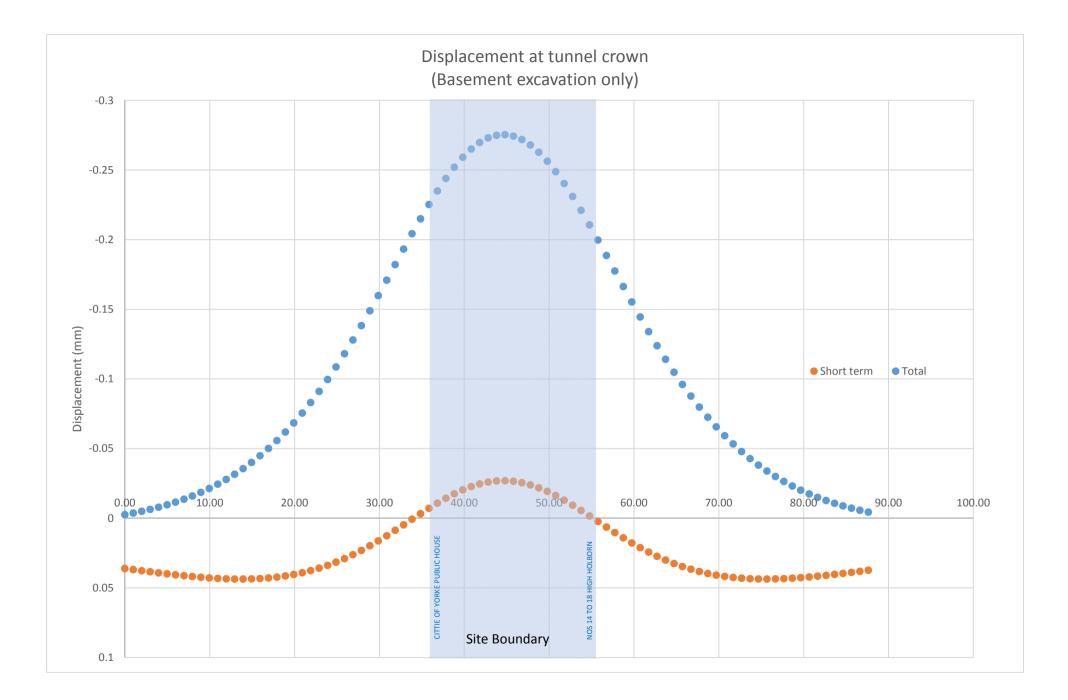
Structure: AR | Sub-structure: Sub #

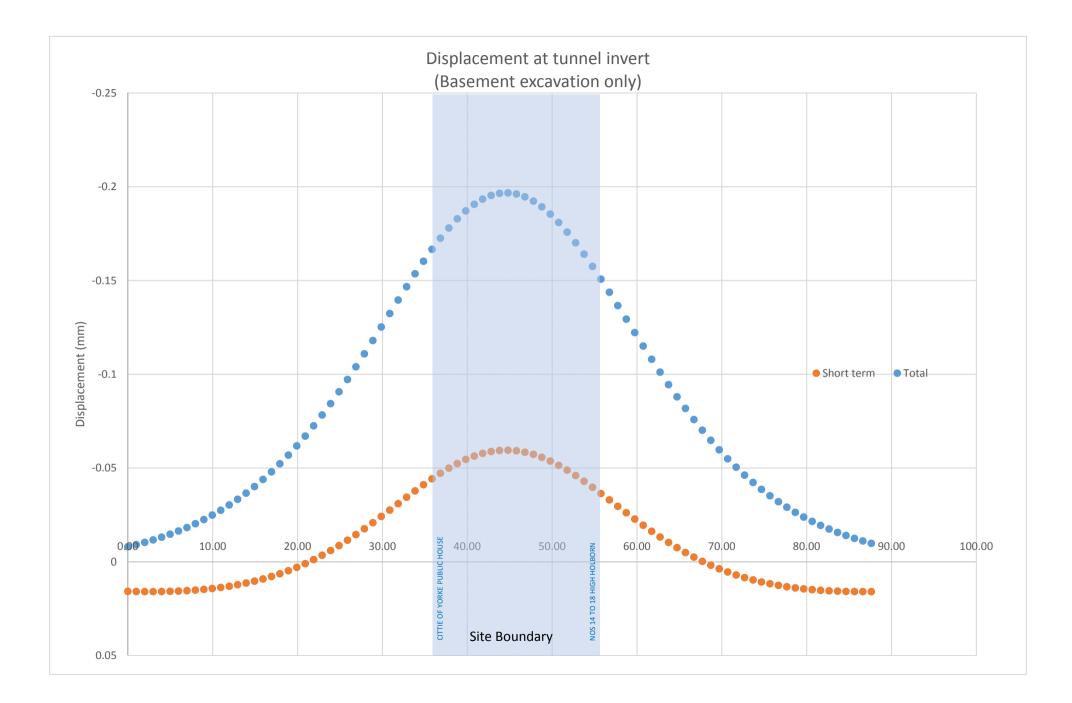
Vertical Combined Start Length Curvature Deflection Average Max. Damage Category Offset from Segment Ratio Strain Strain Strain Vertical Strain Strain Strain Movement Calculations [m] [m] [m] [%] [%] [%]

