BYRNELOOBY

File note

Job Number:	8240
Reference:	8240 – FN 002
Title:	26 Netherall Gardens- Response to BIA audit
Date:	23 rd October 2019

Introduction

Sinclair Johnston Partners Ltd (now trading as Byrne Looby) prepared a revised basement impact for the proposed development at 26 Netherall Gardens. This was reviewed by Campbell Reith who prepared an Audit report ref 12985-51rev D dated June 19. Following BL's response to the seven initial queries set out in Appendix 2 of their report, a further three were raised via email. The responses to these three queries are set out below.

Email Query Responses

1 Secant wall embedment depth and assumptions for design

Initial assumptions have been based on a pile length of 7.6m for the basement and 9.6m for the rear wall, with a ratio of embedment depth to exposed length of 1:1, embedment depth is 3.8m and 4.8m respectively, as set out on section 4.1.1 of the GMA.

The design assumes the secant piled wall will be propped at the head and the base in both the temporary and permanent case. In the temporary case, the head support will be provided by temporary structural propping as indicated in Appendix C of SJP 'Design & Construction Statement', and the base will be propped by the ground as set out on section 4.1.1 of the GMA. In the permanent case, a basement box will be formed with a ground floor slab and a base slab, which provide the head and base propping respectively, as set out on section 4.1.1 of the GMA and as indicated in the structural drawings. The piles will be spanning between the props in the temporary case and working compositely with the liner wall to span the props in the permanent case.

Please refer to Appendix A of this File Note where section 4.1.1 of the revised GMA has been provided. Please refer to Appendix B where the indicative temporary works, as outlined in Appendix C of SJP 'Design & Construction Statement', have been provided.

2 Outline construction programme

To be provided by the client.

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3 Proximity of neighbouring buildings input page

GEA provided software printouts as part of the appendices in the GMA Report.

'The coordinates, levels and details for each line analysed are printed off and they reference the site plan, on the assumption that the auditor is familiar with the layout of X-Disp printouts then the information that has already been provided gives the details the auditor are asking for'

Please refer to Appendix A of this File Note where the revised GMA report has been provided with the X-Disp printouts included as part of the GMA report appendices.

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Appendix A

4.0 GROUND MOVEMENTS

An assessment of ground movements surrounding the excavation has been undertaken using the X-Disp computer program licensed from the OASYS suite of geotechnical modelling software from Arup. This program is commonly used within the ground engineering industry and is considered to be an appropriate tool for this analysis. The X-Disp program has been used to predict ground movements likely to arise from the installation of the bored piled walls and then from the subsequent excavation of the basement. For the X-Disp analysis, the soil movement relationships used for the embedded retaining walls are those taken from CIRIA report C760¹.

For the purpose of these analyses, the corners have been defined by x and y coordinates, with the x-direction having been taken as being perpendicular to Netherhall Gardens whilst the y-direction is parallel to it. Vertical movement is in the z-direction.

The full outputs of all of the stages of the analyses can be provided on request but the output movement contour plots are included within the appendix along with the input parameters and the building damage assessment.

4.1 Models Used

The construction sequence and details of the proposed foundations together with details of the adjacent buildings have all been provided by SJ&P.

4.1.1 Piling and Excavation Related Movements

The bored pile walls will be installed from the ground levels noted previously and will support the excavation in the temporary case with the permanent excavation support provided by the piled walls acting compositely with the walls and floors to form a rigid basement box. A formal pile design will be undertaken by the piling contractor in due course, along with the finalization of the excavation sequence and propping design. However, at this stage there is considered to be sufficient detail in the Sinclair Johnston documents to make certain assumptions upon which the ground movements can be based.

The wall is proposed to be a secant bored pile wall. The SJ&P drawings indicate that the piled wall will be propped at pile head level as well as at basement level in both temporary and permanent conditions and on this basis a piled wall of high stiffness in clay is considered an appropriate wall model for the analysis. Pile lengths of 7.6 m have been adopted for the basement wall, representing a ratio of embedded length to exposed length of 1:1 which is considered reasonable for a multi propped walls such as this. The rear wall piles have been taken as bearing at the same level as the basement piles (65.4 m OD) which results in these piles being 9.6 m long.

The shape of the basement means that some simplification is required to model it within the X-Disp program. Accordingly the re-entrant corner of the piled wall has been simplified in the northwestern corner to a diagonal line.