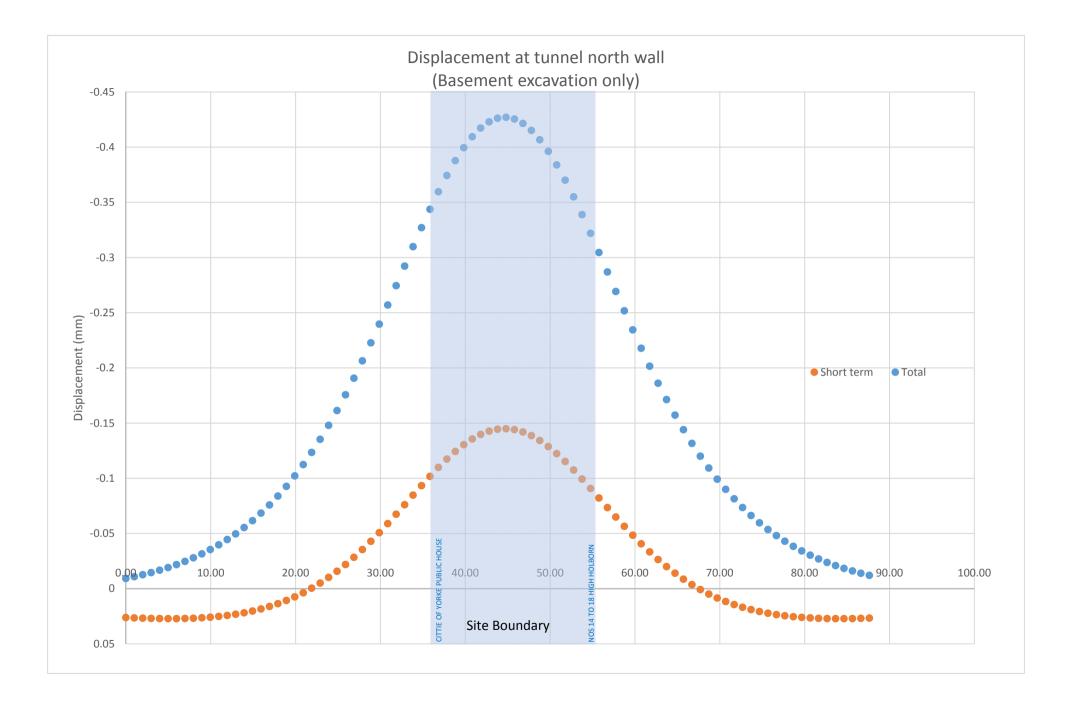


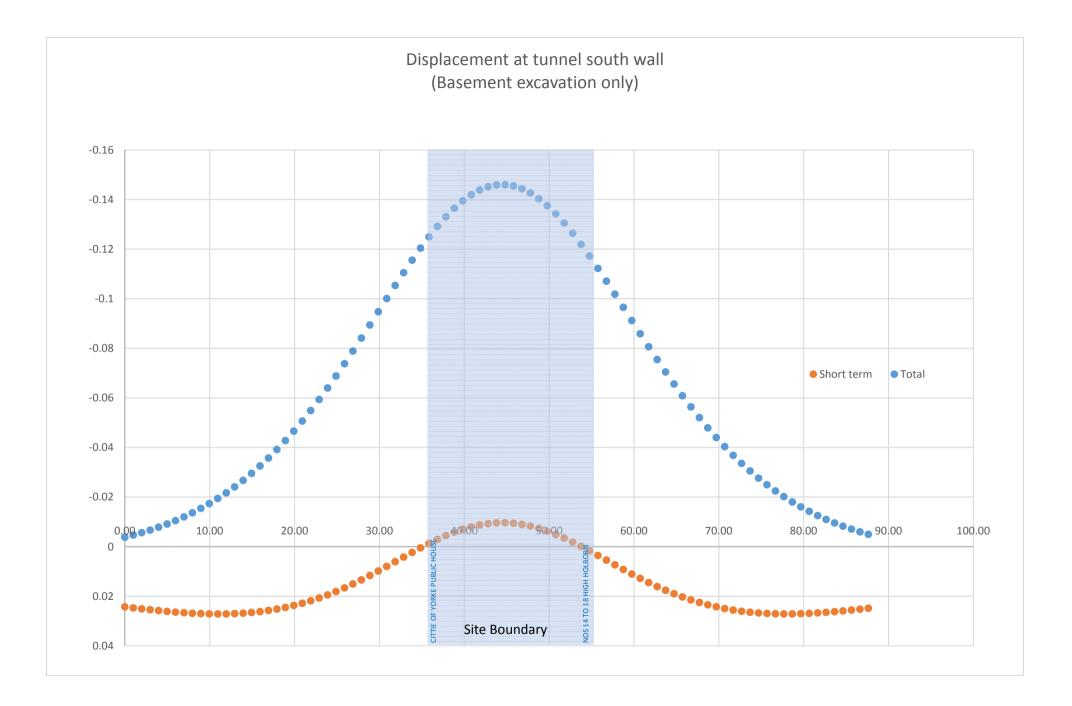


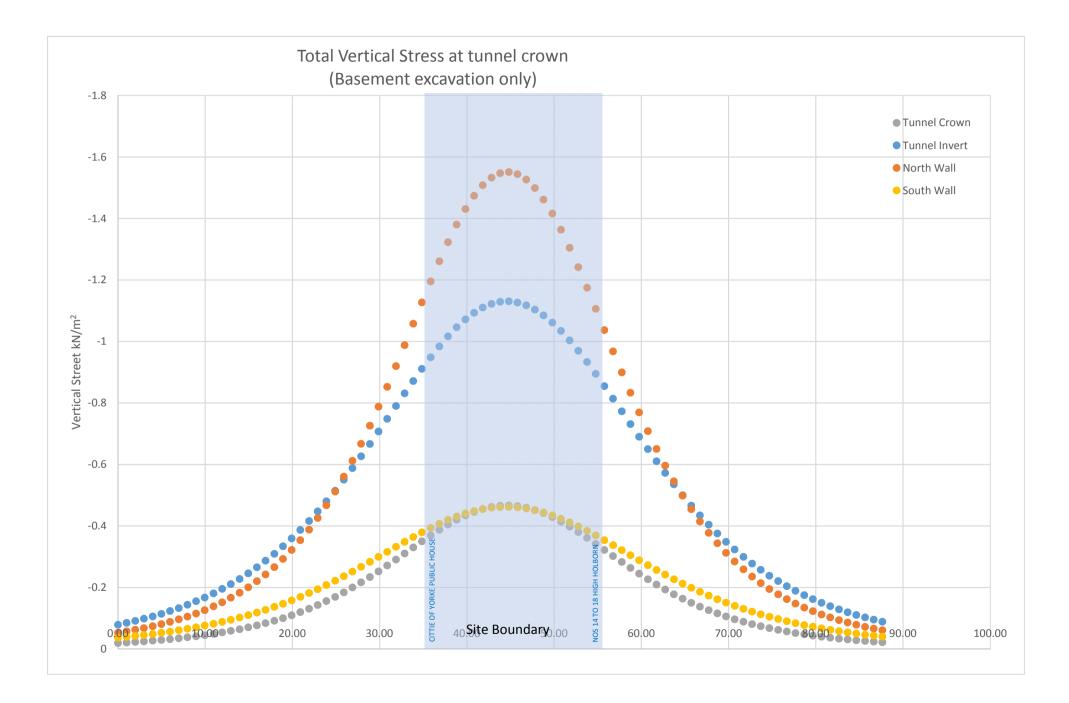