4.1.2 Basement Heave Considerations

At this site the loads imposed by the proposed building are to be supported upon a raft that bears within the London Clay. The excavation does, however cause unloading of the London Clay which in turn leads to heave and swelling due to elastic 'rebound' following stress relief in the short term and long term swelling due to the recovery of pore water pressures.



¹ Gaba, A. Hardy, S. Powrie, W. Doughty, L and Selemetas, D (2017) Embedded retaining walls – guidance for economic design CIRIA Report C760



\bigcirc	GEOTECHNICAL AND	Job No.	Sheet No.	Rev.
Oasys	ENVIRONMENTALASSOCIATES	L J15344		
26 Netherhall Gardens		Drg. Ref.		
Pile Installation		Made by MC	Date 20-Aug-2019	Checked

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Building

Stage: Stage: Name	Specific	Specific Building:	Sub-building	Vertical	Deflection	Average	Max Slope	Max	Max	Max Gradient of	Max Gradient of	Min Radius	Min Radius	Damage
Ref.	Building: Ref.	Name	Name	Offset from Line for Vertical Movement	Ratio	Horizontal Strain		Settlement	Tensile Strain	Horizontal Displacement Curve	Vertical Displacement Curve	of Curvature (Hogging)	of Curvature (Sagging)	
				[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0 Base Model	1	24 Netherhall Gardens	Front	0.0	0.0010296	0.019327	-236.65E-6	2.3032	0.020459	-307.98E-6	-236.65E-6	-	100940.	0
(2	24 Netherhall Gardens	Side	0.0	964.68E-6	-0.037104	-40.116E-6	2.5756	0.0074413	648.92E-6	-40.116E-6	78124.	18016.	0
(Negligible)	3	24 netherhall Gardens	Rear Side	0.0	0.010276	-994.41E-6	-755.86E-6	4.1634	0.0097614	223.02E-6	-755.86E-6	2923.5	-	0
	4	24 Netherhall Gardens	Rear	0.0	0.0031450	0.023023	365.87E-6	4.3267	0.026605	-294.92E-6	365.87E-6	-	8171.7	0
(Negligible)	7	28 Netherhall Gardens	Side	0.0	233.74E-6	0.0	-65.806E-6	0.35013	223.70E-6	0.0	-65.806E-6	-	151510.	0
(8	28 Netherhall Gardens	Rear	0.0	0.0	0.0	179.66E-6	0.35687	35.763E-9	0.0	179.66E-6	-	-	0
(Negligible)	9	Rear Structures	West	0.0	0.0024797	-224.10E-6	147.99E-6	2.0600	0.0028181	64.894E-6	147.99E-6	-	49962.	0
(Negligible)	10	Rear Structures	North	0.0	374.36E-6	841.20E-6	164.18E-6	1.0726	0.0013809	-49.599E-6	164.18E-6	-	141640.	0
(Negligible)	11	Rear Structures	East - North	0.0	0.0013756	0.0	-109.21E-6	0.81893	0.0020329	0.0	-109.21E-6	-	71357.	0
(27 2	12	Rear Structures	East - Mid	0.0	2.7940E-6	0.0	171.50E-6	0.80993	2.7537E-6	0.0	171.50E-6	-	4.8587E+6	0
(Negligible)	13	Rear Structures	East - South	0.0	0.0	0.0	-11.303E-6	0.65934	35.763E-9	0.0	-11.303E-6	1.1009E+18	1.4084E+18	0
(Negligible)	14	Rear Structures	South	0.0	565.95E-9	0.015099	199.66E-6	2.0500	0.015100	-209.23E-6	199.66E-6	-	48.355E+6	0







\frown	Job No.	Sheet No.	Rev.
Oasys	J15344		
26 Netherhall Gardens	Drg. Ref.		
Pile Installation and Excavation	Made by MC	Date 20-Aug-2019	Checked

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Building

Stage: Stage: Name	Specific	Specific Building:	Sub-building	Vertical	Deflection	Average	Max Slope	Max	Max	Max Gradient of	Max Gradient of	Min Radius	Min Radius Damage
Ref.	Building: Ref.	Name	Name	Offset from Line for Vertical Movement	Ratio	Horizontal Strain		Settlement	Tensile Strain	Horizontal Displacement Curve	Vertical Displacement Curve	of Curvature (Hogging)	of Curvature (Sagging)
				[m]	[%]	[%]		[mm]	[%]			[m]	[m]
0 Base Model	1	24 Netherhall Gardens	Front	0.0	0.0047024	0.064279	-590.90E-6	4.9077	0.066678	-682.60E-6	-590.90E-6	15952.	6141.0 1 (Very
	2	24 Netherhall Gardens	Side	0.0	0.012770	-0.092243	790.54E-6	5.0570	0.019863	0.0013748	790.54E-6	1128.3	4072.4 0
(Negligible)	3	24 netherhall Gardens	Rear Side	0.0	0.0091134	-0.014403	-561.99E-6	4.9552	0.0067119	538.63E-6	-561.99E-6	3141.0	- 0
	4	24 Netherhall Gardens	Rear	0.0	0.0027240	0.030459	400.55E-6	5.0793	0.030524	-337.73E-6	400.55E-6	153840.	7896.1 0
(Negligible)	7	28 Netherhall Gardens	Side	0.0	233.74E-6	0.0	-65.806E-6	0.35013	223.70E-6	0.0	-65.806E-6	-	151510. 0
(8	28 Netherhall Gardens	Rear	0.0	0.0	0.0	179.66E-6	0.35687	35.763E-9	0.0	179.66E-6	-	- 0
(Negligible)	9	Rear Structures	West	0.0	0.0020253	-49.035E-6	147.99E-6	2.2718	0.0027183	98.289E-6	147.99E-6	17.109E+6	38813. 0
(11-12-12-1-)	10	Rear Structures	North	0.0	374.36E-6	841.20E-6	164.18E-6	1.0726	0.0013809	-49.599E-6	164.18E-6	-	141640. 0
(Negligible)	11	Rear Structures	East - North	0.0	0.0013756	0.0	-109.21E-6	0.81893	0.0020329	0.0	-109.21E-6	-	71357. 0
	12	Rear Structures	East - Mid	0.0	2.7940E-6	0.0	171.50E-6	0.80993	2.7537E-6	0.0	171.50E-6	-	4.8587E+6 0
(Negligible)	13	Rear Structures	East - South	0.0	0.0	0.0	-11.303E-6	0.65934	35.763E-9	0.0	-11.303E-6	1.1009E+18	1.4084E+18 0
(Negligible)	14	Rear Structures	South	0.0	0.0015553	0.036768	301.40E-6	2.2546	0.038320	-582.68E-6	301.40E-6	14683.	48.355E+6 0