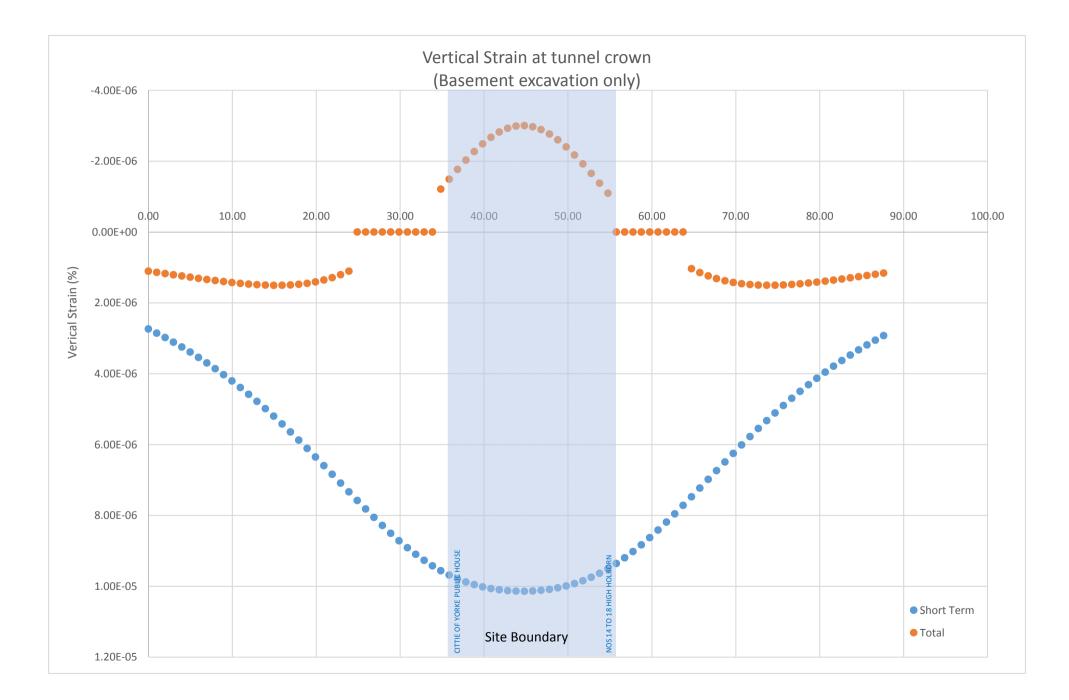


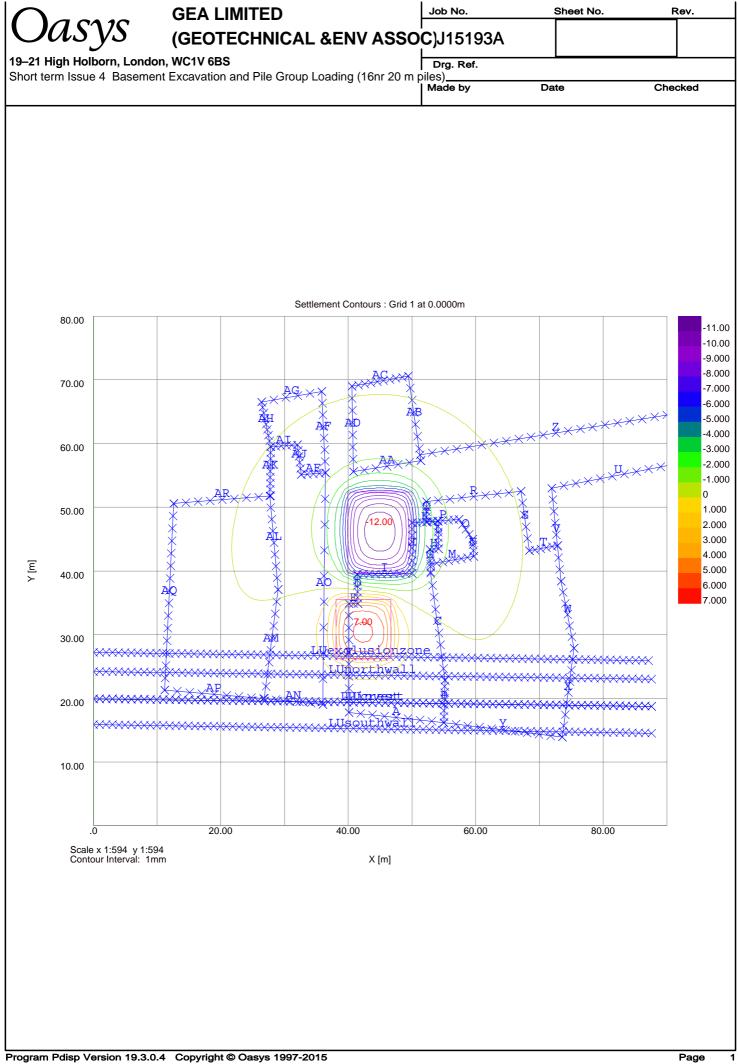


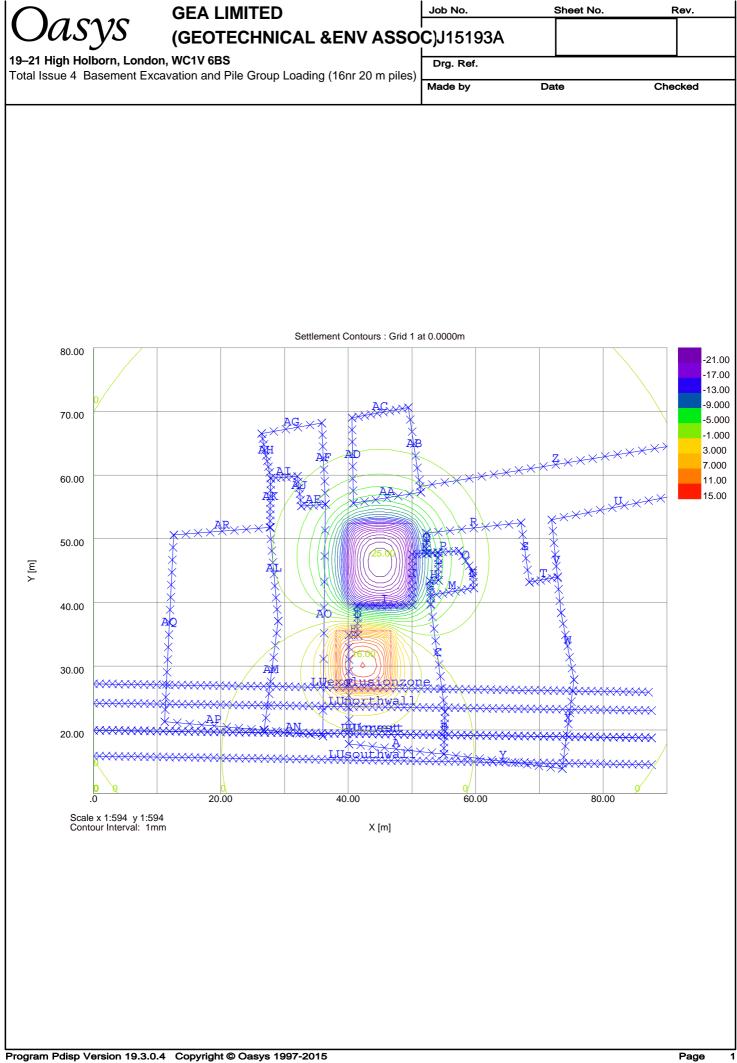