\bigcirc	Job No.	Sheet No.	Rev.
Oasys	J15344		
26 Netherhall Gardens	Drg. Ref.		
Pile Installation and Excavation	Made by MC	Date 20-Aug-2019	Checked
Titles Job No.: J15344 Job Title: 26 Netherhall Gardens sub-title: Issue 2 Calculation Heading: Pile Installation and Excavation Initials: MC Checker: Date Saved: Date Saved: 20-Aug-2019 Date Checked: Notes File Name: Xdispl Issue 2 Piling and Excavation.xdd File Path: C:\Users\MartinCooper\Desktop\Jobs\J15\Netherhall Gardens			
History			
Date Time By Notes Date 16:54 MartinCooper Notes 11-Dec-2015 06:58 MartinCooper Notes 14-Dec-2015 11:55 MartinCooper Notes 15-Dec-2015 12:45 MartinCooper Notes 15-Dec-2015 12:45 MartinCooper Notes 15-Dec-2015 12:43 MartinCooper Notes 15-Dec-2015 14:46 MartinCooper Notes 15-Dec-2015 14:45 MartinCooper Notes 10-Aug-2019 17:03 MartinCooper Notes 20-Aug-2019 17:03 MartinCooper Notes 20-Aug-2019 18:19 MartinCooper Notes 20-Aug-2019 18:19 MartinCooper Notes 20-Aug-2019 23:31 MartinCooper Notes 20-Aug-2019 23:31 MartinCooper Notes 20-Aug-2019 23:31 MartinCooper Notes			
Displacement Lines			
Kei. Name zi yi zi zi yz zz intervais catoliace surface type for tunnels			
1 Line 1 30.00000 4.70000 71.00000 14.10000 71.00000 7 Surface Yes 2 Line 2 32.0000 15.10000 71.00000 51.0000 71.00000 7 Surface Yes 3 Line 3 39.4000 14.20000 71.00000 45.0000 14.2000 71.00000 6 Surface Yes 4 Line 4 44.60000 14.2000 71.00000 4.3000 71.00000 6 Surface Yes 5 Line 5 29.0000 51.10000 71.60000 4.30000 71.00000 6 Surface Yes 6 Line 6 30.70000 51.10000 71.60000 41.90000 71.60000 5 Surface Yes 7 Line 6 30.70000 51.0000 71.60000 16.6000 16 Surface Yes 8 Line 8 34.60001 14.90000 71.60000 16 Surface Yes 9 Line 9 54.70001 14.0000 77.00000 16 Surface Yes			
Ref. Name Extrusion: Base	Calculate		
Polygonal Excavations			
Ref. 1 Excavation Name: Piling Basement Surface level [m]: 72.600 Contribution: Positive Surface movement curves which are splied between surface and [m]: 65.400			
$ \begin{array}{cccc} \mbox{Corner} & \mbox{x} & \mbox{Base} & \mbox{Arc} & \mbox{Stiffened Prev. Prev. Prev. Next} & \mbox{Next} & \mbox{Next} & \mbox{Next} & \mbox{Level Enabled} & Stide: Stide:$			
[m] [m] [m] [m] [%] [m] [%] [%] 1 28.000 16.900 65.400 Yes No - - - - 2 38.100 16.900 65.400 Yes No - - - - 3 38.100 24.500 65.400 Yes No - - - - 4 29.800 24.500 65.400 Yes No - - - - 5 28.000 20.700 65.400 Yes No - - -			
Side x1 y1 x2 y2 G.M. Curve: Vertical G.M. Curve: Horizontal [m] [m] [m] [m]			
1 28.000 16.900 38.100 16.900 Inst. of contiguous bored pile Inst. of contiguous bored pile Pile VIIA CS80 wall in stiff clay (CIRIA CS80 vall			
Ref. 2 Excavation Name: Piling half at upper level Surface level [m]: 75.000 Contribution: Positive Surface movement curves which are surface are applied between surface and [m]: 65.400			
Corner x y Base Arc Stiffened Prev. Prev. Next Next Next Level Enabled Side: Sid			
1 45.100 16.400 65.400 Yes No -			

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Oasy	<i>VS</i>	J15344		
26 Netherhall Ga	rdens	Drg. Ref.		
Issue 2 Pile Installation a	nd Excavation	Made by	Date	Checked
Side x1 y1	x2 y2 G.M. Curve: Vertical G.M. Curve: Horizontal	MC	20-Aug-2019	
[m] [m]	[m] (m]			
2 49.800 16.400	Fig. 2.8(b)) Fig. 2.8(a)) 49.800 24.800 Inst. of contiguous bored pile wall in stiff clay (CIRIA C580 wall in stiff clay (CIRIA C580			
3 49.800 24.800	Fig. 2.8(b)) 43.800 Inst. of contiguous bored pile Inst. of contiguous bored pile wall in stiff clay (CIRIA C580 wall in stiff clay (CIRIA C580			
4 43.800 24.800	Fig. 2.8(b)) Fig. 2.8(a)) 45.100 16.400 No vertical ground movement No horizontal ground movement			
Ref. Excavation Name: Surface level [m]: Contribution: Surface movement curves u selected are applied betu surface and [m]:	3 Excavation Basement 72.600 Positive which are 69.100 ween			
Corner x y Baa Leve	se Arc Stiffened Prev. Prev. Next Next Next el Enabled Side: Side: Side: Side: Side: d pl p2* d p1 p2*			
[m] [m] [m] 1 28.000 16.900 69.0] [m] [%] [%] [m] [%] [%] 000 Yes Yes 0.067.000 25.000 0.067.000 25.000			
2 38.100 16.900 69.0 3 38.100 24.500 69.0 4 29.800 24.500 69.0 5 28.000 20.700 69.0	000 Yes 0.6 67,000 25,000 0.0 67,000 25,000 000 Yes Yes 0.6 67,000 25,000 0.6 67,000 25,000 000 Yes Yes 0.6 67,000 25,000 0.0 67,000 25,000 000 Yes Yes 0.0 67,000 25,000 0.0 67,000 25,000 000 Yes Yes 0.0 67,000 25,000 0.0 67,000 25,000			
Side x1 y1 [m] [m]	x2 y2 G.M. Curve: Vertical G.M. Curve: Horizontal [m] [m]			
1 28.000 16.900	38.100 16.900 Exc. in front of high Exc. in front of high stiffness wall in stiff clay stiffness wall in stiff clay			
2 38.100 16.900	(CIRIA C580 Fig. 2.11(b)) (CIRIA C580 Fig. 2.11(a)) 38.100 24.500 Exc. in front of high stiffness wall in stiff clay stiffness wall in stiff clay			
3 38.100 24.500	29.800 24.500 Exc. in front of high stiffness wall in stiff clay (CTEN C500 Fig. 2.11(a)) (CTEN C500 Fig. 2.11(b)) (CTEN C500 Fig. 2.11(b))			
4 29.800 24.500	28.000 20.700 Exc. in front of high stiffness wall in stiff clay stiffness wall in stiff clay (CIRIA C580 Fig. 2.11(b)) (CIRIA C580 Fig. 2.11(a))			
5 28.000 20.700	28.000 16.900 Exc. in front of high Exc. in front of high stiffness wall in stiff clay (CIRIA C580 Fig. 2.11(b)) (CIRIA C580 Fig. 2.11(a))			
Ref. Excavation Name: Surface level [m]: Contribution: Surface movement curves v selected are applied betw curface and [m]:	4 Excavation of half at upper level 75.000 Positive which are 72.000 ween			
Corner x y Bas	se Arc Stiffened Prev. Prev. Next Next a) Enabled Side Side Side Side Side Side			
[m] [m] [m]	d pl p2* d pl p2*] [m] [%] [%] [m] [%] [%]			