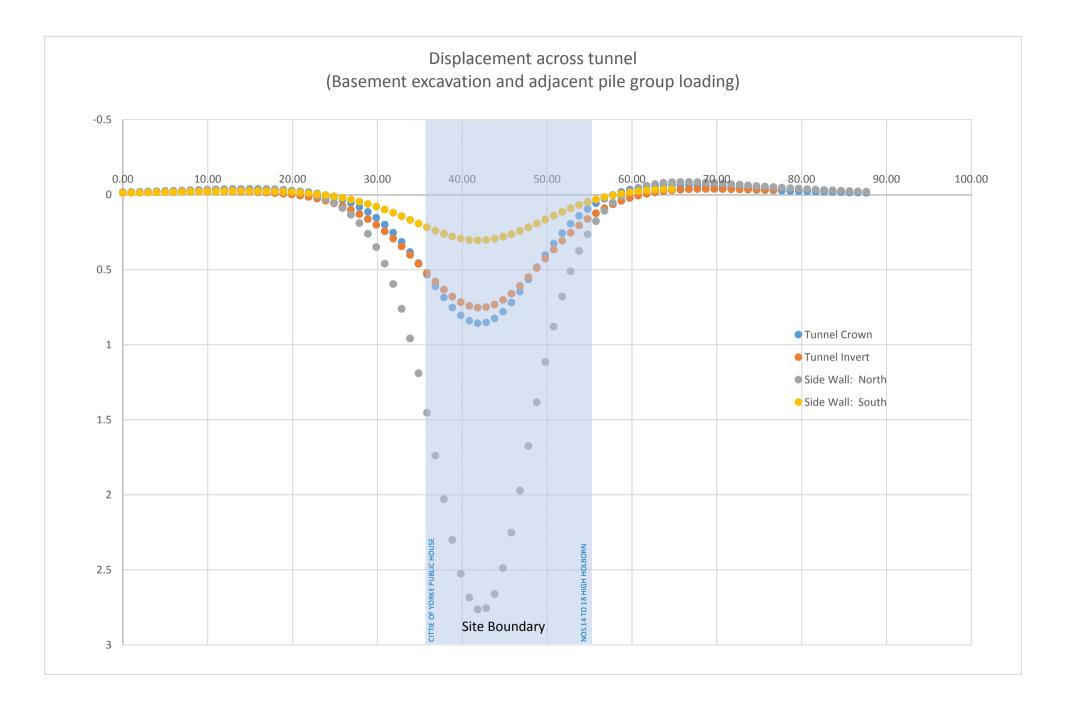


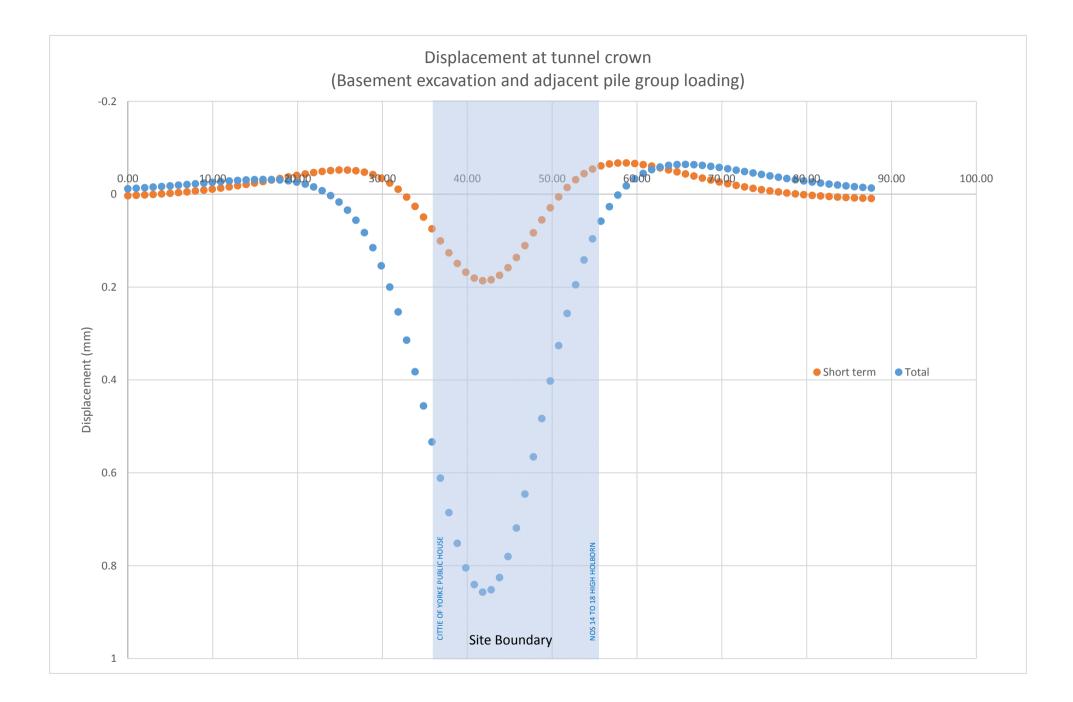


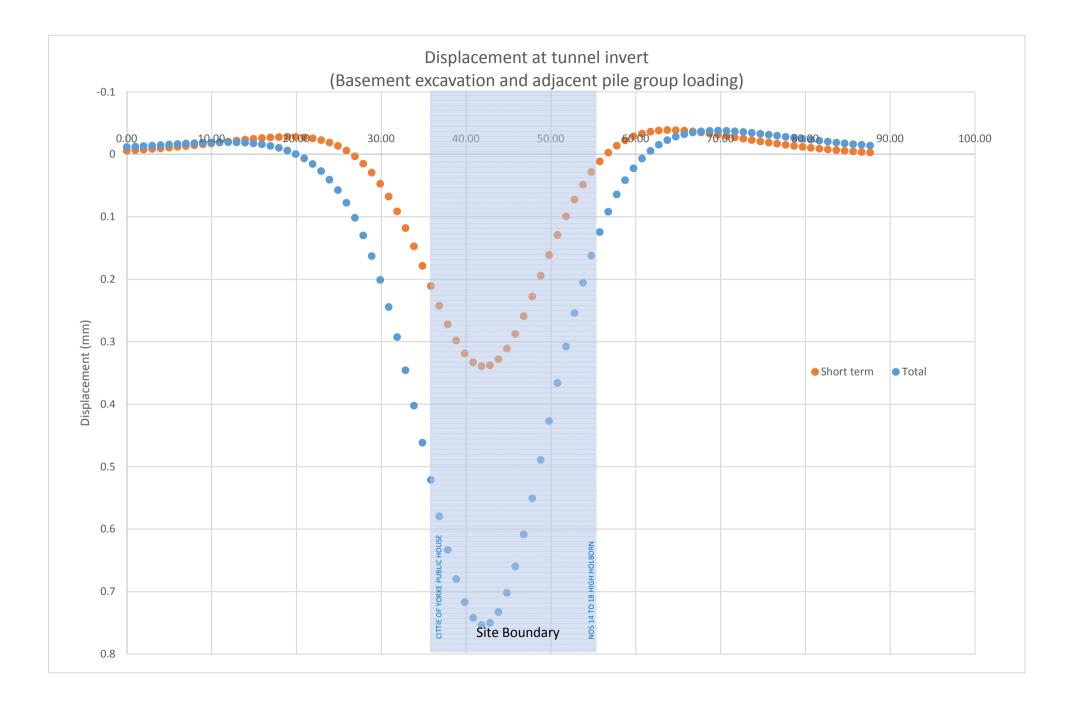


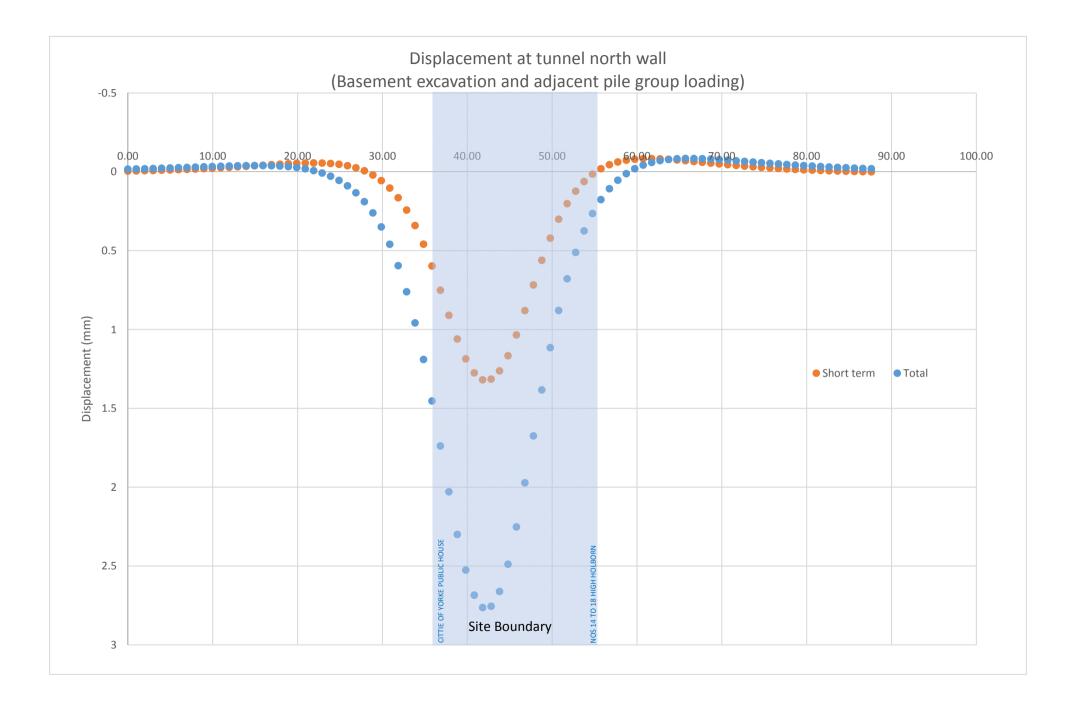