1 45.100 16.400 72.0 2 49.800 16.400 72.0 3 49.800 24.800 72.0 4 43.800 24.800 72.0	000 Yes No - <td></td> <td></td> <td></td>			
Side xl yl [m] [m]	x2 y2 G.M. Curve: Vertical G.M. Curve: Horizontal [m] [m]			
1 45.100 16.400	49.800 16.400 Exc. in front of high Exc. in front of high stiffness wall in stiff clay stiffness wall in stiff clay (CIRIA C580 Fig. 2.11(b)) (CIRIA C580 Fig. 2.11(a))			
2 49.800 16.400	49.800 Z4.800 Exc. in front of high Exc. in front of high stiffness wall in stiff clay stiffness wall in stiff clay (CIRIA C580 Fig. 2.11(b)) (CIRIA C580 Fig. 2.11(a))			
3 49.800 24.800	43.800 Exc. in front of high Exc. in front of high stiffness wall in stiff clay (CIRIA C580 Fig. 2.11(b)) (CIRIA C580 Fig. 2.11(a))			
Circular Excavations	TILOU IN THE NO VELLERI GIUNN MOVEMENT NO NOITONERI GIUNN MOVEMENT			
Vertical Ground Movement	Curves			
Curve Name: Coordinates:	No vertical ground movement [Distance from wall / wall depth or max. excavation depth (x), Depth / wall			
	<pre>depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)]</pre>			
Curve Fitting Method: x Order:	Polynomial			
y Order: Polynomial: z = Coeff. of Determination:	0 0.0x + 0.0			
Curve Name: Coordinates:	Inst. of contiguous bored pile wall in stiff clay (CIRIA C580 Fig. 2.8(b)) [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (z)($\$$)]			
Curve Fitting Method:	[0.000,0.000,0.040][2.000,0.000,0.000] Polynomial			
x Order: y Order: Polynomial: z =	1 0 -2.0E-2x + 4.0E-2			
Curve Name: Coordinates:	Inst. of planar diaphragm wall in stiff clay (CIRIA C580 Fig. 2.9(b)) [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (x)(k)]			
	[0.000, 0.000, 0.050][0.050, 0.000, 0.047][0.100, 0.000, 0.043][0.150, 0.000, 0.040] [0.200, 0.000, 0.057][0.250, 0.000, 0.034][0.300, 0.000, 0.031][0.350, 0.000, 0.040] [0.400, 0.000, 0.025][0.450, 0.000, 0.022][0.500, 0.000, 0.020][0.550, 0.000, 0.018] [0.600, 0.000, 0.051][0.650, 0.000, 0.021][0.700, 0.000, 0.012][0.750, 0.000, 0.018] [0.600, 0.000, 0.005][0.650, 0.000, 0.013][0.700, 0.000, 0.012][0.750, 0.000, 0.005] [1.000, 0.000, 0.001][0.850, 0.000, 0.007][0.900, 0.000, 0.003][1.150, 0.000, 0.005] [1.200, 0.000, 0.004][1.250, 0.000, 0.001][1.300, 0.000, 0.003][1.150, 0.000, 0.002] [1.400, 0.000, 0.000][1.450, 0.000, 0.001][1.500, 0.000, 0.003][1.350, 0.000, 0.001]			
Curve Fitting Method: x Order: v Order:	Polynomial 4 0			
Polynomial: z = Coeff. of Determination:	- -1.2355E-2x ⁴ + 3.4814E-2x ³ - 2.8885E-3x ² - 6.5618E-2x + 4.9987E-2 1.0000			
Curve Name: Coordinates:	Exc. in front of high stiffness wall in stiff clay (CTRIA C580 Fig. 2.11(b)) [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth $(z)($ []			
	[0.000,0.000,0.039][0.100,0.000,0.049][0.200,0.000,0.056][0.300,0.000,0.062]			

Job No. Sheet No. Rev. asys J15344 26 Netherhall Gardens Dra. Ref. Issue 2 Made by Date Checked Pile Installation and Excavation 20-Aug-2019 MC Side G.M. Curve: Vertical G.M. Curve: Horizontal y1 [m] $\begin{bmatrix} 0.400, 0.000, 0.0671 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.071 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.051 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000, 0.001 \\ [0.500, 0.000] \\ [0.500, 0.000$ Curve Fitting Method: Polynomial x Order: y Order: ... Polynomial: z = $-2.6455E-3x^4 + 2.8495E-2x^3 - 1.0051E-1x^2 + 1.0569E-1x + 3.8990E-2$ Coeff. of Determination: 9.9991E-1 Horizontal Ground Movement Curves No horizontal ground movement [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (s)(%)] [0.000,0.000,0.000](1.000,1.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000] Polynomial Curve Name: Curve Fitting Method: x Order: y Order: Polynomial: z = Coeff. of Determination: 0 0 Inst. of contiguous bored pile wall in stiff clay (CIRIA C580 Fig. 2.8(a)) [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)] [0.000,.0000,.0041](0.050,0.000,0.0381](0.100,0.000,0.036][0.150,0.000,0.034] [0.200,0.000,0.025](0.450,0.000,0.023][0.300,0.000,0.025][0.350,0.000,0.020] [0.400,0.000,0.025](0.450,0.000,0.023][0.500,0.000,0.020] [0.600,0.000,0.025][0.550,0.000,0.023][0.500,0.000,0.021] [0.600,0.000,0.014][0.550,0.000,0.013][0.900,0.000,0.016][1.950,0.000,0.010] [1.200,0.000,0.025][1.450,0.000,0.004][1.300,0.000,0.001][1.50,0.000,0.003] [1.200,0.000,0.025][1.450,0.000,0.001][1.500,0.000,0.000] Polynomial Curve Name: Coordinates: Curve Fitting Method: x Order: y Order: Polynomial: z = $-4.2486E-3x^3 + 1.9096E-2x^2 - 4.6221E-2x + 4.0729E-2$ Coeff. of Determination: 1.0000 Inst. of planar diaphragm wall in stiff clay (CIRIA C580 Fig. 2.9(a)) Curve Name: Coordinates: Inst. of plana lighting wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max excavation depth (x)(%) [0.000,0.000,0.050][1.500,0.000,0.000] Polynomial Curve Fitting Method: x Order: 1 y Order: 0 Polynomial: z = -3.33E-2x + 5.00E-2 Coeff. of Determination: 1.00 Exc. in front of high stiffness wall in stiff clay (CIRIA C580 Fig. 2.11(a)) [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z) (%)] [0.000, 0.000, 0.150][4.000, 0.000, 0.000] Polynomial Curve Name: Coordinates: Curve Fitting Method: x Order: 1 y Order: 0 Polynomial: z = -3.75E-2x + 1.50E-1 Coeff. of Determination: 1.00 Damage Category Strains Ref. Name 0 (Negligible) 1 (Very Slight) 2 (Slight) 3 (Moderate) to to to to 1 (Very Slight) 2 (Slight) 3 (Moderate) 4 (Severe) 1 Burland Strain Limits 0.0 500.00E-6 750.00E-6 0.0015000 Specific Buildings - Geometry Sub-Building Displacement Distance Distance Name Line Along Along Line: Line: Vertical Vertical Offsets from Displacemen Line for Ref. Building Name Damage Category Strains Poisson's E/G Ratio nt Vertical Limit Sensitivity Start End Movement Calculations [m] [m] [m] [mm] 0.0 0.10000 Burland Strain Limits 0.0 0.0000 Burland 0.0000 Burland 0.0000 Burland 0.0000 1 24 Netherhall Gardens Front 2 24 Netherhall Gardens Side 3 24 netherhall Gardens Rear Side 4 24 Netherhall Gardens Rear 5 28 Netherhall Gardens Front North 6 28 Netherhall Gardens Side 8 28 Netherhall Gardens Side 8 28 Netherhall Gardens Side 9 Rear Structures West 10 Rear Structures Korth 11 Rear Structures East - North Line 1 Line 2 Line 3 Line 4 Line 5 Line 6 Line 7 Line 8 Line 9 Line 10 Line 11 0.00000 0.00000 0.00000 9.30000 7.10000 5.00000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 9.80000 6.00000 9.15000 .00000 .15000 .20000 .30000 .55000 .70000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 0.20000 2.6000 15 15 5 10 Rear Structures North 11 Rear Structures East 12 Rear Structures East 13 Rear Structures East 14 Rear Structures South 0.0 0.10000 Burland Strain Limits East - North East - Mid East - South Line 10 Line 11 Line 12 Line 13 Line 14 0.00000 0.00000 0.00000 0.20000 0.00000 1.10000 0.00000 5.25000 0.00000 6.85000 0.20000 2.6000 0.20000 2.6000 Specific Buildings - Bending Parameters Ref. Building Name Sub-Building Height Default Hogging: Hogging: Hogging: Sagging: Sagging: Sagging: Dist. of N.A. from Edge of Beam in Dist. of Dist. of Bending N.A. from Strain Edge of from N.A. Beam in 2nd Mom. of Area (per unit Dist. of Bending Strain from N.A. 2nd Mom. of Area (per unit width) width) Tension [m] Tension [m] [m] [m³] [m] [m³] [m] 11.000 Yes 11.000 Yes 11.000 Yes 11.000 Yes 9.0000 Yes 9.0000 Yes 4.0000 Yes 4.0000 Yes 4.0000 Yes 4.0000 Yes 4.0000 Yes 1 24 Netherhall Gardens Front 2 24 Netherhall Gardens Side 3 24 netherhall Gardens Rear Side 4 24 Netherhall Gardens Rear 5 28 Netherhall Gardens Front North 6 28 Netherhall Gardens Side 8 28 Netherhall Gardens Side 8 28 Netherhall Gardens Side 443.67 443.67 443.67 443.67 443.67 243.00 243.00 11.000 11.000 11.000 11.000 11.000 5.5000 5.5000 5.5000 5.5000 5.5000 11.000 11.000 11.000 11.000 11.000 110.92 110.92 5.5000 110.92 110.92 110.92 5.5000 5.5000 5.5000 11.000 9.0000 9.0000 4.0000 4.0000 4.0000 4.0000 4.5000 4.5000 4.5000 2.0000 2.0000 2.0000 2.0000 2.0000 60.750 60.750 60.750 4.5000 4.5000 4.5000 9.0000 9.0000 9.0000 4.0000 4.0000 4.0000 4.0000 ardens Side ardens Rear West North East - North East - Mid Fast - South 9.0000 9.0000 4.0000 4.0000 4.0000 4.0000 243.00 5.3333 5.3333 5.3333 5.3333 5.3333 4.5000 2.0000 2.0000 2.0000 2.0000 9 Rear Structures 10 Rear Structures 11 Rear Structures 12 Rear Structures 21.333 21.333 21.333 21.333 21.333

Yes

21.333 21.333

4.0000

5.3333

4.0000

2.0000

2.0000

South

East -

13 Rear Structures 14 Rear Structures



File note

BYRNELOOBY

Appendix B