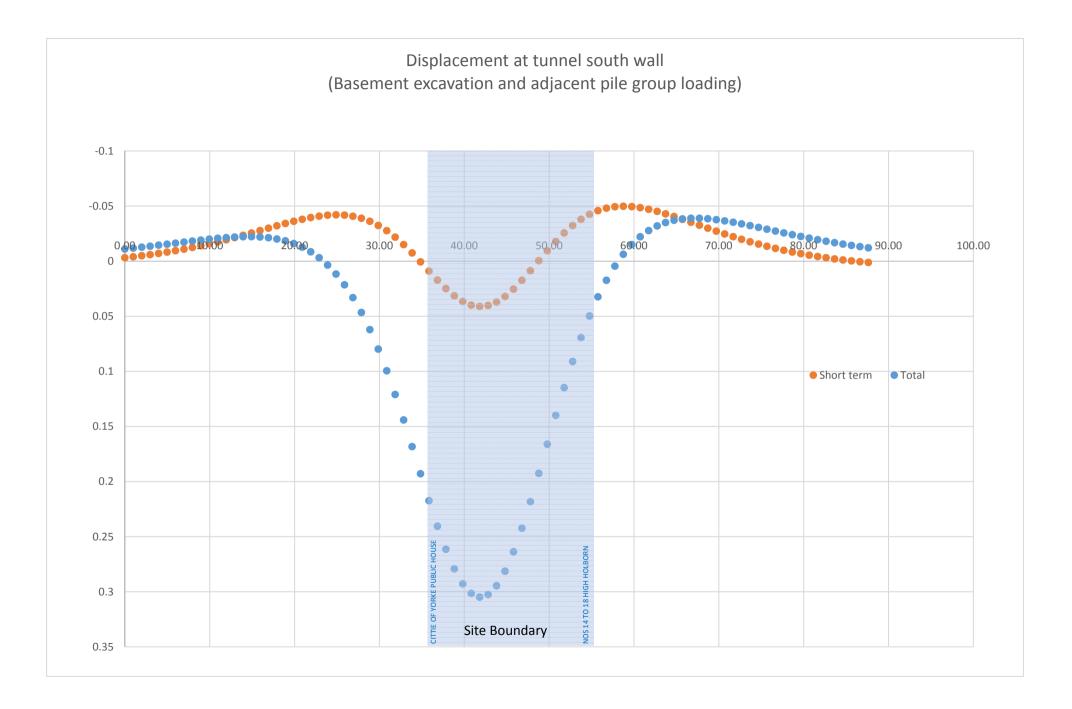


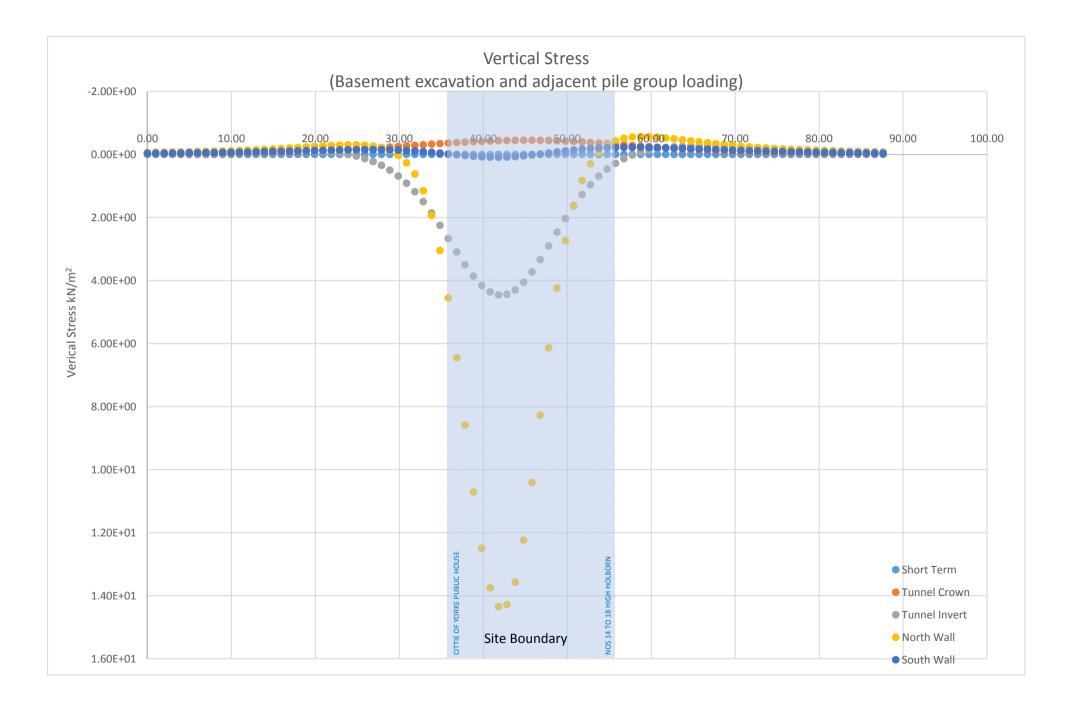


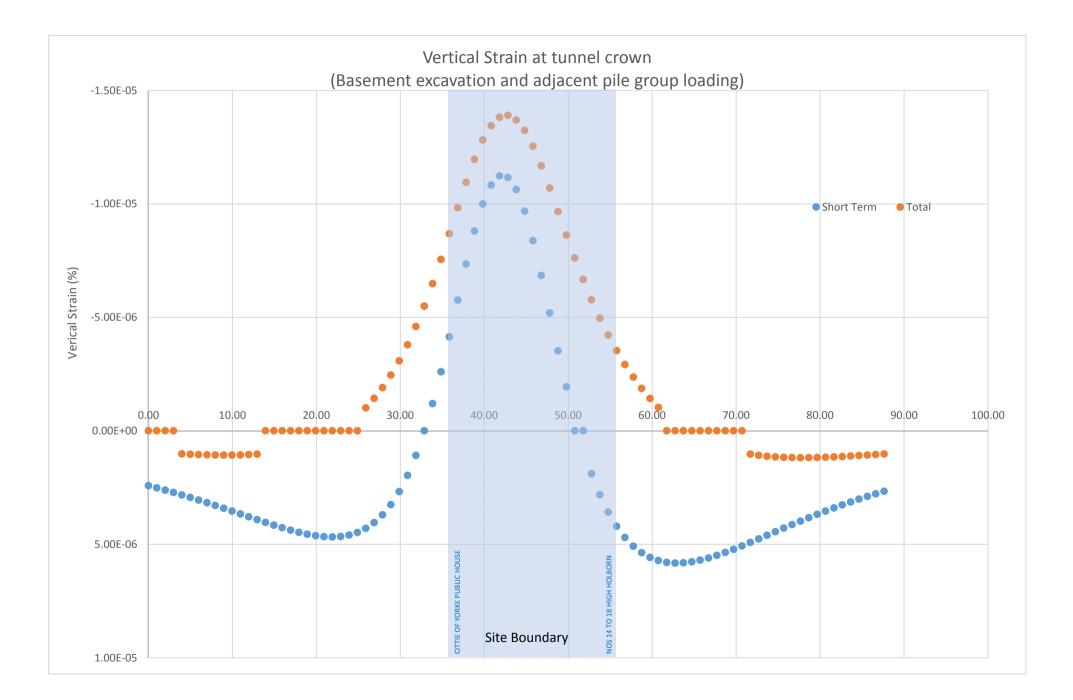












Geotechnical & Environmental Associates (GEA) is an engineer-led and clientfocused independent specialist providing a complete range of geotechnical and contaminated land investigation, analytical and consultancy services to the property and construction industries.

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where information can be found on all of the services that we offer.

